Published in final edited form as:

Health Place. 2010 November ; 16(6): 1113–1123. doi:10.1016/j.healthplace.2010.07.002.

Beyond Individual Neighborhoods: A Geography of Opportunity Perspective for Understanding Racial/Ethnic Health Disparities

Theresa L. Osypuk, SD SM [Assistant Professor]¹ and Dolores Acevedo-Garcia, PhD, MA-URP [Associate Professor]²

¹Northeastern University, Bouve College of Health Science, Department of Health Science, 360 Huntington Avenue, Robinson 316, Boston, MA 02115 tosyuk@neu.edu, ph: 617-373-3667, fax: 617-373-2968

²Northeastern University, Bouve College of Health Science, Department of Health Science and Institute for Urban Health Research, 360 Huntington Avenue, International Village 3rd Floor, Boston, MA 02115 d.acevedogarcia@neu.edu

Abstract

There has been insufficient attention to how and why place and neighborhood context contribute to racial/ethnic health disparities, as well as to policies that can eliminate racial/ethnic health disparities. This article uses a geography of opportunity framework to highlight methodological issues specific for quantitative research examining neighborhoods and racial/ethnic health disparities, including study design, measurement, causation, interpretation, and implications for policy. We argue that failure to consider regional, racialized housing market processes given high US racial residential segregation may introduce bias, restrict generalizability, and/or limit the policy relevance of study findings. We conclude that policies must address the larger geography of opportunity within the region in addition to improving deprived neighborhoods.

Keywords

neighborhood; race/ethnicity; health disparities; bias; policy

Increasing attention has been paid to the large and persistent U.S. racial/ethnic health disparities (U.S. DHHS, 2000). However, we contend there has been insufficient attention to the role of neighborhood context in generating racial/ethnic health disparities in the US. Specifically, in health research, neighborhoods have been studied primarily in isolation from sorting (i.e. residential segregation) processes that result in substantially different distributions of neighborhood context for minorities and whites. Such neighborhood-focused research examines health without attention to the larger context within which neighborhood and moving decisions are made – within regional housing markets, which operate differentially along racial/ethnic lines (Massey and Denton, 1993), and result in a racial/ethnically unequal geography of opportunity (Briggs, 2005; Galster and Killen, 1995; Squires and Kubrin, 2006). Failure to

© 2010 Elsevier Ltd. All rights reserved.

A preliminary version of this manuscript was presented at the annual Society for Epidemiologic Research meeting in June 2008.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

consider the larger housing market in racial/ethnic disparity studies may introduce several types of bias, or limit the policy relevance of the study findings.

High racial residential segregation (hereafter: segregation) is a central feature of American inequality, and has been deemed a fundamental cause of racial health disparities (Acevedo-Garcia et al., 2008; Williams and Collins, 2001). Segregation generates inequalities in neighborhood resources, services, and contexts considered salubrious (e.g. school quality, safety, healthy food access, social networks, proximity to employment) which we will hereafter call “neighborhood opportunity” (Ihlanfeldt, 1999; Massey, 2001). These racial processes may be so severe in the US that they compromise our ability to disentangle the effects of “race” on health from effects mediated by neighborhoods. While these phenomena are sometimes studied directly, they are also often regarded as a methodological “nuisance” in neighborhoods research (Sampson, 2008), making isolated causal inferences regarding neighborhood effects and/or racial/ethnic disparities more challenging. We argue that the methodological difficulty arises precisely because racial segregation and discrimination/racism processes are such profound features of racial inequality in America, and therefore must be taken into account when understanding how place contributes to racial/ethnic health disparities.

In urban studies and sociology, neighborhood inequality is analyzed in a regional (metropolitan) framework, and linked to processes of racial discrimination (e.g. in housing) that operate across the entire region, resulting in differential access to neighborhood resources by race/ethnicity (Massey and Denton, 1993; O’Connor, 2001). For instance, the segregation literature has analyzed patterns in the vastly different racial composition of neighborhoods across metropolitan America (Massey and Denton, 1988). More recently, a geography of opportunity school has focused not on racial composition, but on documenting the variation in neighborhood resources across regions. The central premise of a geography of opportunity framework is that residents of a metropolitan area are situated within a context of neighborhood-based opportunities that shape their quality of life (Briggs, 2005; powell, 2005b). However, this approach is not racially neutral since distributions of neighborhood opportunity can then be mapped onto distributions of racial composition, which consistently shows large racial/ethnic disparities in access to neighborhoods of high opportunity (Pastor, 2001). In sum, both the segregation and geography of opportunity approaches use a regional perspective, which implies examining the entire distribution of neighborhoods across geographically defined markets (e.g. housing and labor markets) that underlie neighborhood inequality, while also acknowledging racialized processes in housing and labor markets that produce racial disparities in neighborhood environments. In contrast, the neighborhood effects literature treats neighborhoods in isolation from this larger context.

Substantively, decontextualizing neighborhoods results from ignoring processes of racial stratification, but in turn it also has methodological implications that limit the utility of neighborhood effects research for estimating health disparities.

We argue that a failure to adopt a regional approach with explicit attention to the racial patterns of the geography of opportunity, given such high racial segregation, has implications for the design, measurement, analyses, and policy relevance of research studies conducted on neighborhood health effects. There has been some discussion highlighting the limitations of neighborhood-health effects literature (and of observational neighborhood studies) for estimating causal effects (Diez Roux, 2004; Oakes, 2004, 2006; Sampson et al., 2002). And while important, this research has not necessarily taken into account the underlying unequal geography of opportunity that is so stark across American regions. Moreover, there are methodological issues in neighborhood effects research, *in addition to threats to internal validity*, that are particularly relevant for the study of *health disparities*, which we believe have not been adequately discussed elsewhere. Such issues include (1) the implications of

neighborhood *study designs* for health disparities (central city vs. regional sampling frames) which may impact selection bias, generalizability, or biased racial disparity estimation; (2) the implications of racial stereotyping and residential segregation for valid *measurement* of neighborhood conditions; (3) the importance of institutional, in addition to interpersonal, racism for *interpreting* neighborhood-health research (including differential policy relevance and counteracting effects of different racism forms), and (4) the *policy relevance* of focusing on individual neighborhoods, which result in favoring place-based solutions over regional policy solutions.

1. Residential segregation and study design: the limitations of central city sampling frames

Incorporating a regional (e.g. metropolitan) approach into study design may be necessary for understanding racial health disparities because inequality operates across a regional context, not in a neighborhood context. Metropolitan areas (MAs) or regions are defined based on a core area with a large population nucleus (e.g. central city), in combination with adjacent communities that have a high degree of economic and social integration with that core (e.g. suburban areas) (U.S. Census Bureau, 2008). MAs are larger than cities (and usually counties), and they are a conceptually relevant geographic unit for racial health inequality and neighborhood research because they approximate racially-segmented housing and labor markets (Jargowsky, 2003).

Yet the sampling frames of many extant multilevel neighborhood-health studies or studies including neighborhood components (including Project on Human Development in Chicago Neighborhoods (Sampson et al., 1997); Detroit Neighborhood Health Study (Galea, 2009); Baltimore Memory Study (Schwartz et al., 2004); New York Social Environment Study (Ahern et al., 2008); Three-City Study of Welfare Reform (Chase-Lansdale et al., 2003); Fragile Families and Child Wellbeing Study (Hale et al., 2009)), may misestimate racial/ethnic health disparities and/or neighborhood contributions to health disparities, by sampling primarily or exclusively from central cities, instead of using regional sampling frames. Notably, many of these aforementioned studies were not designed to estimate racial health disparities, or to estimate neighborhoods' contribution to health disparities; they were designed to examine (and have contributed to our understanding of) the main effects of neighborhoods on health. However, sampling only from central city areas may limit generalizability of estimates for one or more racial/ethnic groups, and additionally it may exhibit confounding or introduce selection bias¹ into neighborhood-health and/or racial disparity estimates (Acevedo-Garcia and Osypuk, 2008b).

Related, although research has advanced our understanding of the physical and social environment within the central city that may affect health, our understanding of suburban neighborhood attributes, and their health effects, remains scant. Furthermore, we lack studies that examine how racial differences in the entire distribution of neighborhood opportunity may result in racial differences in population health. As discussed further below, since housing and urban inequality scholars agree that regional approaches may be necessary to address some of the root causes of housing and neighborhood inequalities, city-based neighborhood studies are limited for informing policy solutions that address inequalities from a regional perspective.

¹We use the term "selection bias" as epidemiologists do, to denote systematic error arising from the manner in which subjects are selected into a study (Kleinbaum et al. 2007; Glymour 2006); we use the term "confounding" to denote what social scientists call "selection bias" or omitted-variable bias, meaning uncontrolled variables that are common causes of both neighborhood of residence, and the health outcome under study.

There may be several methodological implications of city-based neighborhood studies. Analyzing neighborhoods *only* in large cities excludes suburban neighborhoods, where whites and higher socioeconomic status (SES) residents disproportionately live, and where two-thirds of the metropolitan-dwelling population lives. For example, Table 1 shows that 32% of the population, 56% of blacks vs. 24% of non-hispanic whites, and 51% of the poor vs. 30% of the non-poor live in the central city within metropolitan area (MAs). The racial disparities in residence are more pronounced in highly segregated MAs, within racial-SES subgroups; 84% of all blacks, and 91% of poor blacks in the five most highly-segregated metros live in the central city, compared to 34% of all whites and 57% of poor whites. (Authors' calculations, Census 2000 data). Central city neighborhood studies may therefore bias estimates of racial/ethnic disparity towards the null, due to distribution truncation (Cook et al., 1997; Osypuk and Galea, 2007).

Exclusion of suburban areas may introduce a form of selection bias (Glymour, 2006) into studies examining neighborhood phenomena, since people have been selected into a central-city sample based on residence in the central city, which is differential by race, and related to racialized housing market processes such as housing discrimination by real estate professionals, zoning restrictions, and avoidance of black neighborhoods (Acevedo-Garcia and Osypuk, 2008a; Farley et al., 1997). These racialized processes determining central city vs. suburban residence may also be most pronounced in highly segregated MAs (Ellen, 1999; Farley et al., 1997; Rothwell and Massey, 2009).

Focusing only on central city areas, especially in highly-segregated metros, also limits generalizability. The blacks living in central cities of the 5 highest segregation MAs comprise 13% of the entire US black population (Table 1). Therefore, although estimates produced for blacks may be quite representative of US blacks (at least based on sheer size of the population) when derived from studies in these cities, *racial health disparity estimates* derived from neighborhood studies in central cities of high segregation regions like Detroit, Chicago or New York (e.g. (Morenoff et al., 2007; Rosenbaum, 2008)) may have low generalizability since the estimates drawn from whites may not be representative, given that only 2% of US whites live in the central cities of these 5 metros.

2. Residential segregation and analysis: estimation of causal effects given non-overlapping distributions and limited exchangeability

In addition to emphasizing a regional approach (i.e. to improve neighborhood study sampling frames), a geography of opportunity perspective emphasizes a distributional approach, with attention to racial differences. With respect to neighborhoods, this means examining racial disparities in the entire range of neighborhood environments in a region, in lieu of focusing on simply the average or on most disadvantaged neighborhoods. Residential segregation may inhibit causal inference of neighborhoods for health disparities, given that distributions of neighborhood opportunity may not overlap among racial groups, or that racial/ethnic groups may not be exchangeable due to racialized housing market processes, or other race-related differences.

Segregation in the US is very high between blacks and whites, while moderate but increasing between Hispanics and whites (Iceland et al., 2002). Separate also remains highly unequal with respect to neighborhood environment. The entire distribution of neighborhood opportunity is shifted in a substantially worse direction for minorities vs. whites, indicating racially separate neighborhood universes – a pattern which is strongly correlated with racial/ethnic segregation (Acevedo-Garcia et al., 2008; Osypuk et al., 2009b). Therefore not only do minority groups and whites live in separate, i.e. non-overlapping, *actual* neighborhoods, but minority groups and whites live in entirely separate, non-overlapping *types* of neighborhoods.

The social reality of such high segregation complicates quantitative analyses of neighborhoods' contribution to racial health disparities. Segregation implies that individuals are not assigned to neighborhoods randomly, which severely limits our ability to establish causal relationships between the treatment of interest (neighborhood environment) and health in observational studies (Acevedo-Garcia and Osypuk, 2008b). In highly segregated metropolitan areas, by definition, distributions of neighborhood racial/ethnic composition are nonoverlapping for whites and minorities, a type of confounding by social stratification (Oakes, 2006). For example, in areas such as Chicago or Detroit, we may not observe the neighborhood counterfactual for a certain racial/ethnic group, such as blacks living in high % white neighborhoods or in high-opportunity neighborhoods, because the counterfactual exists only in a very limited way. Such neighborhood studies risk violating assumptions of overlap (a.k.a. positivity) and exchangeability (the absence of confounding), which are essential for causal inference (Diez Roux, 2004; Oakes, 2006; Sampson, 2008; Sampson et al., 2002). Therefore neighborhood studies modeling racial disparities using combined (non-race-stratified) models in high segregation regions may trade off solutions to satisfy the overlap assumption (e.g. creating wider neighborhood-variable categories to ensure that whites and minorities fall within each group (Sampson et al., 2008)) with solutions to satisfy the exchangeability assumption (e.g. creating narrower categories/linear specification which reduce confounding but may lead to off-support inference at the ends of the distribution for each racial group). The overlap problem is not solved by improved sampling, since comparable populations may not exist (Oakes, 2006). There are several potential solutions to the overlap problem that may aid estimation of neighborhood's contribution to racial disparities using observational data: stratifying, examining multiethnic neighborhoods, or conducting studies in low-segregation metropolitan regions. However, all these potential solutions have limitations.

A common, appropriate solution to analyzing data with limited racial/ethnic overlap is to stratify neighborhood analyses by race (e.g. (Messer et al., 2006; Osypuk et al., 2009a)). Yet stratification limits comparability of neighborhood effect estimates across models, therefore inhibiting estimation of racial/ethnic health disparities.

Another potential solution to overcome the limited overlap issue is to use low segregation MAs, since racial/neighborhood overlap is greater in these areas (e.g. (Li et al., 2009) in Portland, OR region). However, for racial/ethnic minorities the distribution of neighborhood opportunity is shifted in a much better direction in low-segregated metropolitan areas, compared to high-segregated areas (Osypuk et al., 2009b), thus truncating the worst part of the neighborhood quality distribution from examination. Moreover, the truncation is unequal by race. First, blacks are disproportionately likely to live in high (vs. low) segregation MAs. For example, among MA residents, 69% of non-Hispanic (NH) blacks vs. 53% of NH whites live in high-segregation regions (Table 2). Second, blacks are disproportionately likely to live in high poverty neighborhoods (tracts >20% poverty): 45% of blacks vs. 10% of whites. Third, extremely-high-poverty neighborhoods are located disproportionately in high-segregation metros. For example, 64% of tracts over 40% poverty are located in high (vs. low) segregation MAs (not shown). A focus on low-segregation metro areas may also limit generalizability of white-black racial disparity studies, since the majority of US blacks (59%) live in highly segregated MAs (Table 2), although only a minority of US whites live there (41%). Residential segregation may also modify effects of neighborhoods on health, such that neighborhoods have stronger health effects in high segregation areas. If so, researchers sampling low segregation areas will be testing for neighborhood effects where neighborhoods are not as influential.

Another approach to improve internal validity of estimates of neighborhood effects and health disparities would be to restrict analyses to neighborhoods where minorities and whites live together within a given MA – in other words, choosing multiethnic neighborhoods for sampling frames and excluding predominantly one-race neighborhoods (e.g. (Mojtahedi et al., 2008)).

However, while improving internal validity, this again restricts generalizability of study findings, with imbalances by racial group. For example, only 17% of tracts and 18% of the US population would fall into a multiethnic neighborhood categorized as 33-67% NH white. Moreover, blacks are much more likely to live in multiethnic neighborhoods (28% of blacks vs. 13% of whites in the US), and blacks are much more likely to live in multiethnic neighborhoods in low-segregation MAs (36% of blacks) vs. high-segregation MAs (20%) (Table 2).

The limited generalizability of multiethnic neighborhoods is suggested by Figure 1, which presents the continuous distribution of neighborhood (tract) % NH-white, for white, black and Hispanic populations. The majority of whites live in high % white neighborhoods, and the majority of blacks and Hispanics live in low % white neighborhoods. All groups have limited proportions in the central portion of the graph (multiethnic neighborhoods). Aside from generalizability, neighborhood studies in low-segregation MAs or multiethnic neighborhoods may also bias estimates of neighborhood effects or racial/ethnic disparities towards the null, since part of the neighborhood distribution is truncated in low segregation or multiethnic neighborhoods, and curtailed variation leads to downward-biased estimates (Cook et al., 1997).

Although overlap would improve by examining multiethnic neighborhoods, this does not address the issue of exchangeability between racial groups. For example, surveys show that willingness and motivation to live in multiethnic neighborhoods is differential by race (Charles, 2001; Farley et al., 1997). If neighborhood of residence is caused by race or racialized processes, then comparing different racial groups in the same neighborhood could induce bias by conditioning on a collider (in causal language)(Glymour, 2006), resulting in understating racial disparities. Separating out why different people live in specific neighborhoods (confounding by individual factors, or migration-related selection), from the effects of those neighborhoods (causation), may be the most challenging issue facing neighborhood casual inference research (Oakes, 2004; Sampson et al., 2002), and these issues may be especially difficult with respect to exchangeability of different racial groups.

Maximizing internal validity, including meeting overlap and exchangeability assumptions and avoiding epidemiologic selection bias, is important for estimating causal effects of neighborhood environment. However as we have discussed, to improve internal validity compromises external validity – a common issue in quantitative research. It may be that health disparity research should primarily seek to achieve generalizability, since some have argued that internal validity is unattainable as race/ethnicity may not be modeled as a causal variable given the untenable counterfactual of experiencing life as a member of a different racial/ethnic group (Kaufman and Cooper, 2001). Moreover, descriptive health disparity research may be a powerful tool to monitor disparities and marshal additional resources to address them. Lastly, upstream contextual (i.e. racialized) processes in the operation of housing markets, limiting neighborhood choices for minorities, may be especially important for understanding racial health disparities. But estimating causal relationships of these upstream factors is difficult, as epidemiologic methods are well suited for estimating proximal causal effects but are limited for estimating distal causal effects (Schwartz and Diez Roux, 2001).

3. Residential segregation and measurement of subjectively perceived neighborhood characteristics: effects of racial stereotyping

In addition to the implications of the design and causal inference of neighborhood studies for understanding racial health disparities, measurement of neighborhood constructs is a third methodological issue that is influenced by segregation and its effects (racism and racial stereotyping). These methodological issues are highlighted in a geography of opportunity

perspective, which calls attention to the continuing significance of race in patterning neighborhood outcomes (Briggs, 2005; powell and Graham, 2002; Squires and Kubrin, 2006). The limited racial/ethnic overlap in neighborhoods, combined with the impact of race-based stereotypes, may influence the utility of subjective assessments of neighborhood environment, which are commonly used in neighborhood effects research.

Research using methodological advancements like Ecometrics (Raudenbush and Sampson, 1999) suggests that subjective reports of neighborhood context may augment administrative data to improve measurement of neighborhood context, especially for social constructs (e.g. neighborhood safety). There is often between-person and between-group variability in neighborhood subjective assessments (Raudenbush, 2003) which could lead to neighborhood-variable measurement error, ie. bias by compositional factors such as respondent race. Depending on the form of measurement error, this could bias neighborhood-health estimates towards or away from the null (Kleinbaum et al., 2007). One can adjust for bias resulting from variability in the within-neighborhood measurement model if one has measured the variable associated with the bias. However, racial/ethnic differences in neighborhood assessments arising from substantially separate experiences of actual neighborhood conditions may not be amenable to statistical adjustment for “race” if residents of different racial groups live in separate neighborhoods (e.g. limited overlap).

Another concern is that subjective neighborhood assessments may be influenced by neighborhood racial composition above and beyond relevant objective neighborhood characteristics, suggesting that neighborhood racial composition is used as a proxy by residents for neighborhood quality (Ellen, 2000). Thus subjective measures of neighborhood environment often used in neighborhoods research may implicitly incorporate information about the racialized metropolitan context, but this is not typically modeled in health studies. For example, perceptions of crime are influenced not only by the objective reality of the existence of crime, but also by reports of disorderly or uncivil conduct, visible markers of housing deterioration, or a neighborhood’s racial makeup. Indeed, residents living in neighborhoods with higher proportions of young black males *perceive* more crime than the objective crime statistics suggest. One explanation is that high proportions of black male youths trigger race-based threatening stereotypes among neighborhood residents (Quillian and Pager, 2001; Sagar and Schofield, 1980; Skogan, 1995).

If this phenomenon indicates racialized assessment of neighborhood environment, it suggests caution in using perceptions of neighborhood environment in health research. If methods such as Ecometrics lead to measures that overreport crime in black areas but not in white areas, then subjective reports may be biased by race-based stereotyping – a type of misclassification error (Kleinbaum et al., 2007) affected by neighborhood racial composition. There are at least three potential solutions one may apply: adjusting for respondent race, adjusting for predictors of racial bias, or using respondents that are less biased by stereotypical views (e.g., less acculturated immigrants)(Pérez et al., 2008; Zhou, 2001).²

Analytic techniques (such as adjusting for race in the measurement model) may be able to correct this bias if the race of the informant patterns the racial stereotyping, and if there is overlap of different racial groups living in neighborhoods of different racial composition. However, there may be little neighborhood overlap across racial groups by definition in highly segregated areas. Moreover, although blacks may hold less negative racial stereotyping of their own group compared to that held by whites, blacks still express stereotypes about their own

²Recent immigrants report lower levels of discrimination in the U.S. than more acculturated counterparts, which may be attributable to less tendency to view society through a racial/ethnic stratification lens (Zhou 2001). However immigrants may still harbor racial stereotypes based on the social structure of their country of origin (McClain et al., 2006).

group in practice (Sagar and Schofield, 1980) so race adjustment may not remove the bias (Quillian and Pager, 2001). However many health studies apply subjective assessments utilizing crude measures for the neighborhood exposure variables, meaning they have not adjusted for respondent demographics in the first stage regression (in measurement creation, e.g. conditional Empirical Bayes estimates) (Mujahid et al., 2008; Osypuk et al., 2009a; Sampson et al., 1997). Comparing unconditional and conditional first-stage equation estimates would help guide whether lack of control for demographic attributes of the reporter is a serious concern in subjective neighborhood measures.

4. Interpretation of neighborhood research: incorporating effects of institutional and interpersonal racism

Racism and discrimination are often invoked as potential explanations for racial health disparities due to evidence that those reporting perceived experiences of racism exhibit worse health (Guyll et al., 2001; Williams et al., 2003), and evidence that racial residential segregation is associated with worse health and larger health disparities (Acevedo-Garcia et al., 2003; Osypuk and Acevedo-Garcia, 2008). Although there are several forms of racism (Jones, 2000), the majority of racism-health studies operationalize perceptions of racism, or interpersonal racism (e.g. (Williams et al., 2003)), not institutional racism. Yet the geography of opportunity perspective highlights the interrelationship between these forms, including how racial segregation contributes to an enduring “spatial racism” to reinforce the racial hierarchy and white privilege (powell, 2005a). Indeed, one important dimension of racial prejudice, contributing to institutional racism (e.g. racial segregation), is the will to maintain social distance from outgroups (Collins and Williams, 1999). The policy relevance of institutional factors is especially important with regard to the racialized housing market processes that keep this geography intact. By excluding racism processes when estimating neighborhood effects, or by excluding institutional racism (and modeling only interpersonal racism), we may be underestimating how racism and/or neighborhoods contribute to health disparities. A better understanding of how neighborhoods and place contribute to health disparities may therefore emerge by integrating institutional with interpersonal racism health research.

Institutional racism is defined as the “differential access to goods, services, or opportunities of society by race”(Jones, 2000), and housing markets may be powerful engines translating institutional racism into health inequalities. For example, experimental studies document worse outcomes for racial minorities compared to whites for discrete, influential housing-market transactions, including quality of service and steering towards certain neighborhoods from real estate professionals and mortgage financing outcomes (Galster and Godfrey, 2005; Turner et al., 2002a; Turner et al., 2002b). In addition to such discrimination, institutional racism can also be operationalized by racial residential segregation. Housing discrimination indicates the process, and segregation indicates the effects of these processes (Collins and Williams, 1999). Residential segregation is one form of institutional racism that affects health by patterning residence in impoverished neighborhoods and truncating potential socioeconomic advancement for minorities across the life course, compared to that of whites (Acevedo-Garcia et al., 2008; Williams and Collins, 2001). Studies have documented that racial segregation is not accounted for by economic segregation or residential preferences, and that illegal discriminatory acts and government policies have played an important role (Collins and Williams, 1999; Galster, 1988).

Institutional and interpersonal racism are conceptually related, yet the constructs are distinct. Individuals might indeed perceive institutional racism or discrimination that is perpetrated against them, although not necessarily. Overt discrimination is illegal and deemed immoral in the US, so there is a legal and social incentive to practice covert discrimination (Pettigrew and Meertens, 1995). Moreover, the types of discrimination acts that can be observed are likely to

be minor acts such as denial or degradation of services (like in restaurants or stores), as opposed to more serious and consequential forms of discrimination such as for employment or housing (Siegelman, 1999).

Racism and discrimination may be important social constructs for explaining health disparities on average, regardless where one lives in the U.S. But sociological evidence suggests racism and discrimination may vary systematically by place, e.g. by neighborhood racial composition or metropolitan segregation (Allport, 1979; Farley et al., 1997; Hunt et al., 2007; Purnell et al., 1999). However, other than segregation-health studies (e.g. (Acevedo-Garcia et al., 2003)) racism/discrimination with respect to place has not been well examined in the health literature, especially regarding other forms of institutional racism than segregation; some exceptions include (Gee, 2002; Schulz et al., 2000; Seaton and Yip, 2009).

Although there is limited health research on place variation in racism, extrapolating sociological and public health evidence suggests that the effects of interpersonal racism may counteract or offset the effects of institutional racism (e.g. segregation or neighborhood opportunity) with respect to health disparities. Some research suggests that minorities report *higher* interpersonal racism if they live in white (vs. black) neighborhoods (Hunt et al., 2007), or in low poverty (vs. high poverty) neighborhoods (Orr et al., 2003), suggesting that high % black or high % poverty neighborhoods might shield minorities from the negative health effects of interpersonal racism. Since blacks are most likely to live in black neighborhoods within highly segregated metros, then blacks may be less likely to experience health effects of neighborhood-based interpersonal racism in high segregation regions. Other evidence suggests that institutional racism also may be area-based, but run in the opposite direction, such that blacks experience highest exposure to (and therefore effects of) institutional racism and adverse racial stereotypes in highly segregated metros (Farley et al., 1997), or housing developments (Allport, 1979). Thus, the detrimental effects of institutional racism, which largely operate through segregation, may shield blacks from experiences of interpersonal discrimination which have been given preeminence in the health literature over structural discrimination.

Obviously the relative importance of these two racism constructs for health relates to the magnitude of their effect sizes (i.e. with health), and the population distribution of exposure. Since only a third of blacks live in majority-white neighborhoods (Table 2), a minority of blacks is probably exposed to neighborhood-based interpersonal racism (probabilistically speaking), although the majority of blacks is exposed to high institutional racism, i.e. to residential segregation, or to substantially poorer neighborhoods than whites (Osypuk et al., 2009b). Of course, the effects of institutional and interpersonal racism are not mutually exclusive, and also operate outside neighborhood contexts (e.g. in employment).

The policy implications (i.e. exposure modifiability) of the two forms of racism/discrimination are also important to consider. Since an established area of housing policy is dedicated to monitoring housing/mortgage discrimination and enforcing antidiscrimination laws (Goering and Wienk, 1996), institutional racism is a policy-relevant exposure. Indeed, some housing mobility programs are based on civil rights litigation to redress institutional racism by the US government (powell, 2005b). Although the policy implications of intervening on interpersonal racism relate to addressing the institutional dimension, it is not clear how policies would address the subjective appraisal dimension of perceived racism/discrimination.

5. Policy relevant applications of neighborhood research: Integrating a regional perspective

Although the methodological issues that we have discussed bear on the quality of neighborhoods-health research, these issues are also central to policy solutions marshaled to

address place-based racial health inequalities. The range of such policies is much more limited if one applied lessons from traditional neighborhood based research, than if the scope were broadened to focus less on individual neighborhoods and more on the geography of opportunity, i.e. entire distributions of neighborhood opportunity across metropolitan regions. Failure to incorporate regional policy solutions will also reify the municipality or neighborhood as preferred levels of policy intervention, which may not address fundamental processes producing racial housing market inequality.

We have highlighted that racial minorities not only live in different neighborhoods, but also in much worse opportunity neighborhoods than whites. If such neighborhood inequality translates into health inequality, then improving neighborhood environments for minorities is necessary for primary prevention of health problems. Generally, two approaches are used to modify the neighborhood environments for individuals: place-based interventions that improve the conditions in disadvantaged neighborhoods, and people-based interventions that aide households to acquire housing in better neighborhoods. These policies include providing housing subsidies and housing search assistance to provide home seekers with a wider, better range of neighborhood choices; increasing rental and affordable housing in the suburbs; and enforcing housing antidiscrimination laws (Briggs, 2005). Housing policy experts recommend that both place- and people-based approaches are necessary within the mix of social policies to address housing and neighborhood inequality (Katz, 2004; powell, 2005b).

Place-based policies

Place-based policies focus on improving the physical and social infrastructure of disadvantaged neighborhoods, including economic development, housing revitalization, policing crime, and improving public schools. Some neighborhood-based interventions also explicitly seek to address health problems. For example, in public health, there is increasing interest in addressing the presence of food deserts or walkability in disadvantaged neighborhoods (Gallagher, 2006). Since minorities are disproportionately likely to live in disadvantaged communities, neighborhood-based initiatives may tend to benefit minorities. However, the evidence regarding the effectiveness of neighborhood-based strategies is limited. The neighborhood economic development field has considerable experience with neighborhood-based approaches, which can help inform the public health community about the strengths and limitations of such approaches (Blair and Carroll, 2007; Giloth, 2004; Tietz, 1989). Some have argued that because neighborhoods are weak economic units, and are heavily influenced by the operation of labor and other markets at the city or regional level, neighborhood economic interventions may not be very effective (Tietz, 1989).

Place based policies for very poor neighborhoods may moreover be less effective than broad economic policies since they seek to intervene in neighborhoods that have severe, multiple problems. From the population perspective, any place-based intervention may only be ameliorative (Rose, 1992). To the extent that poverty concentration shifts its geographic focus as people move but remains constant within a region, neighborhood revitalization is an intervention that does not address the core issues of poverty concentration. For example, if neighborhood revitalization raises the value of the properties, rents can rise, and this can instigate gentrification and displacement of poor populations.

People-based policies with a regional perspective

Although addressing neighborhood inequality can involve place-based community investment programs, a range of policies (transportation, tax, regulatory policies) at federal, state, and local levels favor development in high-income suburban areas over investment in inner-city neighborhoods (Berube and Katz, 2005). Therefore, advocates must also adapt a regional perspective, to change the distribution of “opportunity neighborhoods” to which minorities

have access. Regionalism, or cooperation among municipalities to solve issues affecting the entire region, requires municipalities within a metropolitan region to contribute to solutions like building their fair share of affordable housing; reducing exclusionary zoning ordinances; implementing public transportation infrastructure accessible to suburban areas; and building the region's employment base. For example, regional approaches may help to deconcentrate poverty by lifting people out of poverty, e.g. linking impoverished residents to employment or training within the region (Ihlanfeldt, 1999). All of these types of policies may aid minorities to move into better neighborhoods (Ellen, 1999; Pastor, 2001), and/or to improve individual circumstances.

A population health approach suggests that it may be more effective to improve health if the entire distribution of an exposure (e.g. in this case neighborhood opportunity) is shifted in the better direction (Rose, 1992). Interventions can affect the entire distribution of neighborhood opportunity, for example, by affecting regional factors like economic conditions or income inequality, by improving availability of rental housing in suburban areas, by reducing housing discrimination, or by providing interventions that improve minority access to the full spectrum of neighborhoods across the entire metro area (housing mobility programs), instead of intervening on deprived neighborhoods only (e.g. neighborhood revitalization interventions) (Osypuk et al., 2009b).

However there are limitations to people-based policies as well. Although deconcentration of poverty and race can be achieved theoretically with housing mobility, the barriers, such as exclusionary zoning, are significant, and the scope of current policies is small (Acevedo-Garcia et al., 2004). In practice, this means that beginning to deconcentrate poverty with the scope of current mobility-policy funding would not substantially influence sending or receiving neighborhoods. Moreover, although regional approaches are necessary, instances of regional cooperation remain limited (Ellen, 1999).

Future Directions

Several recommendations for future research flow from this discussion, and we briefly highlight potential research directions that may improve our understanding of how neighborhoods and place influence racial health disparities. As we have argued, regional sampling frames and integrating institutional racism are important. A few neighborhood studies have implemented regional sampling frames (e.g. LA Family and Neighborhoods Study (Sastry et al., 2006), Multi-City Study of Urban Inequality (MCSUI)(O'Connor, 2001)). MCSUI moreover examined institutional racism. Incorporating institutional racism into health disparities studies is difficult since institutional racism is difficult to measure directly, including because it is often invisible to victims. Moreover some of the strongest designs for ascertaining institutional racism (e.g. paired testing studies (Turner et al., 2002b)) achieve their strength by artificially manipulating the profiles of a pair of potential renters/homeowners who are identical but for their race. Such designs may be helpful for understanding immediate health effects (e.g. of discrimination as an acute stressor) or for understanding mediators of institutional-racism and health, but may be less appropriate for empirically testing institutional racism for longer-term health effects. However modeling metropolitan-level racial segregation or neighborhood racial composition as exposures indicating the outcomes of institutional racism in the housing market, and explicitly testing what may predict or mediate such effects, including the roles of neighborhood preferences, income, or external housing market forces, including longitudinal and/or causal methods that model time-varying mediators, may be suggestions forward (Morenoff, 2003; Osypuk and Acevedo-Garcia, 2008; Osypuk et al., 2009a).

Our discussion suggests health disparities research could better incorporate race-specific housing market processes. A population health approach suggests there is merit in examining

what Rose (1992) calls the causes of causes (e.g. causes of neighborhood sorting patterns). This would shift focus from individual neighborhoods to entire distributions of neighborhood opportunity, for better understanding of the neighborhood exposure variable. Alternately, given some of the limitations of traditional (regression) modeling of observational data that we have discussed, adaptation of complex systems models may be a promising approach to more-directly model segregation, given its dynamic and dependent housing market processes (Bruch and Mare, 2009).

Lastly, pursuing intervention research may overcome some of the internal validity threats arising from observational studies, i.e. health effects of neighborhood mobility policies (DeLuca and Dayton, 2009; Engdahl, 2009). Such programs are voluntary, often regionally based, and offer a chance to observe a clear counterfactual of a policy effect of moving to a different neighborhood.

Conclusion

In this paper, we sought to discuss issues that may impede proper estimation of neighborhood and place contribution to racial health disparities, and to discuss the policy relevance of methodological choices, framed by a geography of opportunity perspective. The fact that whites and minorities live in separate neighborhoods in the US – high residential racial segregation – is not just a methodological nuisance. The fact that minorities experience discrimination and racism that has contributed to their concentration in low-opportunity neighborhoods, and has blocked their social mobility, is not just a bias to be controlled. These are central features of inequality in America, central to the distribution of resources and opportunities, and central to understanding how place contributes to racial/ethnic health disparities.

Acknowledgments

The authors would like to thank Dr. Maria Glymour for providing insightful comments on an earlier version of this manuscript. We wish to thank the W.K. Kellogg Foundation (grant 3011081) for supporting the work of both authors on this manuscript through the DiversityData and DiversityDataKids racial inequality indicator projects (www.diversitydata.org), as well as funding from NICHD (HD058510) to support Dr. Osypuk's work.

References

- Acevedo-Garcia D, Lochner KA, Osypuk TL, Subramanian SV. Future Directions in Residential Segregation and Health Research: A Multilevel Approach. *Am J Public Health* 2003;93:215–221. [PubMed: 12554572]
- Acevedo-Garcia, D.; Osypuk, TL. Impacts of Housing and Neighborhoods on Health: Pathways, Racial/Ethnic Disparities, and Policy Directions. In: Carr, JH.; Kutty, NK., editors. *Segregation: The Rising Costs for America*. Routledge; New York: 2008a. p. 197-235.
- Acevedo-Garcia D, Osypuk TL. Invited Commentary: Residential segregation and health: the complexity of modeling separate social contexts. *American Journal of Epidemiology* 2008b;168:1255–1258. [PubMed: 18974060]
- Acevedo-Garcia D, Osypuk TL, McArdle N, Williams D. Toward a Policy-Relevant Analysis of Geographic and Racial/Ethnic Disparities in Child Health. *Health Affairs* 2008;27:321–333. [PubMed: 18332486]
- Acevedo-Garcia D, Osypuk TL, Werbel RE, Meara ER, Cutler DM, Berkman LF. Does Housing Mobility Policy Improve Health? *Housing Policy Debate* 2004;15:49–98.
- Ahern J, Galea S, Hubbard A, Midanik L, Syme S. "Culture of drinking" and individual problems with alcohol use. *Am J Epidemiol* 2008;167:1041–1049. [PubMed: 18310621]
- Allport, G. *The nature of prejudice*. Perseus books; 1979.

- Berube, A.; Katz, B. *Katrina's Window: Confronting Concentrated Poverty Across America*, METROPOLITAN POLICY PROGRAM. The Brookings Institution; 2005.
- Blair JP, Carroll MC. Inner City Neighborhoods and Metropolitan Development. *Economic Development Quarterly* 2007;21:263–277.
- Briggs, XdS. *The Geography of Opportunity: Race and Housing Choice in Metropolitan America*. The Brookings Institution; Washington DC: 2005.
- Bruch E, Mare R. Preferences and Pathways to Segregation: Reply to Van De Rijt, Siegel, and Macy. *American Journal of Sociology* 2009;114:1181–1198.
- Charles, CZ. Processes of Racial Residential Segregation. In: O'Connor, A.; Tilly, C.; Bobo, L., editors. *Urban Inequality: Evidence from Four Cities*. Russell Sage Foundation; New York: 2001. p. 217–271.
- Chase-Lansdale PL, Moffitt RA, Lohman BJ, Cherlin AJ, Coley RL, Pittman LD, Roff J, Votruba-Drzal E. Mothers' Transitions from Welfare to Work and the Well-Being of Preschoolers and Adolescents. *Science* 2003;299:1548–1552. [PubMed: 12624259]
- Collins CA, Williams DR. Segregation and Mortality: The Deadly Effects of Racism? *Sociological Forum* 1999;14:495–523.
- Cook, TD.; Shagle, SC.; Degirmencioglu, SM. Capturing social process for testing mediational models of neighborhood effects. In: Brooks-Gunn, J.; Duncan, GJ.; Aber, JL., editors. *Neighborhood Poverty: Policy Implications in Studying Neighborhoods*. Russell Sage; New York: 1997. p. 94–119.
- DeLuca S, Dayton E. Switching Social Contexts: The Effects of Housing Mobility and School Choice Programs on Youth Outcomes. *Annual Review of Sociology* 2009;35:457–491.
- Diez Roux AV. Estimating neighborhood health effects: the challenges of causal inference in a complex world. *Social Science & Medicine* 2004;58:1953–1960. [PubMed: 15020010]
- Ellen, IG. Spatial Stratification within U.S. Metropolitan Areas. In: Altshuler, A.; Morrill, W.; Wolman, H.; Mitchell, F., editors. *Governance and Opportunity in Metropolitan America*. National Academy Press; Washington, DC: 1999. p. 192–212.
- Ellen, IG. *Sharing America's Neighborhoods: The Prospects for Stable, Racial Integration*. Harvard University Press; Cambridge, MA: 2000.
- Engdahl, L. *New Homes, New Neighborhoods, New Schools: A Progress Report on the Baltimore Housing Mobility Program*. Baltimore Regional Housing Campaign, and Poverty & Race Research Action Council; Baltimore, MD and Washington DC: 2009.
- Farley R, Fielding EL, Krysan M. The Residential Preferences of Blacks and Whites: A Four-Metropolis Analysis. *Housing Policy Debate* 1997;8:763–800.
- Galea S. *Health in the city: Findings from Detroit Neighborhood Health Study*, Detroit Neighborhood Health Study Symposium. 2009
- Gallagher, M. *Examining the impact of food deserts on public health in Chicago*. Mari Gallagher Research & Consulting Group; Chicago, IL: 2006.
- Galster G. Residential segregation in American cities: A contrary review. *Population research and policy review* 1988;7:93–112.
- Galster G, Godfrey E. By words and deeds: Racial steering by real estate agents in the U.S. in 2000. *Journal of the American Planning Association* 2005;71:251–268.
- Galster GC, Killen SP. The geography of metropolitan opportunity: a reconnaissance and conceptual framework. *Housing Policy Debate* 1995;6:7–43.
- Gee GC. A multilevel analysis of the relationship between institutional and individual racial discrimination and health status. *American Journal of Public Health* 2002;92:615–623. [PubMed: 11919062]
- Giloth, R. The "Local" in Workforce Development Politics: An Introduction. In: Giloth, R., editor. *Workforce Development Politics: Civic Capacity and Performance*. Temple University Press; 2004. p. 1–29.
- Glymour, MM. Using causal diagrams to understand common problems in social epidemiology. In: Oakes, JM.; Kaufman, JS., editors. *Methods in Social Epidemiology*. Jossey-Bass; San Francisco: 2006.
- Goering, J.; Wienk, R. *Mortgage Lending, Racial Discrimination, and Federal Policy*. Urban Institute Press; Washington DC: 1996.

- Guyll M, Matthews K, Bromberger J. Discrimination and unfair treatment: relationship to cardiovascular reactivity among African American and European American women. *Health Psychology* 2001;20:315–325. [PubMed: 11570645]
- Hale LP, Berger LMP, LeBourgeois MKP, Brooks-Gunn JP. Social and Demographic Predictors of Preschoolers' Bedtime Routines. *Journal of Developmental & Behavioral Pediatrics* 2009;30:394–402. [PubMed: 19745760]
- Hunt M, Wise LA, Jipguep M-C, Cozier YC, Rosenberg L. Neighborhood racial composition and perceptions of racial discrimination: evidence from the black women's health study. *Social Psychology Quarterly* 2007;70:272–289.
- Iceland, J.; Weinberg, DH.; Steinmetz, E. U S Census Bureau, (Ed), Series CENSR-3. U.S. Government Printing Office; Washington, DC: 2002. Racial and ethnic residential segregation in the United States: 1980-2000.
- Ihlanfeldt, KR. The Geography of economic and social opportunity in metropolitan areas. In: Altshuler, A.; Morrill, W.; Wolman, H.; Mitchell, F., editors. *Governance and Opportunity in Metropolitan America*. National Academy Press; Washington DC: 1999. p. 213-252.
- Jargowsky, PA. Center on Urban and Metropolitan Policy (Ed), *The Living Cities Census Series*. Brookings Institution; 2003. *Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s*.
- Jones CP. Levels of racism: a theoretic framework and a gardener's tale. *American Journal of Public Health* 2000;90:1212–1215. [PubMed: 10936998]
- Katz, B. *Neighborhoods of choice and connection: the evolution of American neighbourhood policy and what it means for the United Kingdom, Poverty and place: policies for tomorrow*. Joseph Rowntree Foundation; York, UK: 2004.
- Kaufman JS, Cooper RS. Commentary: Considerations for Use of Racial/Ethnic Classification in Etiologic Research. *Am J Epidemiol* 2001;154:291–298. [PubMed: 11495850]
- Kleinbaum, DG.; Sullivan, KM.; Barker, ND. *A pocket guide to epidemiology*. Springer; New York: 2007.
- Li F, Harmer P, Cardinal B, Bosworth M, Johnson-Shelton D. Obesity and the built environment: does the density of neighborhood fast-food outlets matter? *Am J Health Promot* 2009;23:203–209. [PubMed: 19149426]
- Massey, D.; Denton, N. *American Apartheid: Segregation and the Making of the Underclass*. Harvard University Press; Cambridge, MA: 1993.
- Massey, DS. Residential Segregation and Neighborhood Conditions in U.S. Metropolitan Areas. In: Smelser, NJ.; Wilson, WJ.; Mitchell, F., editors. *America Becoming: Racial Trends and Their Consequences, Volume I*. National Academy Press; Washington DC: 2001. p. 391-434.
- Massey DS, Denton NA. The Dimensions of Residential Segregation. *Social Forces* 1988;67:281–315.
- McClain PD, Carter NM, Soto VMD, Lyle ML, Grynaviski JD, Nunnally SC, Scotto TJ, Kendrick JA, Lackey GF, Cotton KD. Racial Distancing in a Southern City: Latino Immigrants' Views of Black Americans. *Journal of Politics* 2006;68:571–584.
- Messer LC, Kaufman JS, Dole N, Savitz DA, Laraia BA. Neighborhood Crime, Deprivation, and Preterm Birth. *Annals of Epidemiology* 2006;16:455–462. [PubMed: 16290179]
- Mojtahedi MC, Boblick P, Rimmer JH, Rowland JL, Jones RA, Braunschweig CL. Environmental Barriers to and Availability of Healthy Foods for People With Mobility Disabilities Living in Urban and Suburban Neighborhoods. *Archives of Physical Medicine and Rehabilitation* 2008;89:2174–2179. [PubMed: 18996247]
- Morenoff JD. Neighborhood mechanisms and the spatial dynamics of birth weight. *American Journal of Sociology* 2003;108:976–1017.
- Morenoff JD, House JS, Hansen B, Williams DR, Kaplan GA, Hunte H. Understanding social disparities in hypertension prevalence, awareness, treatment, and control: the role of neighborhood context. *Soc Sci Med* 2007;65:1853–1866. [PubMed: 17640788]
- Mujahid MS, Diez Roux AV, Morenoff JD, Raghunathan TE, Cooper RS, Ni H, Shea S. Neighborhood characteristics and hypertension. *Epidemiology* 2008;19:590–598. [PubMed: 18480733]

- O'Connor, A. Understanding inequality in the late twentieth-century metropolis: new perspectives on the enduring racial divide. In: O'Connor, A.; Tilly, C.; Bobo, LD., editors. *Urban Inequality: Evidence from Four Cities*. Russell Sage Foundation; New York: 2001. p. 1-33.
- Oakes JM. The (mis)estimation of neighborhood effects: causal inference for a practicable social epidemiology. *Social Science & Medicine* 2004;58:1929–1952. [PubMed: 15020009]
- Oakes JM. Commentary: Advancing neighbourhood-effects research—selection, inferential support, and structural confounding. *International Journal of Epidemiology* 2006;35:643–647. [PubMed: 16556642]
- Orr, L.; Feins, JD.; Jacob, R.; Beecroft, E.; Sanbonmatsu, L.; Katz, LF.; Liebman, JB.; Kling, JR. Moving to Opportunity for Fair Housing Demonstration Program: Interim Impacts Evaluation. US Dept of HUD; Washington, DC: 2003. p. 341
- Osypuk TL, Acevedo-Garcia D. Are Racial Disparities in Preterm Birth Larger in Hypersegregated Areas? *American Journal of Epidemiology* 2008;167:1295–1304. [PubMed: 18367470]
- Osypuk TL, Diez Roux AV, Hadley C, Kandula NR. Are Immigrant Enclaves Healthy Places to Live? The Multi-ethnic Study of Atherosclerosis. *Social Science & Medicine* 2009a;69:110–120. [PubMed: 19427731]
- Osypuk, TL.; Galea, S. What Level Macro? Choosing Appropriate Levels for Modeling Space, Place, and Health. In: Galea, S., editor. *Macrosocial Determinants of Population Health*. Springer Media; New York, NY: 2007. p. 399-435.
- Osypuk TL, Galea S, McArdle N, Acevedo-Garcia D. Quantifying Separate and Unequal: Racial-Ethnic Distributions of Neighborhood Poverty in Metropolitan America. *Urban Affairs Review* 2009b; 45:25–65. [PubMed: 20160903]
- Pastor, M. Geography and Opportunity. In: Smelser, NJ.; Wilson, WJ.; Mitchell, F., editors. *America Becoming: Racial trends and their consequences*, Volume I. National Academy Press; Washington DC: 2001. p. 435-468.
- Pérez DJ, Fortuna L, Alegría M. Prevalence and correlates of everyday discrimination among U.S Latinos. *Journal of Community Psychology* 2008;36:421–433. [PubMed: 19960098]
- Pettigrew TF, Meertens RW. Subtle and blatant prejudice in western Europe. *European Journal of Social Psychology* 1995;25:57–75.
- powell, ja. Dreaming of a Self Beyond Whiteness and Isolation. *Journal of Law & Policy* 2005a;18:13–45.
- powell, ja. Remedial Phase Expert Report of john powell in Thompson v. HUD Kirwan Institute for the Study of Race and Ethnicity; Columbus: 2005b.
- powell, ja; Graham, KM. Citizens' Commission on Civil Rights (Ed), *Rights at Risk: Equality in an Age of Terrorism*. Citizens' Commission on Civil Rights; Washington DC: 2002. Urban fragmentation as a barrier to equal opportunity.
- Purnell T, Idsardi W, Baugh J. Perceptual and phonetic experiments on American English dialect identification. *Journal of Language and Social Psychology* 1999;18:10–30.
- Quillian L, Pager D. Black neighbors, higher crime? The role of racial stereotypes in evaluations of neighborhood crime. *American Journal of Sociology* 2001;107:717–767.
- Raudenbush, SW. The quantitative assessment of neighborhood social environments. In: Kawachi, I.; Berkman, LF., editors. *Neighborhoods and Health*. Oxford University Press; New York, NY: 2003. p. 112-131.
- Raudenbush SW, Sampson RJ. Econometrics: toward a science of assessing ecological settings, with application to the systematic social observation of neighborhoods. *Sociol Methodol* 1999;29:1–41.
- Rose, G. *The Strategy of Preventive Medicine*. Oxford University Press; New York, NY: 1992.
- Rosenbaum E. Racial/Ethnic Differences in Asthma Prevalence: The Role of Housing and Neighborhood Environments. *Journal of Health and Social Behavior* 2008;49:131–145. [PubMed: 18649498]
- Rothwell J, Massey DS. The effect of density zoning on racial segregation in US urban areas. *Urban Affairs Review* Prepublished April 9, 2009. 200910.1177/1078087409334163
- Sagar HA, Schofield JW. Racial and behavioral cues in Black and White children's perceptions of ambiguously aggressive acts. *Journal of Personality and Social Psychology* 1980;39:590–598. [PubMed: 7431207]

- Sampson R, Raudenbush S, Earls F. Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science* 1997;277:918–924. [PubMed: 9252316]
- Sampson RJ. Moving to Inequality: Neighborhood Effects and Experiments Meet Social Structure. *American Journal of Sociology* 2008;114:189–231.
- Sampson RJ, Morenoff JD, Gannon-Rowley T. Assessing “Neighborhood Effects”: Social Processes and New Directions in Research. *Annu Rev Sociol* 2002;28:443–478.
- Sampson RJ, Sharkey P, Raudenbush SW. Durable effects of concentrated disadvantage on verbal ability among African-American children. *Proceedings of the National Academy of Sciences* 2008;105:845–852.
- Sastry N, Ghosh-Dastidar B, Adams JL, Pebley AR. The Design of a Multilevel Survey of Children, Families, and Communities: The Los Angeles Family and Neighborhood Survey. *Social Science Research* 2006;35:1000–1024.
- Schulz A, Williams D, Israel B, Becker A, Parker E, James SA, Jackson J. Unfair treatment, neighborhood effects, and mental health in the Detroit metropolitan area. *J Health Soc Behav* 2000;41:314–332. [PubMed: 11011507]
- Schwartz BS, Glass TA, Bolla KI, Stewart WF, Glass G, Rasmussen M, Bressler J, Shi W, Bandeen-Roche K. Disparities in Cognitive Functioning by Race/Ethnicity in the Baltimore Memory Study. *Environmental Health Perspectives* 2004;112:314–320. [PubMed: 14998746]
- Schwartz S, Diez Roux AV. Commentary: Causes of incidence and causes of cases -- a Durkheimian perspective on Rose. *International Journal of Epidemiology* 2001;30:435–439. [PubMed: 11416059]
- Seaton EK, Yip T. School and neighborhood contexts, perceptions of racial discrimination, and psychological well-being among African American adolescents. *J Youth Adolesc* 2009;38:153–163. [PubMed: 19636714]
- Siegelman, P. Racial discrimination in ‘everyday’ commercial transactions: What do we know, what do we need to know, and how can we find out?. In: Fix, M.; Turner, MA., editors. *A national report card on discrimination in America: The role of testing*. The Urban Institute; Washington, DC: 1999. p. 69-97.
- Skogan WG. Crime and the Racial Fears of White Americans. *Annals of the American Academy of Political and Social Science* 1995;539:59–71.
- Squires, GD.; Kubrin, CE. *Privileged Places: Race, Residence, and the Structure of Opportunity*. Lynne Rienner Publishers; Boulder, CO: 2006.
- Tietz M. Neighborhood Economics: Local Communities and Regional Markets. *Economic Development Quarterly* 1989;3:111–122.
- Turner, MA.; Freiberg, F.; Godfrey, E.; Herbig, C.; Levy, DK.; Smith, RR. *All other things being equal: A paired testing study of mortgage lending institutions*. The Urban Institute; Washington DC: 2002a.
- Turner, MA.; Ross, SL.; Galster, GC.; Yinger, J. *Discrimination in Metropolitan Housing Markets: Phase I*. US Dept of HUD; Washington DC: 2002b.
- U.S. Census Bureau. *American Factfinder Glossary, Central City and Metropolitan Statistical Area*. U S Census Bureau. 2008
- U.S. DHHS. *Healthy People 2010: Understanding and Improving Health*. Government Printing Office; Washington, DC: 2000.
- Williams DR, Collins C. Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health. *Public Health Reports* 2001;116:404–416. [PubMed: 12042604]
- Williams DR, Neighbors HW, Jackson JS. Racial/ethnic discrimination and health: findings from community studies. *American Journal of Public Health* 2003;93:200–208. [PubMed: 12554570]
- Zhou, M. Straddling different worlds: the acculturation of Vietnamese refugee children. In: Rumbaut, RG.; Portes, A., editors. *Ethnicities: Children of Immigrants in America*. Russell Sage Foundation; Berkeley, CA: 2001. p. 187-228.

Figure 1.
Neighborhood % NH White Distributions by Race-Ethnicity 100 Largest Metros (2000)

Table 1
Distribution of population by race, poverty, neighborhood, and metropolitan segregation; US Census 2000 Data.

	US		Population by Race/Ethnicity				Tracts		Impoverished			Non-Impoverished		
	Total Population	NH Whites	NH Blacks	Blacks ^	Hispanics	Tracts	Total Population	NH Whites	Blacks ^	Total Population	NH Whites	Blacks ^		
US N in US	281,421,906	196,389,122	35,275,033	32,714,224	35,238,481	65,443	35,245,850	15,414,119	8,146,146	246,176,056	174,371,878	24,568,078		
All Metro Areas														
N in Metropolitan Area	225,993,693	150,576,663	30,422,409	28,434,103	32,138,289	51,467	27,089,548	10,320,335	6,732,653	198,904,145	135,352,859	21,701,450		
N in Central City	72,900,478	36,065,957	16,814,941	15,981,207	14,822,675	19,247	13,675,299	3,631,369	4,490,058	59,225,179	30,536,012	11,491,149		
% of Metro Population in Central City	32.3%	24.0%	55.3%	56.2%	46.1%	37.4%	50.5%	35.2%	66.7%	29.8%	22.6%	53.0%		
% of Metro Population in Suburban areas	67.7%	76.0%	44.7%	43.8%	53.9%	62.6%	49.5%	64.8%	33.3%	70.2%	77.4%	47.0%		
# Metro Population living in extremely high poverty neighborhood ^^^	7,034,674	1,620,730	2,866,902	2,736,952	2,182,020	2,251	3,460,707	529,334	1,371,783	3,573,967	652,594	1,365,169		
% Metro Population living in extremely high poverty neighborhood ^^^	3.1%	1.1%	9.4%	9.6%	6.8%	4.4%	12.8%	5.1%	20.4%	1.8%	0.5%	6.3%		
Highest 5 Segregated Metros ***														
N in Metropolitan Area	24,160,657	13,300,271	5,183,411	5,059,214	4,045,586	6,227	3,397,628	826,197	1,269,350	20,763,029	12,076,451	3,789,864		
N in Central City	13,134,108	4,522,647	4,315,660	4,255,090	3,158,060	3,728	2,758,583	468,456	1,150,790	10,375,525	3,834,136	3,104,300		
% of Metro Population in Central City	54.4%	34.0%	83.3%	84.1%	78.1%	59.9%	81.2%	56.7%	90.7%	50.0%	31.7%	81.9%		
# Metro Population living in extremely high poverty neighborhood ^^^	1,386,403	141,053	699,999	714,884	500,718	472	674,026	56,440	352,872	712,377	59,841	362,012		

	US				Population by Race/Ethnicity			Tracts		Impoverished			Non-Impoverished		
	Total Population	NH Whites	NH Blacks	Blacks [^]	Hispanics	Tracts	Total Population	NH Whites	Blacks [^]	Total Population	NH Whites	Blacks [^]	Total Population	NH Whites	Blacks [^]
poverty neighborhood ^{^^}															
% Metro	5.7%	1.1%	13.5%	14.1%	12.4%	7.6%	19.8%	6.8%	27.8%	3.4%	0.5%	9.6%			
Population living in extremely high poverty neighborhood ^{^^}															
% of US population that lives in central city of the highest 5 segregated metros ^{***}	4.7%	2.3%	12.2%	13.0%	9.0%	5.7%	7.8%	3.0%	14.1%	4.2%	2.2%	12.6%			

NOTES

[^] The “black” racial category includes black Hispanics.

^{***} Highest segregated metros defined as the 5 metros with the highest black-white dissimilarity score in 2000; they include Chicago IL, Detroit MI, Gary IN, Milwaukee WI, New York NY.

^{^^} Extremely high poverty neighborhoods defined as tracts equal to or higher than 40% poverty in 2000.

Table 2

Distribution of population by race, neighborhood, and metropolitan segregation; US Census 2000 Data.

<u>Number</u>	Total Population	NH Whites	NH Blacks	Hispanics	Tracts
In US	281,421,906	196,389,122	35,275,033	35,238,481	65,443
In Metropolitan Area	225,993,693	150,576,663	30,422,409	32,138,289	51,467
In High Segregated Metros ^{**}	124,355,060	79,826,740	20,832,227	16,849,086	29,211
In Low Segregated Metros ^{**}	101,638,633	70,749,923	9,590,182	15,289,203	22,256
In Highest 5 Segregated Metros ^{***}	24,160,657	13,300,271	5,183,411	4,045,586	6,227
In High Poverty Neighborhoods [^]	51,860,853	18,784,124	15,874,142	14,201,557	13,751
In Extremely High Poverty Neighborhoods ^{^^}	7,952,260	1,948,201	3,159,931	2,301,296	2,510
In Majority-NH White Neighborhoods ^{^^^}	215,814,652	181,876,864	12,764,343	12,808,994	49,509
Percent Distribution					
% population by Race/Ethnicity (among Total US pop)	100.0%	69.8%	12.5%	12.5%	--
% population in Metropolitan Area (among US pop)	80.3%	76.7%	86.2%	91.2%	78.6%
% population in High Segregated Metros ^{**} (among Metropolitan Pop)	55.0%	53.0%	68.5%	52.4%	56.8%
% population in Low Segregated Metros ^{**} (among Metropolitan pop)	45.0%	47.0%	31.5%	47.6%	43.2%
% population in High Segregated Metros ^{**} (among US pop)	44.2%	40.6%	59.1%	47.8%	44.6%
% population in Highest 5 Segregated Metros ^{***} (among US pop)	8.6%	6.8%	14.7%	11.5%	9.5%
% population in High Poverty Neighborhoods [^] (among US Pop)	18.4%	9.6%	45.0%	40.3%	21.0%
% population in Extremely High Poverty Neighborhoods ^{^^} (among US pop)	2.8%	1.0%	9.0%	6.5%	3.8%
% population in Majority-NH White Neighborhoods ^{^^^} (among US Pop)	76.7%	92.6%	36.2%	36.3%	75.7%
Entire US					
N in Multiethnic Neighborhoods [#]	49,960,586	26,008,852	9,772,815	9,909,966	11,290
% in Multiethnic Neighborhoods [#] (in entire US)	17.8%	13.2%	27.7%	28.1%	17.3%
All Metropolitan Areas					
N in Multiethnic Neighborhoods [#]	42,441,633	22,044,369	7,535,027	8,908,381	9,535
% in Multiethnic Neighborhoods [#] (among Metropolitan areas)	18.8%	14.6%	24.8%	27.7%	18.5%
High Segregation Metros^{**}					

	Total Population	NH Whites	NH Blacks	Hispanics	Tracts
N in Multiethnic Neighborhoods #	20,756,895	10,662,839	4,079,167	3,909,244	4,813
% in Multiethnic Neighborhoods # (among high segregation metros)	16.7%	13.4%	19.6%	23.2%	16.5%
Low Segregation Metros**					
N in Multiethnic Neighborhoods #	21,684,738	11,381,530	3,455,860	4,999,137	4,722
% in Multiethnic Neighborhoods # (among low segregation metros)	21.3%	16.1%	36.0%	32.7%	21.2%

NOTES

- ** High segregated metros defined as metros with a black-white dissimilarity over .60; Low segregated metros defined as metros with a black-white dissimilarity under .60; measured in 2000.
- *** Highest segregated metros defined as the 5 metros with the highest black-white dissimilarity score in 2000; they include Chicago IL, Detroit MI, Gary IN, Milwaukee WI, New York NY.
- # Multiethnic neighborhoods defined as tracts that were 33-67% NH White in 2000.
- ^ High poverty neighborhoods defined as tracts equal to or higher than 20% poverty in 2000.
- ^^ Extremely high poverty neighborhoods defined as tracts equal to or higher than 40% poverty in 2000.
- NH=Non-Hispanic
- ^^^ Majority NH-White neighborhoods are tracts with over 50% NH white composition.