METROPOLITAN STRUCTURE AND NEIGHBORHOOD ATTAINMENT: EXPLORING INTERMETROPOLITAN VARIATION IN RACIAL RESIDENTIAL SEGREGATION*

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Abstract

Using data from the 1981, 1991, and 2001 waves of the Panel Study of Income Dynamics, in conjunction with decennial census data for tracts and metropolitan areas, we examine how characteristics of metropolitan areas are associated with black and white households' neighborhood racial composition. Results from hierarchical linear models show that about 20-40% of the variation in the percentage of households' tract population that is non-Hispanic white or non-Hispanic black exists across, rather than within, metropolitan areas. Over time, white households' exposure to non-Hispanic white neighbors has declined and their exposure to non-Hispanic black neighbors has increased; these trends cannot be attributed to changes in the ecological structure and demographic composition of metropolitan areas. Black households' exposure to non-Hispanic black neighbors has declined over the past two decades. Several metropolitan-area characteristics that have been identified in past research as salient determinants of racial residential segregation emerge as important predictors of black and white households' spatial proximity to white and black neighbors as well as the racial difference in neighborhood racial composition. In large metropolitan areas and areas with greater concentrations of blacks, blacks and whites have fewer white neighbors and more black neighbors. In metropolitan areas with large foreign-born populations, blacks have fewer non-Hispanic white and non-Hispanic black neighbors. In metropolitan areas characterized by ample supplies of new housing and low levels of municipal fragmentation, whites have comparatively more minority neighbors.

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It has long been observed that in American cities blacks and whites rarely share the same neighborhoods, and the pernicious social and economic consequences of this racial residential segregation—for African Americans in particular—have been well-documented (Massey et al. 1988; 1991; Massey and Denton 1993). Quantitative studies of the determinants of racial residential segregation have adopted two main approaches. The most common research design is aggregate, computing measures of segregation between racial and ethnic groups for samples of cities or metropolitan areas, and examining how these levels of segregation are related to other metropolitan area characteristics (e.g., Farley and Frey 1994; Frey and Farley 1996; Krivo and Kaufman 1999; Logan, Stults, and Farley 2004; Iceland 2004; Massey and Denton 1987; 1993; White and Glick 1999; see Charles 2003 for a review). The degree to which blacks (and other minorities) are "hyper-segregated" from whites is also explored in this research tradition (Massey and Denton 1989; Wilkes and Iceland 2004). Although studies in this tradition occasionally disaggregate measures of racial residential segregation by social class (Fischer 2003; Iceland, Sharpe and Steinmetz 2005; Iceland and Wilkes 2006; Massey and Fischer 1999; St. John and Clymer 2000), ethnicity and nativity (Iceland 2009; Iceland and Scopilitti 2008; Scopilitti and Iceland 2008), and other characteristics (Clark and Blue 2004; Holloway et al. 2005), these studies focus primarily on metropolitan-area level determinants of residential segregation.

A second, somewhat less common, research design explores the determinants of residential segregation at the individual level through models of locational attainment. These studies typically use cross-sectional data to examine the associations between individual-level characteristics and the racial and ethnic composition of individuals' neighborhoods (e.g.,

Adelman 2005; Alba and Logan 1993; Alba, Logan and Stults 2000; Bayer, McMillan, and Rueben 2004; Freeman 2000; Logan, Alba, and Leung 1996; White and Sassler 2000; Woldoff 2008). Although studies in this tradition occasionally include a few metropolitan-area characteristics as predictors, their focus is primarily on the influence of individual characteristics, particularly indicators of socioeconomic status such as education, income, wealth, and homeownership.

In this paper, we bridge these two approaches to the study of racial residential segregation. We take individuals as our units of analysis, as in the locational attainment tradition, but focus on the influence of metropolitan-area characteristics that typically appear in aggregate-level studies. We use three waves of individual-level data spanning two decades from the Panel Study of Income Dynamics (PSID), to which we have appended data describing the racial composition of respondents' census tract of residence and the demographic, ecological, and economic structure of respondents' metropolitan areas. Because the individuals in our sample are nested within metropolitan areas, we apply hierarchical modeling techniques to these multilevel data.

We begin by examining an implicit assumption of aggregate-level studies of racial residential segregation, namely, that the metropolitan area one lives in has an important influence on the racial composition of blacks' and whites' neighborhoods. Despite aggregate-level studies' almost exclusive focus on between-metropolitan area variation in racial residential segregation, we actually know little about the degree to which black and white households' neighborhood racial composition varies across, rather than within, metropolitan areas. Thus, we begin by addressing this fundamental question, decomposing the variance in neighborhood racial composition into its between-metropolitan area and within-metropolitan area components. We

also examine changes during the 1980s and 1990s in black and white households' exposure to white and black neighbors. We then turn to an examination of how metropolitan area characteristics, such as their size, racial composition, economic vitality, industrial structure, and level of suburbanization, help to explain variation across metropolitan areas in blacks' and whites' neighborhood racial composition, while controlling for a wide array of established individual-level predictors. Here we seek to identify not only the metropolitan-area characteristics that are associated with the neighborhood racial composition of blacks and whites but, more directly related to racial segregation, how those characteristics are differentially associated with the locational attainments of blacks and whites.

BACKGROUND AND HYPOTHESES

Many of our most influential theories of residential attainment are virtually blind to the potential roles of metropolitan context. Speare's *residential satisfaction perspective* (Speare 1974; Speare et al. 1975) and the modifications and extensions of that framework (Landale and Guest 1985; Newman and Duncan 1979; Rossi 1980) focus on a set of personal and life-course variables that influence residential decision-making by affecting levels of residential satisfaction. Similarly, the influential *spatial assimilation model* (Alba et al. 1999; Massey 1985), rooted in the arguments of the traditional urban ecological paradigm, emphasizes socioeconomic characteristics as the main predictors of residential outcomes. Past studies demonstrate unequivocally that life-course indicators (e.g., age, marital status, the presence of children), housing characteristics (e.g., homeownership, crowding), and socioeconomic resources (e.g., income, education) associated with these models are often strong predictors of residential choice and opportunity and, therefore, must be taken into account in modeling racial differences in residential outcomes (South and Crowder 1997). However, both the residential satisfaction

model and the spatial assimilation perspective ignore the broader context in which residential attainment processes play out.

In contrast, at least two existing theoretical perspectives point to potentially important effects of economic, political, and demographic structures in the metropolitan area. First, the *place stratification* model draws attention to the barriers to residential mobility faced by black residents, especially in the form of discrimination within metropolitan housing markets (Galster 1991; Galster and Keeney 1988; Massey and Denton 1993). According to this perspective, the discriminatory practices of real estate agents (Pearce 1979; Yinger 1995), local governments (Shlay and Rossi 1981), and mortgage lenders (Shlay 1988; Squires and Kim 1995) create a racially segmented housing market that restricts residential options for African Americans, especially for those wishing to reside in racially integrated neighborhoods. White stereotyping of, and hostility towards, black residents may also impede blacks' access to racially-mixed or predominantly white neighborhoods (Charles 2006; Krysan and Farley 2002; Quillian and Pager 2001). The place stratification model also highlights the unwillingness of majority groups to share neighborhoods with minority residents and how whites in particular seek to avoid racially-mixed areas (Crowder 2000; Crowder and South 2008; Krysan 2002).

A second theoretical perspective focuses on an even broader set of structural constraints to, and facilitators of, residential attainment. According to the *housing availability model* (South and Crowder 1997), the likelihood of gaining access to a particular type of neighborhood, and racially integrated neighborhoods in particular, are largely contingent upon the quantity and quality of destination opportunities afforded by local housing markets and ecological structures. In those areas in which desirable destination opportunities are lacking, the likelihood of an individual actuating their residential preferences is likely to be relatively low. Although this

theoretical perspective is still developing, there is some evidence that the ecological conditions and residential opportunities afforded by the metropolitan area significantly influence neighborhood attainment processes (cf. Crowder 2000: Crowder and South 2005) and broader patterns of residential segregation (Farley and Frey 1994; Logan et al 2004).

In combination with aggregate studies of racial residential segregation, these theoretical arguments provide the basis for a number of hypotheses regarding possible effects of metropolitan area characteristics on the composition of neighborhoods occupied by white and black householders. One metropolitan area characteristic that has been linked to racial/ethnic residential segregation and that is especially germane to these theoretical models is the overall level of population **suburbanization**. Logan et al. (2004) find in a sample of 286 metropolitan areas in 2000 that suburbanization (as measured by the percentage of the population living outside of the central cities of the metropolitan area) is positively associated with black-white residential segregation. However, how this metropolitan area characteristic influences underlying race-specific patterns of neighborhood attainment, independent of the effects of micro-level determinants of residential outcomes, is unclear. The place stratification model implies that high levels of suburbanization inhibit black residential exposure to white populations while providing opportunities for white householders to insulate themselves in predominantly white neighborhoods.

Hypothesis 1a: The level of suburbanization in the metropolitan area will increase the concentrations of white population and decrease the concentrations of black population in the neighborhoods occupied by white householders.

Hypothesis 1b: For black householders, the concentration of whites in the neighborhood will be negatively associated, and the concentration of black neighbors positively associated, with the level of suburbanization in the metropolitan area.

In a similar way, the level of **political fragmentation** within the metropolitan area may significantly structure opportunities for residence in racially integrated neighborhoods. Farley and Frey (1994) argue that dramatic and persistent regional differences in levels of residential segregation by race (Farley and Frey 1994; Frey and Farley 1996; Logan et al. 2004), and changes therein, are at least partly a function of the fact that metropolitan areas of the Northeast and Midwest tend to encompass a multitude of suburban and exurban municipalities that have traditionally utilized their autonomy to erect land use regulations and zoning ordinances that serve to exclude minority groups. In contrast, annexation and county-wide governance in many metropolitan areas of the West and South have historically made exclusionary land-use policies less common.

Hypothesis 2a: A high level of political fragmentation in the metropolitan area will increase exposure of white householders to larger concentrations of white neighbors and reduce their exposure to black neighbors.

Hypothesis 2b: Among black householders, the level of political fragmentation in the metropolitan area will decrease residential exposure to white neighbors and increase exposure to black neighbors.

Several features of the population of the metropolitan area may have important influences on racially-differentiated patterns of neighborhood location. Aggregate studies have indicated that the level of racial segregation in a city is directly related to the size of the population (Farley and Frey 1994; Logan et al 2004), providing support for traditional ecological argument that

large population aggregations necessitate, and give rise to, spatial differentiation (c.f., Wirth 1938). It is not yet clear whether this broad ecological factor influences individual residential outcomes once the micro-level characteristics that affect residential location are taken into account.

Hypothesis 3a: Among black householders, the size of the metropolitan population will be associated with higher levels of exposure to black neighbors and lower exposure to white neighbors.

Hypothesis 3b: Among white householders, residential exposure to whites will increase and residential exposure to blacks will decrease with the overall size of the metropolitan population.

The housing availability and place stratification perspectives also have implications for the effects metropolitan-area racial composition on access to various types of neighborhoods. If the effects of metropolitan area racial composition simply reflect demographic opportunities to move to a neighborhood of a given racial-ethnic composition, as implied by the housing availability model, then we would expect these effects to operate similarly for black and white householders. Specifically, we would expect the relative size of the black population in the metropolitan area to increase the concentration of black neighbors in the neighborhoods occupied by both black and white householders. On the other hand, if members of different racial and ethnic groups respond differently to metropolitan-area racial composition then we would expect the effects to differ among white and black householders. For example, whites may respond to larger black populations by attempting more vigorously to segregate themselves from black populations, using discriminatory methods implicated in the place stratification model. This argument is consistent with group-threat arguments implying that discrimination against

minorities increases with the size of the minority group (Blalock 1967; Lieberson 1980) and with arguments pointing to more pronounced racial structuring of the housing market in metropolitan areas containing large minority populations (Stearns and Logan 1986). Under this scenario, whites would go to greater lengths to avoid integrated living, despite demographic constraints to the contrary, in metropolitan areas with relatively large black populations. As a result, we would expect that the relative size of the black population in the metropolitan area would have a weaker effect on the exposure to black neighbors for white than for black householders.

Hypothesis 4a: The relative size of the black population in the metropolitan area will increase the concentration of black residents in the neighborhoods occupied by both black and white householders.

Hypothesis 4b: The percentage black in the metropolitan area will have a stronger positive influence on the percentage black in neighborhoods occupied by black householders than in the neighborhoods occupied by white householders.

The role of discrimination, as highlighted in the place stratification perspective, is also reflected in at least some arguments related to the effect of **foreign-born populations** on race-specific patterns of residential location. According to what White and Glick (1999) have called the polarization model, the rapid influx of immigrants into the city might exacerbate the residential segregation of blacks from whites, in part by polarizing race relations and providing whites with an opportunity to create a residential buffer between themselves and blacks. Although White and Glick found little support for the polarization thesis in their study of changes in segregation levels between 1980 and 1990, this argument suggests that a high level of immigration to the metropolitan area will intensify whites' concerns over integration and may decrease their likelihood of entering or remaining in racially-mixed or predominantly black

neighborhoods, and increase their likelihood of seeking out areas with higher concentrations of whites. Similarly, while a high concentration of immigrants in the metropolitan area is likely to reduce racial isolation in the neighborhood by increasing overall racial and ethnic diversity in the area, it may also reduce the likelihood that black householders will gain access to areas with large white populations as whites' resistance to integration manifests itself as discriminatory barriers to black residential attainment.

Hypothesis 5a: Among black householders, larger shares of foreign-born populations in the metropolitan area will be associated with lower residential exposure to white and black neighbors.

Hypothesis 5b: Among white householders, the relative size of the foreign-born population in the metropolitan area will be positively associated with the concentration of whites in the neighborhood but negatively associated with the concentration of blacks in the neighborhood of residence.

The overall **economic health** of the metropolitan area may also shape race-specific processes of residential attainment. Poor economic conditions in the metropolitan may be accompanied by relatively small class differentials by race, thereby producing more similar residential outcomes for black and white householders. At the same time, high levels of poverty are likely to produce relatively unattractive conditions (e.g., poor housing stock, high crime, and low-quality schools) in many neighborhoods of the metropolitan area. To the extent that this poverty and related social dislocations are concentrated in predominantly black neighborhoods (Massey and Denton 1993; Jargowsky 1997), such conditions may lead individual householders to avoid neighborhoods with high concentrations of blacks. Following the place stratification model, white householders may be especially motivated and well-positioned to distance

themselves from relatively unattractive areas, and may adhere to discriminatory practices that limit black residential options. This raises the possibility of significant racial differences in the effects of metropolitan poverty levels on residential outcomes.

Hypothesis 6a: Among black and white householders, the poverty level in the metropolitan area will be positively associated with residential exposure to white neighbors and negatively associated with residential exposure to black neighbors.

Hypothesis 6b: The effect of metropolitan poverty level on residential exposure to white and black neighbors will be especially strong among white householders.

In their studies of inter-metropolitan variation in levels of black-white segregation, Farley and Frey (1994) and Logan et al. (2004) found that segregation between blacks and whites tends to vary significantly with the functional specialization of the metropolitan area. Specifically, levels of segregation tend to be relatively high in those metropolitan areas with an economic base heavily dependent on **manufacturing** and relatively low in areas with a specialization in **government** activities. Farley and Frey (1994) attributed these variations in segregation to a combination of population and ecological factors: differences in the type of housing available in cities with different economic foci, differences in the educational level and general social characteristics of the populations in these areas, and the impact of these population and housing characteristics on the adoption of fair housing legislation. Thus, it remains to be seen if the functional specialization of the metropolitan area has a similar influence on the residential location of black and white householders net of the effects of individual- and household-level characteristics that affect neighborhood choice.

Hypothesis 7a: Among black householders, residence in a neighborhood containing a larger share of white neighbors or a lower share of black neighbors will be negatively

associated with the economic dependence on manufacturing in the metropolitan area and positively associated with metropolitan specialization in government activities.

Hypothesis 7b: For white householders, residence in a metropolitan area in which the economic focus is on manufacturing will reduce residential exposure to white neighbors and increase exposure to black neighbors. Residence in a metropolitan area with a greater focus on government activities will have the opposite effect, reducing the concentration of whites and increasing the concentration of blacks in the neighborhoods occupied by white householders.

Finally, integral to the housing availability perspective is the assumption that characteristics of the metropolitan-area housing stock play a role in shaping patterns neighborhood attainment. For example, Farley and Frey (1994) and Logan et al. (2004) find that the supply of **new housing** in the metropolitan area is inversely associated with black-white segregation, an effect that has been interpreted as a function of both the availability of housing options and anti-discrimination legislation governing new housing. Farley and Frey (1994) argue that new housing developments usually lack the exclusionary reputations of older, predominantly white areas and have frequently been subjected to more audits and other measures aimed at detecting and redressing discriminatory housing practices. Following this argument, the availability of new housing may open up opportunities for residential attainment in general, but is likely to have a particularly strong impact on residential opportunities for black householders. However, here, too, little is known about how the metropolitan-level supply of new housing affects the residential location of black or white households net of the effects of micro-level measures of neighborhood attainment.

Hypothesis 8a: The relative availability of new housing in the metropolitan area will have a positive effect on the concentrations of white residents and a negative effect on the concentrations black residents in neighborhoods occupied by black householders.

Hypothesis 8b: For white householders, high concentrations of new housing in the metropolitan area will increase residential exposure to black neighbors and reduce exposure to white neighbors.

DATA AND METHODS

The PSID is a well-known longitudinal survey of U.S. residents and their families (Hill 1992). Starting in 1968, members of the initial panel of approximately 5,000 families were interviewed annually until 1997 and biennially thereafter. New families have been added to the panel as children and other members of original panel families form their own households. By 2005, a cumulative total of over 9,000 families had been included in the survey panel, providing information on more than 67,000 individuals over the course of the study. Sample attrition has been modest, especially in more recent years, and has not compromised the representativeness of the sample (Duncan and Hill 1989).

For this analysis we select black and white household heads (or "householders") from the 1981, 1991, and 2001 PSID waves. We select household heads rather than all PSID sample members because the decision as to which neighborhood to live in is most often a family decision, and selecting only household heads avoids the double-counting of the same locational decision for all family members. We select these years rather than decennial census years because the PSID did not conduct interviews in 2000. Using data from waves ten years apart aligns our study closely with census-based studies, and also sharply reduces the number of individuals who contribute data to more than one wave. We treat these three waves of data as

repeated cross-sections. Given our focus on the effects of metropolitan-area characteristics on households' neighborhood racial composition, we restrict the sample to individuals who were residing in a census-defined metropolitan area at the time of the interview. Our sample consists of 13,671 person-year observations (contributed by 8,767 persons), which are nested within 274 metropolitan areas.[1]

A particularly valuable feature of the PSID for our purposes is the availability of restricted-access Geocode Files that allow us to determine householders' census tract and metropolitan area of residence at each interview. We use this information to append to each householder's data record information describing their tract and metropolitan area. Following most prior work in both the aggregate and individual-level (i.e., locational attainment) traditions, we use census tracts as our approximation of neighborhoods. In the main analyses we use as our dependent variable the percentage of the tract population that is non-Hispanic white, but building on the recommendation of Wright, Ellis, and Parks (2005) we also report the results of supplementary analyses that use the percentage of the tract population that is non-Hispanic black as the outcome. These supplementary analyses acknowledge that the residential integration of blacks and of whites often means living with other races and ethnicities, in addition to one another (Iceland 2004; Logan et al. 2004). Tract-level census data are drawn from the Neighborhood Change Data Base (NCDB), in which data from earlier censuses (1970, 1980, and 1990) have been normalized to 2000 tract boundaries, allowing us to produce consistent, time-varying measures of neighborhood racial composition (GeoLytics 2008). We use linear interpolation and extrapolation to estimate the values of tract percent non-Hispanic white and tract percent non-Hispanic black for 1981, 1991, and 2001.

Measuring the Independent Variables: Our focal independent variables are characteristics of the PSID households' metropolitan area of residence as of the interview wave. Metropolitan area population size is measured in logged form to reduce skewness. We also include the percentage of the metropolitan area population that is non-Hispanic black, the percentage living in households with an income below the poverty level, and the percentage of the population that is foreign-born. Our measures of metropolitan-area industrial structure are the percentage of the labor force employed in manufacturing and the percentage working in local, state, or federal government. New housing construction is measured by the proportion of housing units built in the prior ten years. All of these variables are computed from the 1980, 1990, and 2000 U.S. Census of Population Summary Files (U.S. Department of Commerce 1984; 1992; 2004). The percentage of the metropolitan area population residing in the suburban ring of the metropolitan area is taken from the U.S. Department of Housing and Urban Development's State of the Cities Data Systems (U.S. Department of Housing and Urban Development 2009). Our measure of political fragmentation, adapted from Bischoff (2008), uses data on the number and size of municipal governments in each metropolitan area as given in the U.S. Census of Governments (U.S. Department of Commerce 2008). This measure captures the probability that two randomly selected individuals from the same metropolitan area live in different municipalities. Formally, the measure is defined as

$$frag = \sum_{d=1}^{k} p_d (1 - p_d)$$

where p is the proportion of individuals in the metropolitan area k living in municipality d. There is complete fragmentation if all metropolitan-area residents live in different municipal districts and there is complete incorporation if all individuals live in a single metropolitan-wide

municipality. As with the measures of census tract racial composition, we use linear interpolation and extrapolation to estimate metropolitan-level values of these characteristics for the years 1981, 1991, and 2001.

Although our primary focus is on the influence of metropolitan-area characteristics, we also control for an array of individual-level predictors of neighborhood racial composition. These controls help to adjust for differences in population composition across metropolitan areas that could confound associations between metropolitan-level ecological characteristics and levels of residential segregation. Householder's race is a dummy variable scored 1 for black respondents and 0 for white respondents. Householder's sex is a dummy variable scored 1 for female household heads and 0 for male household heads. Householder's age is measured continuously in years. Married respondents (and long-term cohabitors) are distinguished from unmarried respondents by a dummy variable. The number of children in the household is measured continuously. Homeowners are distinguished from renters with a dummy variable. Household crowding is measured by the number of persons per room in the dwelling. Householder's educational attainment is measures by completed years of schooling. Family income refers to total taxable income for householders and (if present) spouses, in constant 2000 dollars. A dummy variable distinguishes employed householders from nonemployed householders. Finally, we control for the PSID interview year with dummy variables for the 1991 and 2001 waves, with the 1981 wave serving as the reference. To facilitate interpretation of their effects, all continuous independent variables are grand mean centered.

Analytical Strategy: We use hierarchical linear modeling (HLM) to examine the impact of metropolitan-area characteristics on PSID householders' census tract racial composition. The multilevel analysis proceeds in two parallel steps. First, random intercept models are estimated

for blacks and whites separately. These race-specific regression models include a random intercept at the metropolitan-level. The random intercept corrects for the observational clustering within metropolitan areas and decomposes the variance into the within and between components. Estimating models separately for blacks and for whites allows for a comparison of the variance components across groups. The race-specific random intercept models take this general form:

$$Y_{ij} = \beta_{0j} + \beta X_{\text{time dummies}} + \beta X_{\text{individual characteristics}} + r_{ij}$$
$$\beta_{0j} = \gamma_{00} + \gamma Z_{\text{msa characteristics}} + u_{0j}$$

A second series of multilevel models pools together the black and white samples. These models include a random intercept for metropolitan areas and a random slope householder's race. The random slope captures the difference in neighborhood racial composition between blacks and whites across metropolitan areas. Estimating pooled models for whites and blacks provides information about how well metropolitan-level characteristics account for racial differences in neighborhood racial composition. The racially-pooled random intercept and random slope models take this general form:

$$Y_{ij} = \beta_{0j} + \beta X_{\text{time dummies}} + \beta X_{\text{individual characteristics}} + \beta x_{\text{black}} + r_{ij}$$
$$\beta_{0j} = \gamma_{00} + \gamma Z_{\text{msa characteristics}} + u_{0j}$$
$$\beta_{\text{black}} = \gamma_{10} + \gamma Z_{\text{msa characteristics}} + u_{1j}$$

These models are efficient and asymptotically unbiased under the following assumptions (Raudenbush and Bryk 2002:255). First, the level-one residuals (i.e., within-metropolitan area disturbances) are normally distributed and conditionally independent with a mean of zero in each metropolitan area and with equal variances across metropolitan areas [i.e., $r_{ij} \sim$iid $N(0, \sigma^2)$]. Second, the individual-level and metropolitan-level predictors are independent of r_{ij} and are independent of the random effects (u_{0j}, u_{1j}). Third, the random effects (u_{0j}, u_{1j}) are multivariate

normal with a mean of zero and an estimated variance (τ_{00}, τ_{11}) and a covariance (τ_{01}). Fourth, the level-one residuals and level-two random effects are conditionally independent.

RESULTS

Table 1 presents descriptive statistics for all variables used in the analysis separately for the black and white PSID householders.[2] Immediately apparent is the pronounced difference between blacks and whites in neighborhood racial composition. Black householders reside in census tracts that are on average 27% non-Hispanic white and 64% non-Hispanic black. In contrast, white PSID householders reside in tracts that are on average 85% non-Hispanic white and less than 6% non-Hispanic black. These sharp racial differences in neighborhood racial composition underscore the high levels of residential segregation between blacks and whites in U.S. metropolitan areas.

Table 1 about here

With one exception, these black and white PSID householders inhabit metropolitan areas with generally similar values on the focal explanatory variables. The exception is racial composition: black respondents reside in metropolitan areas that average 22% non-Hispanic black; in contrast, white respondents reside in metropolitan areas that are, on average, only 12% non-Hispanic black. Compared to the metropolitan areas inhabited by white PSID householders, the metropolitan areas inhabited by black PSID householders tend to be slightly larger, poorer, less politically fragmented, and more suburban, and to have more new housing, and their industrial structure is less oriented toward manufacturing and more toward government employment. But these differences are generally small.

Much larger racial differences are observed for the individual-level explanatory variables. Compared to the white PSID householders, the black PSID householders are more likely to be

female (49% of blacks versus 24% of whites) and, correspondingly, less likely to be married (38% of blacks versus 65% of whites). The black respondents are slightly younger than the white respondents (mean age for blacks = 40.3 years, versus 43.8 years for whites). On average, the black PSID households in our sample have more children present (1.19 versus .76 for whites) and are more crowded (.69 persons per room for blacks versus .51 for whites). Sharp racial differences are observed in home ownership, with 37% of blacks but 68% of whites owning their homes.

Racial differences in the indicators of socioeconomic status are also pronounced. Black householders have completed almost two fewer years of schooling than white householders (mean for blacks = 11.9 versus 13.7 for whites) and are less likely to be employed (65% versus 77%). The mean income of black families is only about half the mean income of white families (mean = $34k for blacks versus $66k for whites).

Table 2 presents a series of multilevel linear models predicting blacks' and whites' neighborhood racial composition, here measured as the percentage of the tract population that is non-Hispanic white. Model 1 is a one-way analysis of variance (ANOVA) with random effects, or what Raudenbush and Bryk (2002) refer to as a fully unconditional model. The variance components, used to compute the intraclass correlation coefficient (ICC), allow us to determine the percentage of the variance in neighborhood racial composition that exists across metropolitan areas. For blacks, 40% of the variance in the percentage of the residential tract that is non-Hispanic white is between metropolitan areas (419.03 / (419.03 + 634.29)); the corresponding figure for whites is 35% (112.02 / (112.01 + 204.78)). Thus, although a substantial proportion of the (within-race) variation in blacks' and whites' exposure to non-Hispanic white neighbors is attributable to their location in different metropolitan areas, it is also clear that most of the

variation exists within metropolitan areas. Also worth noting is the substantially greater overall variance in blacks' exposure to white neighbors relative to whites' exposure to white neighbors. For blacks, the 95% confidence interval for tract percent non-Hispanic white ranges from 42.7% to 50.5% (46.629 +/- (1.96)(1.993)). The parallel confidence interval for whites ranges only from 83.6% to 86.4% (85.007 +/- (1.96)(.739)).

Table 2 about here

Model 2 of Table 2 includes as independent variables the two dummy variables for the 1991 and 2001 survey years, with the 1981 survey serving as the reference category. Among black households, between 1981 and 1991 there was a statistically significant increase of almost 2 points in the percentage of the tract population that is non-Hispanic white, followed by a drop of about 1.49 points (1.95 - .46) between 1991 and 2001. In contrast, white households' exposure to white neighbors fell monotonically over this period, dropping by over two and one-half percentage points between 1981 and 1991 and then by another 4 percentage points from 1991 to 2001. This trend is consistent with declining levels of white-nonwhite residential segregation observed over this period (e.g., Logan, Stults, and Farley 2004; Timberlake and Iceland 2007).

Model 3 of Table 2 adds as predictors the individual-level covariates. For blacks, several of the variables exhibit the expected association with the percentage of the residential tract population that is non-Hispanic white. Black households that are headed by older individuals, that are more crowded, and (at a borderline level) have more children tend to reside in neighborhoods with comparatively fewer non-Hispanic whites. Black households that are comprised of a married (or cohabiting) couple, that have higher incomes, and whose head has more education tend to live in neighborhoods with comparatively more non-Hispanic white

residents. Net of the effects of the other predictors, householder's gender, tenure (i.e., homeownership), and employment status are not significantly associated with neighborhood racial composition. The individual-level covariates account for 5% of the variance in tract percent non-Hispanic white at the individual level and about 14% of the variance in tract percent non-Hispanic white at the metropolitan level (computed from changes in variance components from Model 2 to Model 3).

Controlling for the individual-level covariates almost completely eliminates the increase in black households' tract percent non-Hispanic white from 1981 to 1991, and causes the change from 1981 to 2001 to become negative and statistically significant. Thus, over this period black households would have become exposed to fewer non-Hispanic whites in their neighborhoods if these households had not experienced the observed changes in the individual-level covariates.

A somewhat different set of predictors emerges for whites. White households headed by females, that have more children, and that are more crowded tend to reside in neighborhoods with comparatively fewer non-Hispanic whites. White households headed by married/cohabiting couples, that are owner-occupied, that have higher incomes, and in which the head has more education tend to reside in census tracts with comparatively more whites. Householder's age and employment status do not exhibit net associations with tract racial composition in this model. Again comparing the variance components in Models 2 and 3, the individual-level covariates are seen to explain only 3% of the variance in tract percent non-Hispanic white at the individual level and less than 1% of the variance in tract percent non-Hispanic white at the metropolitan level.

Model 4 of Table 2 adds to Model 3 the metropolitan-level (Level-2) covariates. Among blacks, three of these variables take on statistically significant coefficients. The percentage of

black households' tract population that is non-Hispanic white is lower in larger metropolitan areas and in metropolitan areas that have relatively large black and foreign-born populations. The nine added covariates explain about 60% of the (Model 5) metropolitan-level variance in black households' exposure to non-Hispanic white neighbors ((359.53 – 145.42) / 359.53). It is worth noting that, once these metropolitan-level covariates are controlled, the coefficients for the time trend dummy variables become positive and significant at a borderline level. Changes in metropolitan structure, and particularly the growth in the black and foreign-born populations, tend to suppress increases in black householders' exposure to white neighbors.

Again, a somewhat different set of predictors emerges for whites. As was the case for blacks, whites households' exposure to non-Hispanic white neighbors is significantly lower in larger metropolitan areas and in metropolitan areas with relatively large black and foreign-born populations. In addition, however, the percentage of the population that is white in white householder's tracts is comparatively smaller in metropolitan areas characterized by a large supply of newly-constructed housing and high poverty rates, and this percentage is higher in metropolitan areas with greater political fragmentation. The nine added metropolitan-level covariates explain over two-thirds of the (Model 5) metropolitan-level variance in white households' exposure to non-Hispanic white neighbors ((113.97 – 36.67) / 113.97).

The borderline significant ($p < .10$) inverse association between metropolitan-area percent black and the percentage of non-Hispanic whites in white households' tracts runs contrary to the hypothesis, derived from group threat theory, that whites will sequester themselves in predominantly white neighborhoods when faced with large African American populations in the larger metropolitan area. Although whites may especially prefer such neighborhoods in metropolitan areas containing large black populations, these preferences are apparently

overridden by the necessity to share neighborhoods with nonwhites when blacks comprise an unusually large share of the metropolitan area population. In metropolitan areas with large black populations, the simple availability of neighborhoods with a comparatively large percentage of blacks appears to trump any ostensible desire of whites to avoid living near nonwhites.

Studies of the effects of metropolitan-level characteristics on racial residential segregation imply both that racial differences in neighborhood attainment vary significantly across metropolitan areas and that metropolitan-level characteristics differentially affect the neighborhood attainments of blacks and whites. The models presented in Table 3 address these issues by analyzing the pooled sample of black and white PSID households. The first model (Model 1) is a random-coefficient model in which the effect of being black on the percentage of the tract population that is non-Hispanic white is allowed to vary across metropolitan areas. In the average metropolitan area, black households reside in tracts that are 36 percentage points less white than are the tracts that white households reside in. Equally important, the black slope is shown to vary significantly across metropolitan areas. That is, the racial difference in the percentage of neighbors who are non-Hispanic white differs significantly from one metropolitan area to the next.

Table 3 about here

The remaining models in Table 3 treat the black slope as the outcome. Thus, these models examine how survey year and the individual-level and metropolitan-level covariates are associated with the *racial difference* in exposure to non-Hispanic white neighbors. Model 2 adds the period dummy variables. Both coefficients are statistically significant. The change in the black-white difference in the percent of the tract population that is non-Hispanic white grew more pronounced by 4½ points between 1981 and 1991 and then by almost another 2½

percentage points between 1991 and 2001. As shown in Table 2, these trends were generated more by declines in whites' exposure to non-Hispanic white neighbors than by increases in blacks' exposure to non-Hispanic white neighbors.

Model 3 adds individual-level covariates. Several of these predictors are significantly associated with the racial difference in the percentage of the tract population that is non-Hispanic white. More so than among white householders, older black householders are more likely than their younger counterparts to reside in neighbors with few whites. The difference in exposure to white neighborhoods between married-couple households relative to other household types is more pronounced among blacks than among whites. Children reduce blacks' exposure to non-Hispanic whites more than whites' exposure to non-Hispanic whites. Owning one's home is associated with residence in whiter neighborhoods significantly less so for blacks than for whites. Consistent with what has been called the "weak version" of the place stratification model (Logan and Alba 1993), both education and income are more positively associated with the percentage of the tract population that is non-Hispanic white among black household heads than among white household heads. About 13% of the inter-metropolitan variance in the black-white difference in tract percent non-Hispanic white is explained by racial differences in the individual-level covariates (.13 = (445.136 – 390.460) / 445.136).

Of central relevance for this study are the coefficients for the metropolitan-area covariates. Three of these are statistically significant. First, metropolitan area population size (logged) is associated with diminished exposure to white neighbors more among black households than among white households. Although in large metropolitan areas both blacks and whites tend to reside in neighborhoods with comparatively fewer non-Hispanic whites (Table 2, Model 4), this association is significantly stronger among blacks. Thus, metropolitan area

population size is associated with higher levels of black-white residential segregation (Logan, Stults, and Farley 2004) primarily because it reduces blacks' exposure to white neighbors.

Second, the percentage of the metropolitan area population that is black is more negatively associated with black households' exposure to white neighbors than with white households' exposure to white neighbors. This finding may offer somewhat more qualified support for the "group threat" hypothesis than does the analysis presented in Table 2. Although both whites and blacks live in "less white" neighborhoods in metropolitan areas with large black populations—likely a consequence of the simple availability of nonwhite neighbors—the association is weaker for whites than for blacks, perhaps suggesting that whites consciously attempt to counteract opportunities to share their neighborhoods with blacks when blacks are numerically well-represented in the larger metropolitan area. As shown in Table 2, whites are unsuccessful at completely overriding these opportunities. But the racial difference in the association between metropolitan-area percent black and exposure to white neighbors may suggest that whites may have a special proclivity to avoid black neighbors in metropolitan areas with large black populations.

Third, the effect of the municipal fragmentation on the percentage of the tract population that is non-Hispanic white is significantly less positive among black households than among white households. Relative to metropolitan areas with less municipal fragmentation, in metropolitan areas with greater fragmentation whites live in much whiter neighborhoods than do blacks. About 44% of the Model 3 inter-metropolitan variance in the black slope is explained by the metropolitan-area characteristics (.44 = (390.460 – 217.547) / 390.460).

It is worth noting that the period changes in the residential distributions of black and white households are not the result of changes in the measured metropolitan-area characteristics,

including changes in racial and foreign-born composition, since these effects are held constant in Model 4. Thus, these net changes in blacks and white households' exposure to non-Hispanic white neighbors suggest that other factors, such as an increased tolerance for other-race neighbors (Schuman, Steeh, and Bobo 1997) or the more rigorous enforcement of fair housing laws (Ross and Turner 2005), may play a role in accounting for declines in racial residential segregation.

Exposure to Non-Hispanic Black Neighbors

Households' exposure to non-Hispanic white neighbors is, of course, only one dimension of locational attainment; their levels of exposure to other racial groups are also important markers of spatial assimilation (Wright, Ellis, and Parks 2005). Moreover, given the rise of multi-ethnic cities and neighborhoods (Fong and Shibuya 2005), the conceptualization and measurement of neighborhood ethnic-racial composition using only the proportional representation of non-Hispanic whites may obscure important variation in neighborhood locational attainment. Accordingly, we now examine the determinants of black and white households' exposure to non-Hispanic black neighbors. The percentage of the tract population that is non-Hispanic black and the percentage that is non-Hispanic white are, of course, inversely correlated, but the presence of other racial (and ethnic) groups means that these two variables are not perfect mirror images of each other.

Table 4 repeats the analysis presented in Table 2 using the percentage of households' tract population that is non-Hispanic black as the outcome. Model 1, the random effects ANOVA, shows that about 39% of the variance in black households' exposure to non-Hispanic black neighbors is between metropolitan areas (489.53 / (489.53 + 772.05)). Among white households, only 21% of the variance in the percentage of the tract population that is non-Hispanic black is at

the metropolitan level (25.554 / (25.554 + 98.661)). Thus, white households' proximity to black neighbors does not vary greatly from one metropolitan area to the next, primarily because whites are exposed to very few black neighbors no matter where whites live.

Table 4 about here

Model 2 of Table 4 shows that, over time, black households have become less exposed to non-Hispanic black neighbors. The average percent non-Hispanic black in black households' census tracts dropped by 3.6 percentage points from 1981 to 1991 and by another 2.3 percentage points from 1991 to 2001. These changes were matched by opposite, though smaller, changes in white households' exposure to black neighbors. The average percent non-Hispanic black in white households' census tracts increased by about one-half of a percentage point from 1981 to 1991 and then by another percentage point from 1991 to 2001.

Model 3 adds the individual-level covariates. Among black households, the coefficients for these variables come close to mirroring their effects on the percentage of the tract population that is non-Hispanic white (Table 2). Black households headed by older persons and that are more crowded live in neighborhoods with a larger percentage of non-Hispanic blacks. Black households headed by married couples and those in which the head has higher levels of education and the family has higher income are exposed to comparatively fewer non-Hispanic black neighbors. The individual-level covariates account for 4% of the variance in tract percent non-Hispanic black at the individual level and about 11% of the variance in tract percent black at the metropolitan level (computed from changes in variance components from Model 2 to Model 3).

White households that are headed by married couples and that are owner-occupied tend to reside in tracts containing proportionally fewer non-Hispanic blacks. White households with higher incomes and in which the head has more education and is currently employed also tend to

live in neighborhoods with fewer black residents. However, these individual-level characteristics account for only a minuscule proportion of the variance—at either the individual or metropolitan levels—in white households' exposure to non-Hispanic black neighbors.

Model 4 of Table 4 adds to Model 3 the metropolitan-area covariates. For black households, the three metropolitan-area predictors that emerged as statistically significant in the models of exposure to non-Hispanic white neighbors also emerge as significant in the model of proximity to non-Hispanic black neighbors. Metropolitan-area population size and percent black are positively associated with the tract percentage non-Hispanic black—the mirror image of the corresponding effects on the tract percentage that is non-Hispanic white. The percentage of the metropolitan-area population that is foreign born, which likely reflects the relative size of the Hispanic and Asian populations, is inversely associated with black households' exposure to non-Hispanic black neighbors, consistent with the effect of foreign-born population size on black households' exposure to non-Hispanic white neighbors (Table 2). Thus, the larger the size of the non-white and non-black populations (proxied by percent foreign-born), the lower is blacks' exposure to both non-Hispanic blacks and non-Hispanic whites. In addition to these predictors, the percent of the metropolitan-area labor force employed by government is significantly and inversely associated with black households' exposure to black neighbors. The metropolitan-level covariates explain 67% of the (Model 5) metropolitan-level variance in black households' exposure to non-Hispanic black neighbors (421.41 – 138.26) / 421.41).

Only two metropolitan-area covariates exhibit significant associations (at conventional levels) with white households' exposure to non-Hispanic black neighbors. First, the percentage of recently-built housing in the metropolitan area is positively associated with whites' exposure to black neighbors. Second, the larger the relative size of the non-Hispanic black population in

the metropolitan area, the greater is the percentage non-Hispanic black in white households' tract of residence. Again, in absolute terms, we find little support for the group-threat hypothesis that whites' have a special proclivity to avoid having black (or nonwhite) neighbors in metropolitan areas with large black (or nonwhite) populations. As a group the metropolitan-level covariates explain over 73% of the (Model 3) metropolitan-level variance in white households' exposure to non-Hispanic black neighbors ((25.84 – 7.07) / 25.84).

The analysis presented in Table 5 repeats the Table 3 analysis, now using tract percent non-Hispanic black as the outcome. Model 1, the random-coefficient model, indicates that in the average metropolitan area black households reside in tracts that are on average 31.94 percentage points more non-Hispanic black than are the tracts that white households reside in. And, the slope for black race varies significantly across metropolitan areas.

Table 5 about here

The other models treat the black slope as the outcome. For the most part, these effects mirror the effects of the covariates on the racial difference in the tract percent non-Hispanic white shown in Table 3. Model 2 adds the period dummies. Again, the changes in the black-white difference in the percent of the tract population that is non-Hispanic black grew more pronounced between 1981 and 2001. As shown in Table 4, this shift was due more to a decline in blacks' exposure to black neighbors than to an increase in whites' exposure to black neighbors.

Model 3 adds the individual-level covariates. Householder's age is more positively associated with exposure to non-Hispanic black neighbors among blacks than among whites. Relative to same-race unmarried couples, black married-couple households are exposed to fewer black neighbors than are white married-couple households. Homeownership has a significantly

different effect for black and white households, decreasing white households' exposure to black neighbors but increasing black households' exposure to black neighbors. Household crowding is associated at a borderline significance level with greater exposure to non-Hispanic black neighbors more among black than among white households. Householder's education and income are more negatively associated with tract percent non-Hispanic black among blacks than among whites. About 11% of the inter-metropolitan variance in the black-white difference in tract percent non-Hispanic black is explained by racial differences in the individual-level covariates (.11 = (472.36 – 419.84) / 472.36).

Several of the cross-level interactions are also significant. Metropolitan-area population size increases black households' exposure to black neighbors more than white households' exposure to black neighbors. Metropolitan-area percent black increases black households' exposure to black neighbors more than white households' exposure to black neighbors, perhaps again providing qualified support for group-threat theory. The percentage of the metropolitan-area population that is foreign-born more strongly diminishes black households' than white households' exposure to black neighbors. Barely failing to attain statistical significance at the .05 level are the coefficients for the municipal fragmentation index and the percentage of the metropolitan-area labor force employed in government. Compared to metropolitan areas with low levels of municipal fragmentation, in highly fragmented metropolitan areas blacks are especially more likely than whites to reside in "blacker" neighborhoods. And, in metropolitan areas in which a large percentage of the labor force works in government, the racial difference in exposure to non-Hispanic black neighbors is comparatively smaller. The metropolitan-area covariates explain about 46% of the (Model 3) inter-metropolitan variance in the black slope (.46 = (419.84 – 225.96) / 419.84).

DISCUSSION AND CONCLUSION

Over 40 years since the passage of the 1968 Fair Housing Act, high levels of racial residential segregation remain a defining feature of the American urban landscape. Studies of the determinants of segregation have tended to adopt one of two analytical approaches. Aggregate-level studies focus primarily on the characteristics of cities and metropolitan areas that are associated with high or low levels of segregation. Individual-level locational attainment studies focus mainly on the characteristics of individuals and households that are associated with the racial composition of their neighborhoods. We merge these two approaches by exploring the characteristics of metropolitan areas that are associated with black and whites households' neighborhood racial composition. Multilevel analysis of three waves of data—spanning two decades—from the Panel Study of Income Dynamics and the decennial census yields four main conclusions.

First, while a nontrivial proportion of the variance in blacks' and whites' neighborhood racial composition exists across metropolitan areas, most of the variance exists within metropolitan areas. We find that about 20-40% of the variance exists across metropolitan areas. Thus, comprehensive accounts of why some households of a given race share neighborhoods with households of a different race will need to attend both to individual-level determinants that operate within metropolitan areas, including households' demographic and economic characteristics, *and* the structural and ecological characteristics of metropolitan areas.

Second, white households' exposure to minority neighbors increased between 1981 and 2001, and these changes cannot be easily attributed to changes in the ecological structure—including the demographic composition—of metropolitan areas over this period. We also find

that, after controlling for relevant individual-level and metropolitan-level predictors, black households experienced an increase in the proportion of their neighbors that are non-Hispanic white (mainly from 1981 to 1991) and a decrease in the proportion of their neighbors that are non-Hispanic black. As with the residual change over time in neighborhood racial composition among white households, these changes may perhaps be attributable to changes in racial and ethnic groups' willingness to share neighborhoods with each other, although we cannot of course dismiss the possibility that changes in other unmeasured individual or metropolitan-area characteristics could also explain these trends. Declines in housing discrimination against blacks, perhaps resulting from more rigorous enforcement of fair housing laws, may also play a role (Ross and Turner 2005).

A third key conclusion of our analysis is that several of the metropolitan-area characteristics that have previously been identified as salient predictors of metropolitan-level segregation also explain inter-metropolitan variation in black and white households' neighborhood racial composition. The strongest and most consistent of these predictors are variables that capture the racial and nativity composition of the metropolitan area. In general, in metropolitan areas with comparatively large black and foreign-born populations, blacks and whites are less likely to share neighborhoods with non-Hispanic whites and more likely to share neighborhoods with minorities. And in metropolitan areas with comparatively large black populations, both blacks and whites are more likely to share neighborhoods with African Americans. These effects of metropolitan-area race-ethnic composition on households' neighborhood racial composition likely reflect the simple opportunity for households to share neighborhoods with members of a given race-ethnic group. Regardless of their preferences for neighborhoods of a given race-ethnic composition, members of a particular race-ethnic group

will be constrained to share neighborhoods with an out-group when the size of the out-group is large. For example, whites will have difficulty attaining residence in all-white neighborhoods in metropolitan areas with large minority populations because such areas will contain few all-white neighborhoods for whites to live in. While perhaps an intuitive finding, the strong association between metropolitan-area racial and nativity composition, on the one hand, and neighborhood racial composition, on the other, has not been emphasized in the literature on neighborhood attainment.

Moreover, although blacks and whites are more segregated from each other in metropolitan areas with larger black populations (Logan, Stults, and Farley 2004), this should not be taken to mean that whites reside in "whiter" neighborhoods in metropolitan areas with larger black populations. Indeed, the reverse is true. We do find that whites react differently than blacks to metropolitan-area racial and nativity composition, perhaps suggesting that whites are especially motivated to self-segregate in metropolitan areas with large minority populations. But the structural constraints on neighborhood choice imposed by large minority populations in the greater metropolitan area mean that, despite whites' presumably accentuated aversion to living near minorities in high-minority metropolitan areas, they nonetheless live closer to minorities in such communities.

One important implication of the strong association between metropolitan-area racial-nativity composition and households' neighborhood racial-ethnic composition is that increasing population diversity in metropolitan areas will assuredly shape households' exposure to neighbors of a different race and ethnicity. Quite apart from any changes in neighborhood preferences or tolerances for other-race neighbors, as metropolitan areas become more demographically diverse whites will be more and more constrained to reside near neighbors of a

different race or ethnicity. Granted, whites may attempt to combat this tendency by moving to less diverse metropolitan areas (cf. Frey 1995). But increasing population diversity in most metropolitan areas (Frey 2006), as in the U. S. population as a whole, will mean that, more and more, whites will be constrained to share neighborhoods with nonwhites.

Other metropolitan-area characteristics are also associated with black and white households' neighborhood racial composition, and generally in a manner consistent with the Farley-Frey (1994) framework. Even controlling for other metropolitan-level predictors, metropolitan-area population size reduces blacks' exposure to white neighbors more than it reduces whites' exposure to white neighbors, this contributing to higher levels of residential segregation. Higher levels of municipal fragmentation differentially affect blacks' and whites' exposure to white and black neighbors in ways that foster segregation. And high levels of governmental employment reduce blacks' more than whites' proximity to black neighbors, thereby lessening racial residential segregation.

Future research on the metropolitan-level determinants of neighborhood race-ethnic composition might profit by addressing some of the limitations of this analysis. One limitation is the sample size. Although the PSID holds some important advantages for studying the individual-level and metropolitan-level determinants of neighborhood attainment, the sample is not large, at least compared to census data. More importantly, the PSID does not allow for the analysis of racial groups other than whites and blacks over this study's time frame.[3] Analyses of the metropolitan-level predictors of neighborhood racial and ethnic composition using larger samples would enhance confidence in our results and allow them to be extended to other racial and ethnic groups. Future research might also capitalize on a key strength of the PSID—its

longitudinal design—to examine how metropolitan-area characteristics influence household migration between neighborhoods of varying racial and ethnic composition.

Finally, our understanding of the causes of racial residential segregation and neighborhood attainment might benefit from greater theoretical and empirical integration of individual-level and metropolitan-level determinants. Our analysis demonstrates that both individual endowments and metropolitan-area characteristics play important roles in shaping households' neighborhood exposure to members of different races (and, to some extent, ethnicities). But we have for the most part treated these influences separately. This strategy may be an oversimplification, inasmuch as the influence of individual-level determinants may vary across metropolitan areas. For example, it is possible that the effect of individual socioeconomic resources (e.g., education, income) on neighborhood racial-ethnic composition might vary by the racial-ethnic composition of the metropolitan area. Thus, a complete explanation for variation in households' neighborhood racial and ethnic composition may require attending to the joint and perhaps complex interactions between individual-level and metropolitan-level determinants.

NOTES

[1] In supplementary analyses we adjusted for this slight non-independence of observations by including in the multilevel regression models a random intercept for households. However, including this random intercept had no impact on the coefficients of primary interest so we present models without this term. Similar adjustments for the small amount of clustering within census tracts also had no appreciable impact on our substantive conclusions.

[2] The relatively large sample of blacks is a consequence of the PSID's initial over-sampling of poor families.

[3] The PSID Latino sample was only followed from 1990 to 1995.

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Table 1: Descriptive Statistics for Variables Used in Analysis of Census Tract Racial Composition : Black and White Respondents for the 1981, 1991, and 2001Waves Panel Study of Income Dynamics

	Black		White	
	Mean	S.D.	Mean	S.D.
DEPENDENT VARIABLES				
% non-Hispanic White in tract	27.39	(29.39)	85.03	(17.24)
% non-Hispanic Black in tract	63.63	(32.65)	5.84	(11.08)
INDEPENDENT VARIABLES				
Year 1981	0.36	(0.48)	0.33	(0.47)
Year 1991	0.36	(0.48)	0.37	(0.48)
Year 2001	0.28	(0.45)	0.30	(0.46)
Individual Characteristics				
Age	40.31	(15.32)	43.83	(16.87)
Female (1=yes)	0.49	(0.50)	0.24	(0.43)
Married (1=yes)	0.38	(0.49)	0.65	(0.48)
Number of children	1.19	(1.36)	0.76	(1.07)
Home owner (1=yes)	0.37	(0.48)	0.68	(0.47)
Persons per room	0.69	(0.44)	0.51	(0.30)
Education (in years)	11.87	(2.83)	13.72	(3.19)
Family income ($1000s)	34.03	(29.52)	66.10	(74.37)
Employed (1=yes)	0.65	(0.48)	0.77	(0.42)
Metropolitan Characteristics				
Population size (ln)	14.37	(0.98)	13.92	(1.20)
% new housing	22.48	(9.13)	20.61	(9.72)
% black	22.47	(9.38)	12.20	(9.55)
% in poverty	12.30	(3.27)	11.36	(3.24)
% living in suburban area	63.00	(16.11)	60.81	(18.70)
Municipal fragmentation	0.70	(0.23)	0.73	(0.23)
% foreign-born	7.89	(8.24)	8.03	(7.86)
% of labor force in manufacturing	14.95	(6.17)	16.48	(6.77)
% of labor force in local, state, or federal government	16.06	(5.91)	14.12	(4.35)
N of respondents	5825		7846	

Table 2: Multilevel Models of Census Tract Percent Non-Hispanic White: Black and White Respondents from the 1981, 1991, and 2001 Waves of the Panel Study of Income Dynamics

	Model 1		Model 2		Model 3		Model 4	
	Black	*White*	*Black*	*White*	*Black*	*White*	*Black*	*White*
INDEPENDENT VARIABLES	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)
Intercept	46.629 ***	85.007 ***	45.746 ***	88.293 ***	45.388 ***	84.560 ***	35.752 ***	81.433 ***
	(1.993)	(.739)	(2.050)	(.783)	(2.203)	(.989)	(2.206)	(1.035)
Year 1991 (ref. 1981)			1.955 *	-2.644 ***	.374	-3.223 ***	3.289 †	-3.031 ***
			(.784)	(.385)	(.809)	(.385)	(1.685)	(.674)
Year 2001 (ref. 1981)			.463	-6.608 ***	-2.010 *	-7.716 ***	5.143 †	-5.933 ***
			(.850)	(.408)	(.875)	(.414)	(2.783)	(.988)
Individual Characteristics								
Age					-.141 ***	-.016	-.143 ***	-.014
					(.026)	(.013)	(.026)	(.013)
Female(1=yes)					.034	-1.036 *	.029	-1.056 *
					(.863)	(.485)	(.861)	(.481)
Married (1=yes)					3.080 **	1.072 *	3.173 ***	.952 *
					(.952)	(.470)	(.949)	(.465)
Number of children					-.555 †	.150	-.582 †	.104
					(.299)	(.187)	(.298)	(.185)
Home owner (1=yes)					.472	2.295 ***	.513	2.352 ***
					(.823)	(.408)	(.822)	(.404)
Persons per room					-2.831 **	-2.159 **	-2.796 **	-1.895 **
					(.921)	(.656)	(.920)	(.651)
Education (in years)					.793 ***	.306 ***	.810 ***	.308 ***
					(.131)	(.055)	(.131)	(.055)
Family income ($1000s)					.115 ***	.013 ***	.116 ***	.014 ***
					(.015)	(.002)	(.015)	(.002)
Employed (1=yes)					.802	.592	.719	.498
					(.792)	(.478)	(.791)	(.474)
Metropolitan Characteristics								
Population size (ln)							-7.420 ***	-2.207 ***
							(1.566)	(.574)
% new housing							.057	-.129 **

													(.104)		(.043)	
% black													-.903	***	-.100	†
													(.143)		(.058)	
% in poverty													-.224		-.607	***
													(.306)		(.117)	
% living in suburban area													-.013		-.007	
													(.084)		(.031)	
Municipal fragmentation													-3.736		14.447	***
													(7.140)		(2.409)	
% foreign-born													-.673	***	-.804	***
													(.150)		(.066)	
% of labor force in manufacturing													-.154		-.077	
													(.214)		(.075)	
% of labor force in local, state, or federal government													.236		-.155	
													(.242)		(.103)	
VARIANCE COMPONENTS																
Level-two: τ_{00}																
Random intercept (MSA)	419.03		112.02		416.53		114.69		359.53		113.97		145.92		36.67	
Level-one: σ^2																
Residual variance	634.29		204.78		633.84		197.87		601.79		191.30		601.79		189.31	
Pseudo R^2 level-two					.01		.00		.14		.00		.65		.67	
Pseudo R^2 level-one					.00		.03		.05		.07		.05		.08	
LRT χ^2 (Df)					6.75*	(2)	259.32***	(2)	321.2***	(9)	268.28***	(9)	93.56***	(9)	299.75***	(9)
Log likelihood (Df)	-27202	(3)	-32280	(3)	-27199	(5)	-32150	(5)	-27038	(14)	-32016	(14)	-26991	(23)	-31866	(23)
AIC	54410		64565		54407		64310		54104		64059		54029		63788	
BIC	54430		64586		54441		64345		54198		64157		54182		63938	
N	5825		7846		5825		7846		5825		7846		5825		7846	

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3: Multilevel Models of the Black-White Difference in Census Tract Percent Non-Hispanic White: Black and White Respondents from the 1981, 1991, and 2001 Waves of the Panel Study of Income Dynamics

INDEPENDENT VARIABLES	Model 1 *b/*(s.e.	Model 2 *b/*(s.e.	Model 3 *b/*(s.e.)	Model 4 *b/*(s.e.)
Intercept	85.113 *** (.736)	88.372 *** (.814)	84.611 *** (1.168)	82.305 *** (1.190)
Black	-36.093 *** (2.011)	-39.981 *** (2.055)	-36.787 *** (2.272)	-44.235 *** (2.426)
FIXED EFFECTS ON BLACK-WHITE DIFFERENCE				
Year 1991 (ref. 1981)		4.564 *** (.812)	3.583 *** (.827)	5.605 *** (1.664)
Year 2001 (ref. 1981)		6.943 *** (.872)	5.603 *** (.891)	9.505 *** (2.704)
Individual Characteristics				
Age			-.123 *** (.027)	-.128 *** (.027)
Female(1=yes)			1.117 (.950)	1.085 (.946)
Married (1=yes)			2.057 * (.987)	2.238 * (.982)
Number of children			-.725 * (.348)	-.660 # (.346)
Home owner (1=yes)			-1.876 * (.855)	-1.902 * (.851)
Persons per room			-.598 (1.158)	-.937 (1.152)
Education (in years)			.483 *** (.127)	.487 *** (.127)
Family income ($1000s)			.102 *** (.012)	.102 *** (.012)
Employed (1=yes)			.216 (.905)	.219 (.901)
Metropolitan Characteristics				
Population size (ln)				-5.358 *** (1.674)
% new housing				.166 † (.101)
% black				-.735 *** (.151)
% in poverty				.328

				(.295)
% living in suburban area				.049
				(.089)
Municipal fragmentation				-16.402 *
				(7.281)
% foreign-born				.180
				(.152)
% of labor force in manufacturing				-.105
				(.205)
% of labor force in local, state, or federal government				.320
				(.238)
VARIANCE COMPONENTS				
Level-two: τ_{00}				
Random intercept (MSA)	93.33	95.49	96.15	25.61
Level-two: τ_{11}				
Random slope (black)	457.45	445.14	390.46	217.55
Level-two: τ_{01}				
Covariance (intercept, slope)	-34.81	-30.60	-35.97	-23.79
Level-one: σ^2				
Residual variance	388.46	384.30	366.81	365.18
Pseudo R^2 level-two intercept		.00	.00	.73
Pseudo R^2 level-two slope		.03	.15	.52
Pseudo R^2 level-one residual		.01	.06	.06
LRT χ^2 (Df)	1463.2*** (2)[A]	145.91***(4)	654.72***(18)	343.72***(18)
Log likelihood (Df)	-60519 (6)	-60446 (10)	-60118 (28)	-59946 (46)
AIC	121050	120912	120292	119984
BIC	121095	120988	120502	120330
N	13671	13671	13671	13671

† p < .10; * p < .05; ** p < .01; *** p < .001

A: The null model for the Likelihood Ratio Test is a random intercept model only. The two additional degrees of freedom in Model 1 are attributed to a random slope (black, τ_{11}) and the covariance (τ_{01}) between the random intercept and random slope.

Table 4: Multilevel Models of Census Tract Percent Non-Hispanic Black: Black and White Respondents from the 1981, 1991, and 2001 Waves of the Panel Study of Income Dynamics

	Model 1		Model 2		Model 3		Model 4	
	Black	*White*	*Black*	*White*	*Black*	*White*	*Black*	*White*
INDEPENDENT VARIABLES	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)	*b/*(s.e.)
Intercept	40.988 ***	5.667 ***	44.411 ***	4.918 ***	44.789 ***	7.315 ***	55.032 ***	9.339 ***
	(2.163)	(.382)	(2.204)	(.420)	(2.407)	(.601)	(2.300)	(.615)
Year 1991 (ref. 1981)			-3.606 ***	.554 *	-2.248 **	.782 **	-5.509 **	1.458 ***
			(.862)	(.271)	(.894)	(.273)	(1.804)	(.427)
Year 2001 (ref. 1981)			-5.892 ***	1.580 ***	-3.722 ***	2.080 ***	-10.602 ***	2.784 ***
			(.935)	(.287)	(.967)	(.293)	(2.955)	(.605)
Individual Characteristics								
Age					.146 ***	.005	.154 ***	.004
					(.029)	(.009)	(.029)	(.009)
Female(1=yes)					-.038	.380	-.179	.336
					(.953)	(.344)	(.950)	(.341)
Married (1=yes)					-4.148 ***	-.835 **	-4.281 ***	-.856 **
					(1.052)	(.332)	(1.048)	(.330)
Number of children					.364	-.047	.377	-.045
					(.330)	(.132)	(.329)	(.131)
Home owner (1=yes)					1.283	-1.213 ***	1.030	-1.231 ***
					(.910)	(.289)	(.907)	(.286)
Persons per room					2.910 **	.860 †	3.062 **	.814 †
					(1.018)	(.465)	(1.015)	(.462)
Education (in years)					-.722 ***	-.119 **	-.749 ***	-.116 **
					(.145)	(.039)	(.144)	(.039)
Family income ($1000s)					-.120 ***	-.006 ***	-.117 ***	-.006 ***
					(.016)	(.002)	(.016)	(.002)
Employed (1=yes)					-.615	-.818 *	-.695	-.853 **
					(.876)	(.339)	(.873)	(.337)
Metropolitan Characteristics								
Population size (ln)							6.712 ***	-.063
							(1.603)	(.304)
% new housing							-.162	.070 **

											(.111)		(.026)	
% black											1.466	***	.444	***
											(.148)		(.031)	
% in poverty											-.062		.068	
											(.326)		(.070)	
% living in suburban area											.112		.015	
											(.086)		(.017)	
Municipal fragmentation											10.351		-2.597	†
											(7.391)		(1.361)	
% foreign-born											-.429	**	-.007	
											(.158)		(.038)	
% of labor force in manufacturing											.067		.065	
											(.227)		(.045)	
% of labor force in local, state, or federal government											-.628	*	.097	†
											(.258)		(.059)	
VARIANCE COMPONENTS														
Level-two: τ_{00}														
Random intercept (MSA)	489.53		25.55		474.55		25.88		421.41		25.84		138.26	7.07
Level-one: σ^2														
Residual variance	772.05		98.66		767.18		98.26		735.02		96.46		733.61	96.11
Pseudo R^2 level-two					.03		.00		.14		.00		.72	.72
Pseudo R^2 level-one					.01		.01		.05		.02		.05	.03
LRT χ^2 (Df)					41.44***	(2)	30.87***	(2)	266.30***	(9)	150.97***	(9)	120.50***	(9) 227.58** (9)
Log likelihood (Df)	-27772	(3)	-29344	(3)	-27752	(5)	-29328	(5)	-27619	(14)	-29253	(14)	-27558	(23) -29139 (23)
AIC	55551		58693		55513		58666		55265		58533		55163	58324
BIC	55571		58714		55547		58701		55358		58631		55316	58484
N	5825		7846		5825		7846		5825		7846		5825	7846

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 5: Multilevel Models of the Black-White Difference in Census Tract Percent Non-Hispanic Black: Black and White Respondents from the 1981, 1991, and 2001 Waves of the Panel Study of Income Dynamics

INDEPENDENT VARIABLES	Model 1 *b/(*s.e.	Model 2 *b/(*s.e.	Model 3 *b/(*s.e.	Model 4 *b/(*s.e.
Intercept	5.617 *** (.420)	4.897 *** (.533)	7.211 *** (.988)	9.273 *** (.990)
Black	31.943 *** (2.065)	35.992 *** (2.094)	34.464 *** (2.315)	41.478 *** (2.428)
FIXED EFFECTS ON BLACK-WHITE DIFFERENCE				
Year 1991 (ref. 1981)		-4.115 *** (.809)	-3.020 *** (.827)	-4.260 ** (1.631)
Year 2001 (ref. 1981)		-7.317 *** (.868)	-5.687 *** (.890)	-8.257 ** (2.663)
Individual Characteristics				
Age			.141 *** (.027)	.148 *** (.027)
Female(1=yes)			-.585 (.949)	-.544 (.944)
Married (1=yes)			-3.461 *** (.986)	-3.382 *** (.980)
Number of children			.391 (.347)	.388 (.345)
Home owner (1=yes)			2.421 ** (.853)	2.364 ** (.847)
Persons per room			2.132 † (1.155)	2.364 * (1.148)
Education (in years)			-.589 *** (.127)	-.607 *** (.126)
Family income ($1000s)			-.112 *** (.012)	-.111 *** (.012)
Employed (1=yes)			.193 (.904)	.190 (.900)
Metropolitan Characteristics				
Population size (ln)				5.850 *** (1.679)
% new housing				-.119 (.096)
% black				.924 *** (.150)

% in poverty				.035 (.287)
% living in suburban area				.012 (.088)
Municipal fragmentation				12.986 † (7.273)
% foreign-born				-.481 *** (.146)
% of labor force in manufacturing				.203 (.201)
% of labor force in local, state, or federal government				-.422 † (.229)
VARIANCE COMPONENTS				
Level-two: τ_{00} Random intercept (MSA)	17.26	17.47	17.59	2.88
Level-two: τ_{11} Random slope (black)	489.85	472.36	419.85	225.96
Level-two: τ_{01} Covariance (intercept, slope)	21.66	22.01	18.19	-10.12
Level-one: σ^2 Residual variance	385.19	382.91	368.22	366.02
Pseudo R^2 level-two intercept		.00	.00	.83
Pseudo R^2 level-two slope		.04	.14	.54
Pseudo R^2 level-one residual		.01	.04	.05
LRT χ^2 (Df)	1789.00***(2)[A]	87.21***(4)	557.01***(18)	300.01***(18)
Log likelihood (Df)	-60356 (6)	-60313 (10)	-60034 (28)	-59884 (46)
AIC	120725	120645	120124	119860
BIC	120770	120721	120335	120206
N	13671	13671	13671	13671

† p < .10; * p < .05; ** p < .01; *** p < .001

A: The null model for the Likelihood Ratio Test is a random intercept model only. The two additional degrees of freedom in Model 1 are attributed to a random slope (black, τ_{11}) and the covariance (τ_{01}) between the random intercept and random slope.