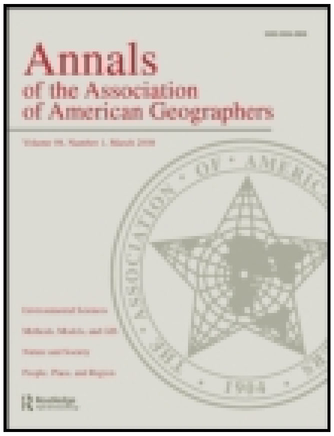

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Agents of Change: Mixed-Race Households and the Dynamics of Neighborhood Segregation in the United States

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Agents of Change: Mixed-Race Households and the Dynamics of Neighborhood Segregation in the United States

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This article explores the effects of mixed-race household formation on trends in neighborhood-scale racial segregation. Census data show that these effects are nontrivial in relation to the magnitude of decadal changes in residential segregation. An agent-based model illustrates the potential long-run impacts of rising numbers of mixed-race households on measures of neighborhood-scale segregation. It reveals that high rates of mixed-race household formation will reduce residential segregation considerably. This occurs even when preferences for own-group neighbors are high enough to maintain racial separation in residential space in a Schelling-type model. We uncover a disturbing trend, however; levels of neighborhood-scale segregation of single-race households can remain persistently high even while a growing number of mixed-race households drives down the overall rate of residential segregation. Thus, the article's main conclusion is that parsing neighborhood segregation levels by household type—single versus mixed race—is essential to interpret correctly trends in the spatial separation of racial groups, especially when the fraction of households that are mixed race is dynamic. More broadly, the article illustrates the importance of household-scale processes for urban outcomes and joins debates in geography about interscalar relationships. *Key Words: households, mixed race, neighborhoods, racial segregation, scale.*

本文探讨了混血家庭的形成对邻里规模种族隔离趋势的影响。人口普查数据显示，这些影响相对于居住隔离的年代际变化的幅度来说是不小的。基于智能体的模型说明了越来越多的混血家庭对邻里规模的隔离测量有潜在的长远影响。它揭示了高比例混血家庭的形成将明显减少住宅区的隔离程度。这种情况甚至在人们对自己同类邻居的喜好高到足以维持谢林型模式中住宅空间的种族分离时也出现。但是，我们也发现一个令人不安的趋势，单一种族家庭的邻里规模隔离水平可以保持持续的高，甚至当越来越多的混血家庭驱使住宅区的隔离率整体下降时。因此，本文的主要结论是通过邻里类别，即单一与混合种族，解析邻里隔离对正确地解释种族群体的空间隔离趋势是必不可少的，尤其是当混合种族家庭的比例是动态的时候。更广泛地说，本文阐释了邻里规模的过程对城市结果的重要性，并加入有关交互尺度关系的地理辩论。关键词：家庭，混血种族，邻里，种族隔离，规模。

Este artículo explora los efectos que tiene la formación de familias mestizas sobre las tendencias de segregación racial a escala de barrio. Los datos censales muestran que estos efectos no son triviales en relación con la magnitud de cambios en segregación residencial registrados durante décadas. Un modelo a base de agente ilustra los impactos potenciales de largo alcance en un creciente número de hogares mestizos a partir de mediciones de la segregación a escala de barrio. El modelo revela que altas tasas de formación de hogares de raza mezclada reducirán considerablemente la segregación residencial. Esto se presenta incluso cuando las preferencias por vecinos del propio grupo son lo suficientemente altas para mantener la separación racial en el espacio residencial según un modelo tipo Schelling. Sin embargo, pusimos al descubierto una tendencia inquietante; los niveles de segregación a escala de barrio para hogares de una sola raza pueden permanecer persistentemente altos aun en el caso de que un creciente número de familias de razas mezcladas haga descender la tasa general de segregación residencial. Entonces, la principal conclusión del artículo es que el análisis de los niveles de segregación vecinal por tipos de familias – de una sola raza versus raza mezclada – es esencial para interpretar correctamente las tendencias de la separación espacial de grupos raciales, en especial cuando la fracción de las familias que son de raza mezclada es dinámica. Más ampliamente, el artículo ilustra la importancia de los procesos a escala familiar para lo que sobrevenga en la ciudad, y se une a los debates que ocurren en geografía sobre relaciones a escalas diferentes. *Palabras clave: hogares, raza mestiza, vecindarios, segregación racial, escala.*

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Scholars continue to dispute the causes of residential racial segregation. In the United States, arguments that discrimination against minorities, especially Blacks, remains a potent force (e.g., Galster 1992; Massey and Denton 1993; Yinger 1997; Meyer 2000; Massey and Lundy 2001; Adelman 2005) contrast with claims that preference for own-group neighbors rather than covert discrimination undergirds today's levels of segregation (e.g., Clark 1991, 1992; Thernstrom and Thernstrom 1997; Fossett 2006; Clark and Fossett 2008).[1] Scholars do agree on this: Declines in segregation occur when members of one racial group move into neighborhoods where other groups account for a larger fraction of the population. We add a twist to this account by considering the effects on residential racial segregation of changes in the fraction of households that are racially mixed. Whenever such households form they combine individuals from two or more racial groups in one neighborhood. Consequently, the more numerous these households, the lower the overall extent of neighborhood-scale segregation between racialized groups. This article investigates the sensitivity of neighborhood segregation levels to the presence of mixed-race households using two strategies—one based on trends observable in confidential 1990 and 2000 U.S. Census long-form data, the other deploying an agent-based simulation—to explore how increases in mixed-race household formation have affected neighborhood racial segregation in the recent past and how they might shape it in the long run.

Our project is situated within a well-established and diverse tradition of research on geographies of racial mixing. Segregation analysts investigate the extent to which people from different racialized groups share neighborhoods (e.g., Duncan and Duncan 1955; Taeuber and Taeuber 1964; Clark 1991; Massey and Denton 1993; Logan, Stults, and Farley 2004; Johnston, Poulsen, and Forrest 2007; Brown and Chung 2008). Research on geographies of multiracial people treats the body as the scale of interest, asking where multiracial people live and how their identities are contingent on these locations (e.g., Harris and Sim 2002; Mahtani 2002; Holloway et al. 2009). Studies linking these two scales together find that multiracial people are generally less segregated in residential space than their single-race counterparts (Johnston, Poulsen, and Forrest 2006; Clark and Maas 2009). Our contribution is to foreground the household scale, which, apart from research on the spatial determinants of mixed-race marriage (e.g., Peach 1980), has received scant attention as a scale of racial mixing in geographical inquiry (cf. Wright et al. 2003; Holloway et al. 2005).

Mixed-race households take several forms. Census 2000 revealed that 68 percent of these households were headed by opposite-sex couples, each person in the couple claiming a different race; the remainder included same-sex couples, households with adopted, step- or foster children, and unrelated roommates (Ellis et al. 2007). These contrasting living arrangements signify different degrees and types of intimacy; regardless of the form or depth of the attachment, they all unite people of two or more races in one household location and thereby affect segregation measured by neighborhood. The percentage of individuals in mixed-race households, especially for Whites and Blacks, is relatively small. U.S. Census 2000 microdata revealed that 94.9 percent of Whites, 92.0 percent of Blacks, 83.9 percent of Latinos, and 80.3 percent of Asians lived in single-race households; that is, households made up of people from the same racial group. Prior research shows how these living arrangements exerted a measureable downward effect on neighborhood segregation levels in 1990. Specifically, the residential segregation for those who live in single-race households was higher than the conventionally reported measures of segregation, which includes those who live in all racial household types—single- *and* mixed-race (Ellis et al. 2007). It stands to reason that changes in the frequency of mixed-race households over time could be partly responsible for changes in assessments of aggregate neighborhood segregation (i.e., measured conventionally using all members of racial groups regardless of living arrangement). In what follows we gauge how changing numbers of mixed-race households affect aggregate segregation trends and whether this development obscures what is happening to the spatial separation of the majority who live in single-race households.

We seek not only to devise appropriate empirical strategies to investigate and report on these issues but also to highlight the broader ramifications of our work for conceptualizing the role of mixed-race households, and household demographic change more generally, in the remaking of urban space (Buzar, Ogden, and Hall 2005). With few exceptions, investigations of the formation and location of mixed-race households—most notably how and where mixed-race couples form and where they subsequently live—do not speak to the implications of these developments for the transformation of spaces beyond the household (cf. Wong 1998; Ellis et al. 2007). Bringing the study of mixed-race households into investigations of residential racial segregation joins the study of interracial intimacy within homes to the literature on residential segregation and neighborhood change. This fusion illustrates how racialized processes at one scale—the private space of households—affect racialized dynamics at another scale—the public space of neighborhoods. As such, our work is mindful of arguments about public–private dichotomies and interdependencies featured prominently in scholarship about space and social relations (Marston 2000; Fincher 2004; England 2008; Staeheli and Mitchell 2008). Before reporting on our empirical work, we selectively survey key literatures on mixed-race households, residential racial segregation, and scale that inform our approach.

What Drives Changes in Neighborhood Segregation?

The research on residential racial segregation is voluminous. The general consensus is that between 1990 and 2000, U.S. segregation levels fell, slowly, for Whites and Blacks but increased for Asians and Latinos (Iceland 2004; Logan, Stults, and Farley 2004). The increase in neighborhood spatial isolation for Asians and Latinos resulted from immigration-led population growth in which newcomers located in close proximity to members of their own conational groups rather than behavioral shifts by these groups or others that promoted spatial separation (Iceland and Scopilliti 2008). Absent this immigration, the isolation of these groups would likely have fallen. Several papers disaggregate these and other trends, picking apart the details for specific groups by income, nativity, or some other variable, to gain additional insight. The bulk of this research shows that even as minority incomes or socioeconomic status rises, groups remain segregated, albeit at slightly lower levels than before (Clark and Blue 2004; Iceland and Wilkes 2006; Clark 2007). This persistent segregation leads to two interpretations (Charles 2003): Discrimination still operates, albeit "under the table" given its legal proscription (e.g., Yinger 1997), or people prefer own-group neighbors sufficiently to maintain racial divisions in urban space in the absence of discrimination (e.g., Clark 1991, 1992; Fossett 2006). The preference story has several variants. Some argue that neighborhood racial composition is not the direct motivation for neighborhood choice but a proxy for other neighborhood characteristics, such as crime and poverty, that people with resources seek to avoid (Harris 1999). Others note that Blacks often cite the chilly reception they expect to receive in majority White neighborhoods and so choose to live with similar others (Farley, Fielding, and Krysan 1997; Logan, Stults, and Farley 2004).

Whether one thinks that discrimination still shapes residential real estate markets or considers the evidence of preference studies sufficient to explain persistent segregation, residential mobility is the mechanism that produces changes in the spatial separation of groups. Simply put, people move into one neighborhood from another and the aggregate effect of this mobility on the geography of group population distributions drives residential racial segregation up or down.

Why do people move? Although most segregation research takes a limited view of this process by highlighting the role of own-group preference or racial discrimination (e.g., Farley, Fielding, and Krysan 1997; Bruch and Mare 2006; Clark and Fossett 2008; Krysan and Bader 2008), the residential mobility literature takes a broader perspective. It conceptualizes moves as the result of households searching for suitable housing and neighborhood environments (Rossi 1955; Clark and Dieleman 1996). Transitions in the life course, such as family formation, having children, or entry or exit from the workforce, condition the utility of housing and its surrounds, motivating when and where households move contingent on their income and neighborhood affordability (Brown and Moore 1970; Speare 1974; Clark, Deurloo, and Dieleman 1984, 2006; Clark and Huang 2003). Given geographical variation in the availability of housing types and neighborhood amenities, the aggregate outcome of these decisions is a patterning of urban residential spaces by household size, type, and age (Gober 1981). Families with children tend to cluster together in areas where single-family homes predominate; young single people are disproportionately found in areas where apartments prevail; and the elderly often gravitate to locales nearest particular sets of amenities and services. This geographic sorting will generate racial segregation if racial groups differ in their predominant household types. Thus, understanding segregation dynamics requires not only consideration of the dueling forces of discrimination and preference for own-group neighbors emphasized in the segregation literature but also an awareness of changes in household organization and the distribution of groups across household types.

Empirical work on how household organization and type affect segregation is relatively sparse but finds, for example, that families with children are more racially segregated than single-person households (Iceland et al. 2010). Thus, changes in the way groups organize into households, such as having relatively more single-person households and fewer families with children, could change levels of segregation. Average family size varies across U.S. metropolitan areas (Gober 1981), so this effect might partially explain the observed interurban variation in segregation. Innovative U.K. research shows that differences in life cycle stage and housing size between non-White immigrants and Whites helps to account for rising rates of White–non-White segregation (Simpson, Gavalas, and Finney 2008).

We aspire to add to this literature by assessing the effects of changes in the frequency of one particular living arrangement—mixed-race households—on residential racial segregation dynamics. Mixed-race households necessarily mingle people from different racial groups in the same neighborhood. A greater propensity to mix within households should drive down (or restrain increases in) segregation at the neighborhood scale, and declines in household-scale mixing should increase (or limit decreases in) neighborhood segregation. The magnitude of these effects will depend additionally on where mixed-race households locate within residential space, specifically, on where they tend to live relative to those in single-race households.

Judging these mixed-race household effects requires some modifications of existing models of segregation dynamics. For example, consider the components of the Schelling schema from which most other models of segregation dynamics are derived. Schelling (1971) investigated how preferences for neighborhood racial composition affect the sorting of people by groups across residential space. The individual or household units who do the preferring, and who move if they do not like the neighborhood's racial mix, belong to one group or another; none of the households are racially mixed. The introduction of mixed-race households to such a model necessitates a distinction between the preferences of single- and mixed-race households because research shows that the latter, particularly households headed by Black–White couples, have a greater preference for racial diversity than the former (Dalmage 2000; Holloway et al. 2005; Wright, Holloway, and Ellis 2011).

Researchers must also decide how potential movers racialize members of mixed-race households when they are evaluating neighborhood environments. For example, do they view them as if they are an all-minority household (a household scale "one-drop rule"; Hollinger 2005), or do they assess neighboring households' populations based on the race of individuals within them (i.e., treating a Black–White couple as one Black neighbor and one White neighbor)? Such assessments will likely condition the effect of changes in the frequency of mixed-race households on residential segregation.

Mixed-Race Households and Neighborhood Segregation

The idea of a relationship between racial mixing in households and neighborhoods has a long history in research on mixed marriage (e.g., Bossard 1932). The relationship we posit—that mixed-race households affect residential segregation across neighborhoods—reverses the directionality of the effects presumed by that literature. The traditional view holds that residential segregation measured at the neighborhood scale—as a measure of social or spatial distance or both—determines mixed-marriage rates: The greater the level of segregation between groups, the lower the rate of marriage between them (e.g., Bossard 1932; Davie and Reeves 1939; Abrams 1943; Kennedy 1943; Clarke 1952; Peach 1980; Morgan 1981; Coleman and Haskey 1986; Lieberson and Waters 1988; Kalmijn and Flap 2001). By suggesting that the effect might work the other way we do not reject the empirical findings of existing mixed-race marriage research, but we are suggesting that they require modification. Much of this work is several decades old and from a time when it was much easier to imagine that neighborhoods circumscribed social worlds, limiting the possibilities for partner selection from further afield. In segregated cities, these circumstances necessarily curtailed partner choice to those in one's own group or to those from groups who were least segregated from it.

Fewer socio-spatial constraints on partner choice exist today. Antidiscrimination laws and affirmative action policies have made workplaces and colleges more racially diverse (Bowen and Bok 1998; Estlund 2003). This, plus the increased entry of women into the labor force, has expanded the range of possibilities for partner selection. At the same time, traditional constraints on partner choice, such as family, have weakened since the 1960s with the growth in independence of young adults (Rosenfeld 2007). More recently, the Internet and social networking tools of the last few years have added to the chances for meaningful contact beyond the boundaries of one's immediate segregated residential milieu (Houston et al. 2005).

We are not arguing that all of the barriers to intimate social interaction between groups have come down or that removal of the remaining obstacles to such contact will be smooth and inevitable. Race remains a salient force in U.S. society, and there are disturbing signs of rollbacks in public policies that promoted desegregation in schools and colleges (e.g., Bowen and Bok 1998; Boger and Orfield 2005). Persistent neighborhood-based segregation, however, is plainly not the constraint to social interaction across racial lines that it was even two decades ago. Increased contact in nonneighborhood spaces (Ellis, Wright, and Parks 2004) combined with relaxing attitudes to interracial intimacy (Romano 2001) and interaction help explain why rates of mixed-race household formation have accelerated in recent years while changes in residential segregation have been sluggish.

We know little about where people meet their spouses or intimate others (Rosenfeld and Thomas 2010). Historically, marital distance—the distance between the residences of spouses prior to marriage—was short (Morrill and Pitts 1967; Coleman 1977; Coleman and Haskey 1986). Most people married someone close by, typically from the neighborhood. This, though, is changing. Recent studies from France and The Netherlands suggest that the neighborhood has declined in importance as a locale for meeting romantic partners, with alternatives such as workplaces becoming more important (Bozon and Héran 1989; Kalmijn and Flap 2001). U.S. research shows that between 15 and 18 percent of people met their partners in the workplace (Laumann et al. 1994). The growth of gender-balanced workplaces appears to be partly responsible for this phenomenon (Svarer 2007). One can easily imagine how racially diverse and gender-balanced workplaces would elevate the odds that some of these romances are racially mixed.

The forces that extend the spatial range of potential romantic partners will also diversify the pool of roommate candidates, which raises the probability that this type of household living arrangement will be also of mixed race. Increased racial diversity in workplaces and colleges within educational and income classes similarly increases the odds that roommates are of different races. These populations—roughly equal on social and economic dimensions other than race—will probably search for housing in overlapping areas from the same workplace or college location.

The expanding contact space argument is not relevant in the case of mixed-race households that form through adoption or foster parenting. Relaxed attitudes are most likely responsible for the increased frequency of these arrangements. Although children from some groups remain heavily favored for transracial adoption over others, Black children, traditionally the least preferred for adoption, are now being adopted at slowly increasing rates in these arrangements, too (Clemetson and Nixon 2006).

The Household Scale and Segregation

Residential racial segregation varies with the spatial scale of measurement (Cowgill and Cowgill 1951; Cortese, Falk, and Cohen 1976; Wong 1997; Kaplan and Holloway 2001). In the United States, scholars typically use census tracts (which mark off areas usually containing between 4,000 and 8,000 people) for segregation analysis because they provide the greatest range of associated social and economic data (Massey and Denton 1988). A few scholars advocate for census blocks, usually the equivalent of a city block but sometimes smaller, to capture the microgeographies of residential racial segregation existing within tracts (Cowgill and Cowgill 1951). Block groups—clusters of blocks—offer a third alternative between larger tracts and smaller blocks (e.g., Frey and Farley 1996). Neighborhood racial segregation measured at the block scale is typically greater than in tracts; generally, the finer the scale of analysis, the higher the degree of segregation (Wong 1997, 2003, 2004). This scale effect is not just a residential phenomenon; segregation analyses of schools and workplaces disguise higher levels of racial separation within specific classrooms, lunchrooms, playgrounds, and workstations (Steinhorn and Diggs-Brown 1999; Tatum 2003).

Tracts and blocks delimited the range of scale possibilities for measuring residential segregation for many years. This has begun to change with the widespread availability of sophisticated geographic information systems and spatial statistics, especially interpolation and smoothing methods. These technologies make it relatively easy to infer segregation at multiple scales. For example, some have interpolated segregation from census data into 100-meter grids, which will correspond roughly to a single household in low-density suburban areas but is the equivalent of many households in more dense multiunit parts of metropolitan areas (Wu and Sui 2001; Sui and Wu 2006). Others propose to measure segregation at the individual scale, taking the view that types of interpersonal contact provide a useful assessment of racial diversity in social spaces (Schnell and Yoav 2001; Echenique and Fryer 2007). In a more integrative vein, some now advocate a continuous approach to scale effects on segregation, aiming to identify which scales matter the most for racial separation (Lee et al. 2008; Reardon et al. 2008; Reardon et al. 2009; cf. Fischer et al. 2004).

As part of this growing interest in scale and segregation, some researchers have mused that, with the right data, one could treat the household as a microspatial container of segregation, in effect using the household as another spatial scale of measurement within a continuum that includes blocks and tracts (Omer and Benenson 2002; Reardon et al. 2008). Although this is potentially useful, the household has social characteristics that complicate treating it as just a microspatial version of administrative spatial units or as simply another scale of measurement within the domain of the modifiable areal unit problem. Households are the basic social and demographic organizational unit in society. They form and dissolve, adding and losing members through individual and joint decisions about who to live with (e.g., marriage, cohabitation, divorce) and because of life course events (e.g., births, deaths). These capacities occur within a context of intimacy where interactions have different meaning and significance from those occurring outside the home, regardless of their proximity. Feminists have emphasized the distinctive role of the household as the private locus of reproduction, consumption, and domesticity, and they have contrasted social relations at this scale from those in public scales of work, production, and civic life (Marston 2000; England 2008). This literature cautions, however, that we resist viewing this public–private divide as impermeable and fixed; such a position risks obscuring the substantial impact of changing social relations and demographic events within the domestic sphere on scales beyond the home (Fraser 1989; Marston 2000; Fincher 2004). What goes on within households, including changes in their size and composition, transforms the social geography of the city at large (Buzar, Ogden, and Hall 2005).

Our view of mixed-race households and residential racial segregation fits within this vision of the household as a distinctive private scale where interracial intimacy is qualitatively different in meaning from other forms of close contact between races in public spaces. Increased racial mixing within households signifies reduced social distance between racialized groups in the most intimate of social settings (Kennedy 2003; Moran 2003; Wright et al. 2003). This reduction in turn affects segregation at the public scale of neighborhoods; when people from different race groups live together, it necessitates a change in the distribution of race groups in blocks or tracts (Wong 1998). Such thinking builds on prior research on scale and segregation empirically and conceptually. We seek to measure the effect of changes in the rate of racial mixing within households on levels of racial mixing in neighborhoods. We do this by framing this linkage as a relation between interracial intimacy in the private spaces of mixed households and racial segregation in the public spaces of neighborhoods.

Analysis

The analysis has two goals: first, to show that mixed-race households affect residential segregation dynamics in the present and, second, to explore how potential growth in the share of households that are racially mixed might drive change in neighborhood segregation levels in the future. Restricted-use census files from 1990 and 2000 provide the data for the first objective. For the second, we deploy a simulation experiment designed to anticipate the possible long-run effects of mixed-race households on residential segregation under a variety of scenarios.

Data

The residential geography of mixed-race households has received relatively scant attention to date partly because there is no publicly released census data on household racial composition at fine geographical scales. Only restricted-use U.S. Census decennial long-form data supply this information and thus we use it for our analysis of mixed-race household effects on residential segregation in the present. We accessed these files in a secure facility after gaining Census Bureau approval.

The analysis takes place at the tract scale for twelve large metropolitan areas[2]—Atlanta, Chicago, Dallas, Detroit, Houston, Los Angeles, Miami, New York, Philadelphia, San Diego, San Francisco, and Washington, DC—examined individually or averaged depending on the question at hand. These twelve locations are home to 39 percent of mixed-race households in the United States, but they are by no means uniform in the local prevalence of mixed-race households; some places have rates of household-scale racial mixing well above the U.S. average and some are below the U.S. average (see Table 1). They also vary substantially in racial population structure; some metropolitan areas are mostly populated by Whites and Blacks; others have larger percentages of Latinos and Asians. All in all, this

Table 1. Characteristics of the twelve metropolitan areas

	% of Households mixed race	National share of mixed-race households (%)	% White	% Black	% Asian	% Latino
United States	**8.2**	**100.0**	**68.3**	**12.1**	**4.2**	**13.8**
12 metros[a]	**9.8**	**39.1**	**53.9**	**16.2**	**7.7**	**21.0**
Atlanta	5.8	1.0	59.1	29.8	3.6	6.6
Chicago	6.9	2.7	59.1	18.7	4.6	16.7
Dallas	9.0	2.0	58.2	14.1	4.3	22.2
Detroit	6.6	1.5	70.6	22.3	2.7	3.0
Houston	9.0	1.8	48.0	16.8	5.3	28.9
Los Angeles	13.2	9.3	38.7	7.6	11.5	40.5
Miami	14.0	2.3	36.4	20.3	2.1	40.4
New York	8.3	7.5	56.2	16.7	7.4	18.3
Philadelphia	6.0	1.6	70.5	19.5	3.5	5.8
San Diego	17.2	2.1	54.8	6.0	10.6	26.8
San Francisco	15.4	4.7	50.3	7.5	20.7	19.7
Washington, DC	8.2	2.6	59.3	26.9	6.1	6.7

[a]The percentages in this row are calculated by pooling the data from the twelve metropolitan areas.

small set of metropolitan areas captures a large range of experience in household-scale racial mixing and racial population diversity.

Mixed-race households in our study are those households that contain people who claim different races on the census, regardless of their relationships. Single-race households include only people who claimed the same race. As is typical in most census-based work on segregation, we limited our definitions of racial categories to those who self-identified as White, Black, Asian-Pacific Islander (Asian for short), American Indian, Other, and Latino, with all groups other than Latino restricted to non-Hispanics.[3] Latino, of course, is a multiracial ethnic category representing a wide range of backgrounds, but we follow the overwhelming majority of analysts who treat this group as a unitary "race" category for the purposes of segregation research. This approach allows us to assess the sensitivity of White–Latino segregation as typically reported to the presence of White–Latino households.

Census Results

Using 2000 census data we calculated sets of dissimilarity indexes for our sample metropolitan areas for two populations: the total (i.e., for those living in single-race *and* mixed-race households) and for those living in single-race households only (i.e., excluding those who live in mixed-race households from the calculation of the index of dissimilarity).[4] The total population measure is that typically reported in the segregation literature. The difference between single-race household and total population segregation measures is a gauge of how much those who live in mixed-race households affect total neighborhood segregation. We restrict our presentation to the analysis of segregation between Whites and the three largest minority groups—Latinos, Blacks, and Asians. These pairings account for the bulk of the population and a very large majority of mixed-race households (Holloway et al. 2005).

Figure 1 plots White–Black, White–Asian, and White–Latino total population and single-race household only dissimilarity index values by metropolitan area. In line with previous findings, White–Black dissimilarity for the total population is consistently the highest in all metropolitan areas and White–Asian dissimilarity tends to be the lowest. In addition, single-race household populations are always more segregated than are total populations (lighter color bars are higher than darker bars for all pairs in all metropolitan areas), confirming previous research based on 1990 census data (Ellis et al. 2007). Figure 2 renders the gaps between single-race household and total population segregation more visible. Each panel depicts the difference between these two values for a specific pair of groups by metropolitan area. These differences are generally smallest in the White–Black case, largest for White–Latino segregation, and somewhere between these extremes for White–Asian segregation. Without mixed-race households, White–Black segregation

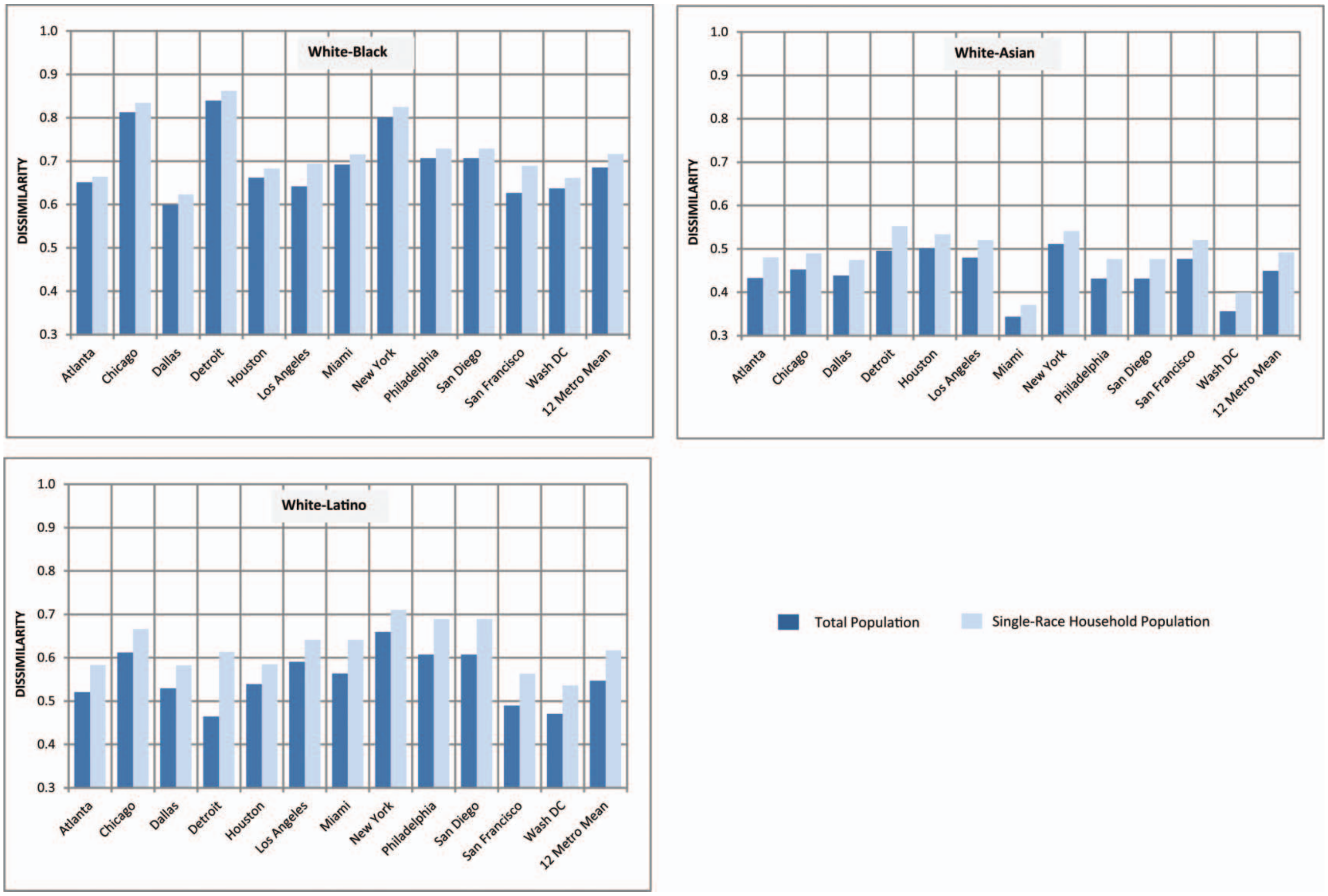

Figure 1. Dissimilarity for total population and single-race household population, 2000. (Color figure available online.)

would be an average of 0.03 points higher (on a 0–1 scale); White–Asian segregation higher by 0.04 points; and White–Latino segregation 0.07 points higher. In percentage terms, White–Black segregation without mixed-race households would be about 5 percent greater than currently recorded; White–Asian and White–Latino segregation would be 10 percent greater.

Figure 3 expands the analysis another step. Consistent with the low rate of Black–White intermarriage (Qian and Lichter 2007), Whites and Blacks are the least likely to share households; this accords with the small difference between single-race household and total population segregation for this pairing. On average, about 12 percent of Asians and Latinos share households with Whites, which is three times the same percentage for Blacks. The average percentage of Whites living with Latinos, however, is double that for Asians. Thus, it is unsurprising that the mixed-race household effect—the gap between single-race household and total population segregation—is greater in the White–Latino than the White–Asian case. As one would expect, metropolitan areas with high rates of household-scale mixing tend to have larger gaps between single-race household and total population segregation. For example, Los Angeles and San Francisco have relatively high percentages of Blacks living with Whites, and this corresponds with larger gaps between single-race household and total population segregation in these places. In contrast, San Diego, which also has an above-average percentage of Blacks living with Whites, does not fit this trend. Similar tendencies and occasional anomalies are evident in the White–Asian and White–Latino cases. With a couple of exceptions, metropolitan areas with above-average gaps between single-race household and total population segregation have above-average rates of household mixing (especially by minority populations with Whites). This suggests that although local rates of mixing are important, they are probably not the only factor determining the mixed-race household effect in specific metropolitan

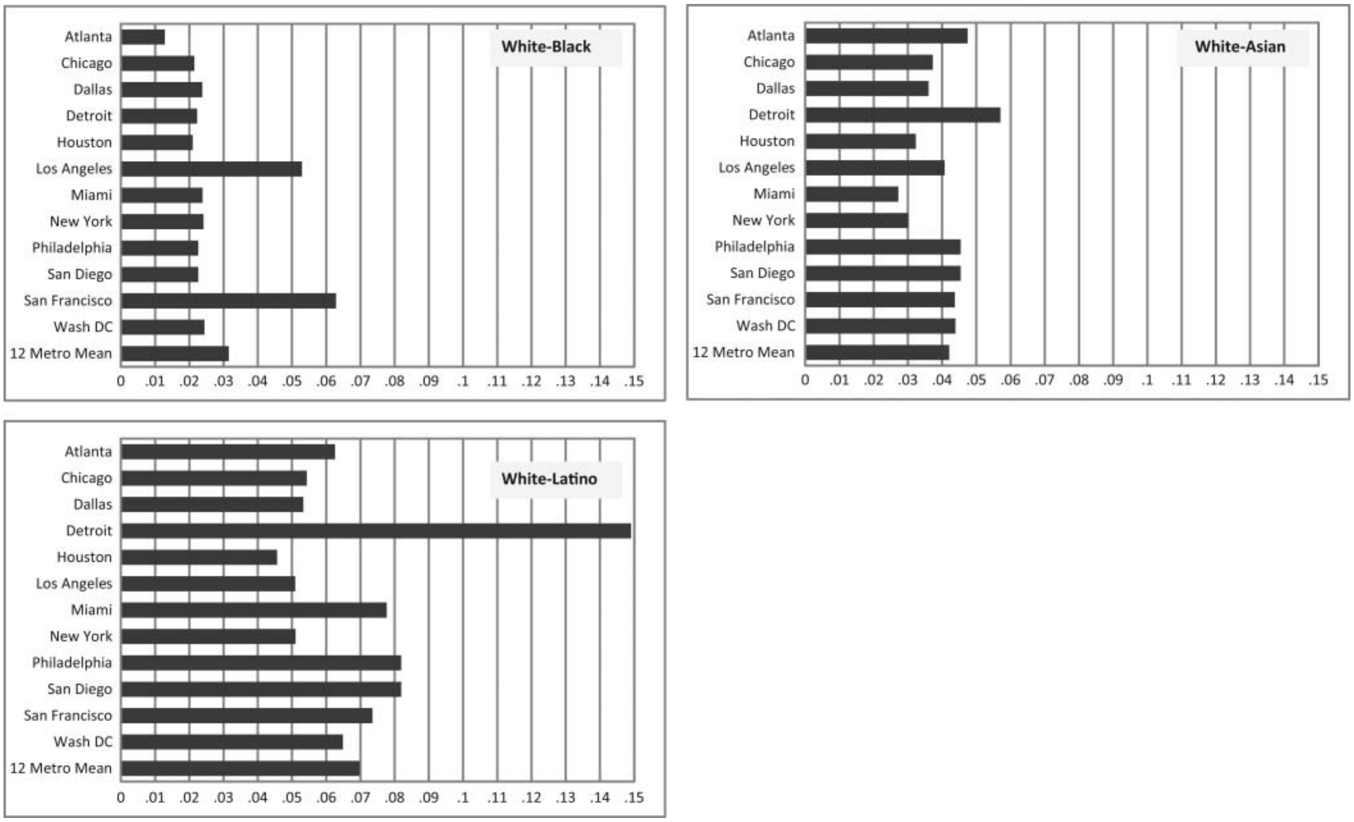

Figure 2. Difference between total population and single-race household population dissimilarity, 2000.

areas. Other forces, such as differences in the neighborhood geography of single-race and mixed-race households, likely matter, too.

This all funnels into the central question motivating this article: How did changes in rates of household mixing in the 1990s affect changes in segregation? The cross-sectional evidence suggests that spatial variation in mixing rates plays a substantial role in intermetropolitan variations in the magnitude of the mixed-race household effect. Changes in those rates could thus leverage meaningful change in the intensity of neighborhood racial segregation in specific metropolitan areas over time. Rates of racial mixing in households certainly changed during the 1990s, with shifts varying in magnitude and direction by group and by metropolitan area (Figure 4). White–Black rates of household racial mixing increased within a modest range in all metropolitan areas, with Dallas, Detroit, Los Angeles, Philadelphia, San Diego, and San Francisco registering above-average increases in the percentages of Blacks living with Whites. White–Asian and White–Latino pairings demonstrate greater intermetropolitan variation. Whites were more likely to live in households with both Asians and Latinos everywhere at decade's end; Asians and Latinos were less likely to live with Whites in 2000 than in 1990 in the majority of metropolitan areas, a drop most likely due to the arrival of already partnered Asians and Latinos through immigration. This percentage decline in living with Whites was especially strong for Latinos, with only Miami bucking the downward trend. For Asians, the percentage decline in living with Whites is large only in metropolitan areas with small Asian populations (Detroit and Miami); averaged across metropolitan areas, this decline is quite small.

What if we could eliminate the changes shown in Figure 4 from our measurement of segregation in 2000? This would allow us to gauge White–Black segregation change in the 1990s absent the increase in White–Black cohabitation, and White–Asian and White–Latino segregation change without Asian and Latino declines in mixed-race living arrangements. A counterfactual experiment provides the means to do just this and involves estimating segregation levels in 2000 holding mixed-race household formation at 1990 rates. The counterfactual mimics the categories in earlier analysis by splitting a group's population into two components: those living in single-race households and those living in mixed-race households. We assume that the relative

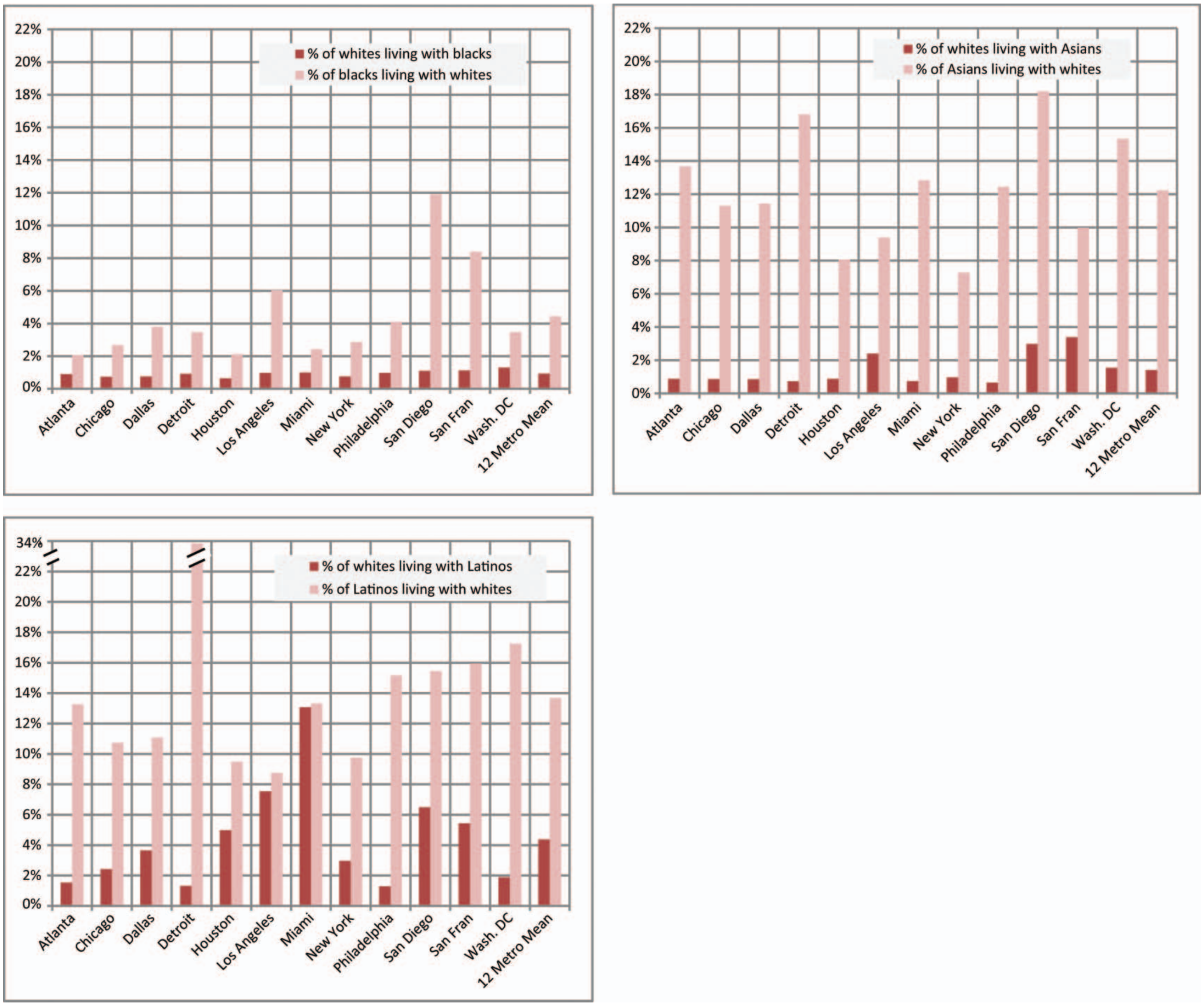

Figure 3. Percentage of group's population sharing households with other groups. (Color figure available online.)

distribution of these subpopulations across tracts will be as observed in 2000. We alter the numbers who live in these two types of households in 2000, however, to reproduce the percentage living in mixed-race households in 1990.[5] In effect, the counterfactual assumes that neighborhood racial geography would evolve in accordance with observed changes from 1990 to 2000—the most reasonable assumption one could make about such geography without additional information—but that the frequency of racial mixing within households would stay constant at 1990 levels. This allows us to measure counterfactual segregation in 2000—the level of segregation that would exist in 2000 without the preceding decade's change in the prevalence of household-scale racial mixing.

Figure 5 charts actual total population segregation change between 1990 and 2000 alongside counterfactual segregation change (the difference between 1990 total population segregation and 2000 counterfactual segregation) for the three pairings of interest. The key feature to note in Figure 5 is whether and to what extent the counterfactual bars end to the right or left of the actual bars. The panel for White–Black segregation shows that in all twelve metropolitan areas the counterfactual bars end to the right of the actual bars, which indicates that household racial mixing had a consistent integrative effect; that is, the 1990s

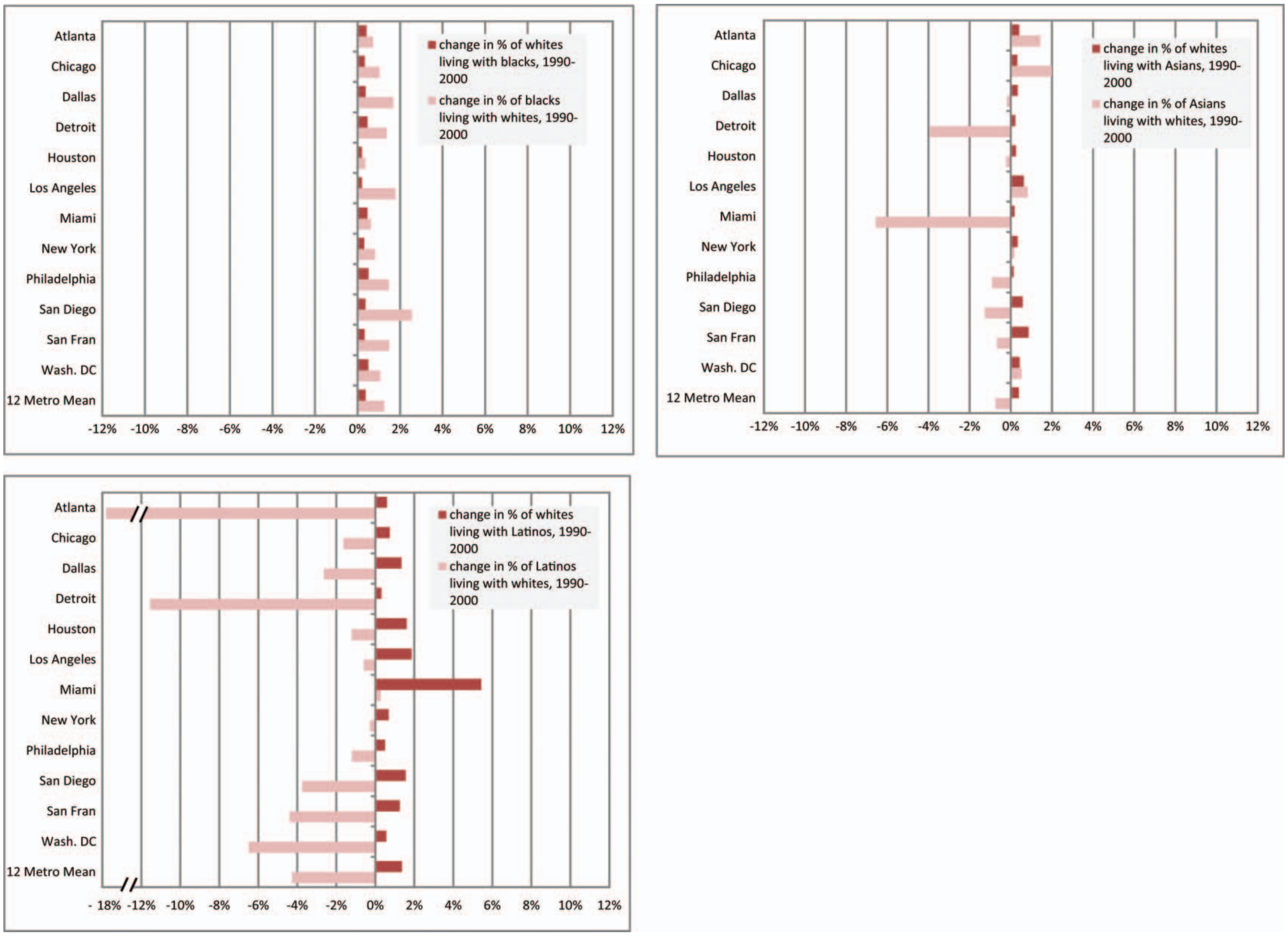

Figure 4. Change in percentage of group's population sharing households with other groups, 1990–2000. (Color figure available online.)

decline in segregation between these groups would have been smaller if the fraction of their populations in mixed-race households was fixed at the (lower) 1990 levels. For all twelve metropolitan areas, the average decline in total population segregation (the conventionally reported measure) between Blacks and Whites was a little over .03 points (on a scale of 0–1). Setting the percentage in mixed-race households to 1990 levels reduces this decline by .01 points (i.e., about one third), a substantial reduction in a slow declining index. Put differently, in the absence of increases in the fraction of the population who live in mixed-race households, overall White–Black segregation in these twelve metropolitan areas would have dropped by only about two thirds of the actual recorded decline. In terms of specific places, the counterfactual shows that increased percentages in mixed-race household populations have been especially important in driving down the level of White–Black segregation in San Diego and San Francisco, two metropolitan areas with high percentages of Blacks living with Whites in 2000, and above-average increases in those percentages in the 1990s. In Houston, White–Black segregation would have increased in the 1990s without its very small increases in the percentages of Blacks and Whites living together.

In the White–Asian panel, the counterfactual bars end to the right of the actual bars in every metropolitan area except for Detroit. Overall, then, changes in the percentage of Whites and Asians living with each other again had an integrative effect. These changes either reduced the increase in White–Asian segregation (Atlanta, Dallas, Houston, Los Angeles, Miami, New York, San Francisco, and Washington, DC) or augmented the decline in White–Asian segregation (Chicago, Philadelphia, and San Diego). The percentage of Whites and Asians living together increased in five of these metropolitan areas (Atlanta, Chicago, Los

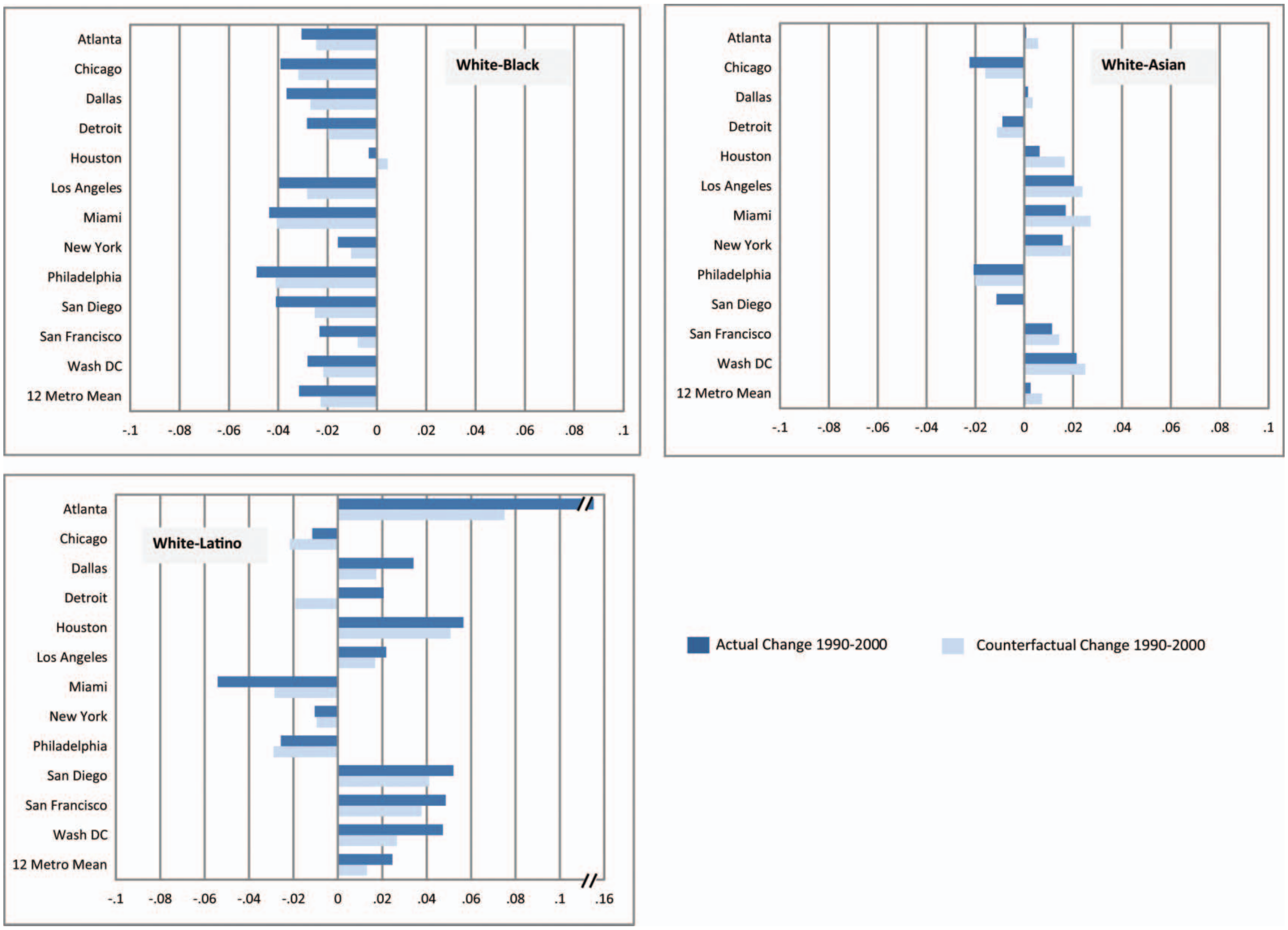

Figure 5. Actual versus counterfactual change in dissimilarity, 1990–2000. (Color figure available online.)

Angeles, New York, and Washington, DC). In the remaining metropolitan areas, the percentage of Asians living with Whites declined. In all but one of these places—Detroit—the increased percentage of Whites living with Asians was apparently large enough to more than counteract this decline and yield, on balance, an aggregate tendency toward neighborhood integration.

In the White–Latino panel, the counterfactual bars end to the left of the actual bars in ten of the twelve metropolitan areas, which signals that compositional changes (i.e., the decrease in the percentage of Latinos living with Whites relative to the increase in the percentage of Whites living with Latinos) had a segregative effect by either increasing residential segregation or reducing the magnitude of neighborhood segregation decline. Counterfactually, if Latinos and Whites lived together at 1990 rates, segregation would have declined more than it did (Chicago and Philadelphia), declined instead of increased (Detroit), or increased less than it did (Atlanta, Dallas, Houston, Los Angeles, San Diego, San Francisco, and Washington, DC). Miami, and to a lesser degree New York, are outliers from this trend (i.e., 1990–2000 changes in the White–Latino propensity to share households had an integrative impact). Miami's status is easy to explain: It was the only metropolitan area in the 1990s where both the percentage of Whites living with Latinos and the percentage of Latinos living with Whites increased. In New York, the decline in the percentage of Latinos living with Whites was slight (–0.28 percent), which appears to have been insufficient to outweigh the integrative effect of the growing percentage of Whites living with Latinos.

The general finding of the counterfactual experiment is that changes in the propensity of people to live in mixed-race households during the 1990s, even when the direction of these changes diverged among race groups, was an important component of residential segregation change between 1990 and 2000 for all three pairs of groups in most of the twelve metropolitan areas studied. The direction of this effect was always integrative for White–Black segregation and almost always integrative for White–Asian segregation. In the latter case, increases in the percentage of Whites living with Asians generated integrative effects that were stronger than the segregative effect produced by the declines in the Asian percentage living with Whites. With the exception of Miami and New York, the opposite occurs in the White–Latino pairing in the majority of metropolitan areas; declines in the percentage of Latinos living with Whites in the 1990s more than offset the integrative tendency of increases in the fraction of Whites living with Latinos. Regardless of these specific results for each pairing, our analysis indicates that current interpretations of the causes of segregation change in the 1990s are incomplete unless they account for changes in the propensity of people to form mixed-race households.

Simulation Results

Census data provide glimpses of how the changing organization of populations in single- and mixed-race households can affect neighborhood segregation dynamics over a relatively short time span of ten years. What about the long run? What will happen to residential segregation at the neighborhood scale if the rates of living in mixed-race households dramatically increase? What will happen under these circumstances to the segregation of those who continue to live in single-race households? And how might these trends be affected by where people in mixed-race households prefer to live (i.e., by the sorts of neighbors they prefer to live among)?

Investigating these sorts of questions requires simulating residential change. These experimental approaches are a familiar option in residential segregation studies because they allow researchers to explore the marginal effect of changes in household preference for neighborhood racial diversity on long-run, system-wide segregation outcomes (e.g., Schelling 1971; Clark 1991; Zhang 2004; Fossett and Waren 2005; Bruch and Mare 2006; Clark and Fossett 2008). As far as we can tell, all prior studies that implemented this type of experimental analysis conceived of the "household" as single race. This means that the only way segregation can decline in these models is if preference structures encourage single-race households to live in diverse neighborhoods. Our variation on this approach lets households be single or mixed race, allowing each household type to have different racial preferences for neighbors and varying the proportion of mixed-race households. This structure allows mixed-race households to lower neighborhood residential segregation in two ways: through greater preference for sharing neighborhood space with other races and through increased proportions of the population living in households with other races.

Schelling's (1971) agent-based model of segregation is the foundation for all subsequent simulation investigations of residential segregation. The model is straightforward: "Agents" are divided into two groups and randomly scattered across a spatial network. They are then set in motion based on a simple preference rule: Move to locations where one's own group is at least 50 percent of the local population. Under this condition, individual agent preference would initially appear to favor a degree of group integration, but the aggregate outcome of individual agents moving to satisfy their apparently diversity-friendly preference rules is extreme segregation. Schelling's contribution was to show how neighborhood space could be highly segregated even when individual agents tolerate near complete integration.

Like others before us, we build on Schelling and adopt preference rules for single-race households that the literature has repeatedly confirmed will generate segregation (e.g., Clark 1991; Laurie and Jaggi 2003; Fossett and Waren 2005; Bruch and Mare 2006). Each single-race household prefers a neighborhood that has a population equal to or greater than 50 percent of the same race.[6] We opt for this well-understood segregation-generating preference structure because our aim is to see how increasing percentages of mixed-race households might change segregation outcomes in a preference environment that otherwise would produce high levels of segregation. In effect, we want to see whether household-scale racial mixing can negate or moderate the known segregating effects of neighborhood preferences in Schelling's agent-based model of segregation.

With these segregation-generating preferences of single-race households as a backdrop, we explore the effects of two preference structures for mixed-race households. We recognize that these two options restrict the possibilities for mixed-race household preference; where such households locate will probably depend on the racial and gender mixtures involved. The two options we selected, however, correspond to those for which the limited literature on mixed-race household residential location has found the clearest empirical support (Dalmage 2000; Wright, Holloway, and Ellis 2011). In the first of these, mixed-race households prefer neighborhoods that have a population equal to or greater than 50 percent of one race present in the household. In effect, this means that mixed-race households favor neighborhoods where one particular race is always in the majority—akin to Schelling's experiment. The difference between this trial and Schelling's is that we can vary the proportion of mixed-race households in the analysis. The second option gives mixed-race households a preference for neighborhood diversity, a possibility that aligns with empirical research that finds Black–White households disproportionately gravitate to racially diverse locales (Wright, Holloway, and Ellis 2011). Under this condition, mixed-race households seek neighborhoods where diversity—measured by entropy—is maximized.[7] Maximum diversity is realized when a neighborhood's population is split evenly between groups.

When the agents in our simulation make choices about where to live—whether to stay or move depending on their neighborhood's racial composition—they have to decide how to evaluate the race of those in their existing or future neighborhood who live in mixed-race households. The simple method is for them to count individuals by race, paying no heed to their living arrangements. But lingering social proscriptions against mixed-race marriage and other mixed-race living arrangements suggest that some might use an alternative rule based on who lives with whom. Specifically, agents might ignore the internal diversity in mixed-race households and identify all of its members as if they were from the same race. This is the household equivalent of the noxious notion of hypodescent or the so-called one-drop rule (Hollinger 2005) in which the racialization of one household member transfers to all others of a different race for the purposes of evaluating neighborhood suitability (Haslanger 2005; Houston 2009). Our simulation analyzes both ontologies—the simple count of individuals and the household one-drop rule—to see whether they modify the effect of the main variables of interest (the preference structures of single- and mixed-race households and the proportion of households that are racially mixed) on segregation.

To explore the effect of these preferences and evaluations, the simulations of two groups, arbitrarily labeled R and G, are run under three distribution conditions—when Gs comprise 10 percent, 25 percent, or 50 percent of the total population—to assess how relative population size affects the results. For each group, we let 20 percent live in one-person households and 80 percent in two-person households. We allow a fraction of households to be single-person units because their existence in real urban environments constrains the fraction of households that can be of mixed race and thus limits the effect household-scale racial mixing can have on neighborhood segregation. Our simulation enhances any effect of this constraint in actual cities because the 20 percent share is roughly double the percentage of persons in the United States who live in single-person households (9.7 percent in 2000). Two-person households can, of course, be single- or mixed-race households. We vary the fraction of households that are mixed race from 0 percent to 50 percent of all G's households in 5 percent increments. We determine the rate of household mixing based on G's population because R's potential mixing rate is constrained by the availability of partners from G when G's population share falls below 50 percent of the total.

The simulation is enacted on a standard fifty by fifty grid with 2,500 cells. Populating this space are 2,950 individuals aggregated into approximately 1,750 households. Each household occupies one cell, yielding a cell vacancy rate of approximately 30 percent to create opportunities for mobility (Fossett and Waren 2005). These households choose whether to move and where to move to on the basis of a neighborhood's racial composition. Households begin their decision process by evaluating the racial composition of their immediate surroundings. A key assumption within models of this type is the rule that defines the extent of these surroundings. The results presented here employ a Queen's second-order contiguity rule, meaning that the neighborhood size for a single cell ranges from eight cells for corners to as many as twenty-four cells for central cells that are not constrained by an edge.[8] Following Fossett and Waren (2005), we also introduce a rule that every household *must* move the first time they are selected by the simulation to evaluate the suitability of their neighborhood.

The preference and counting options we have described correspond to four scenarios listed in Table 2. All four employ the same preference structure for single-race households, varying only in the neighborhood preferences of mixed households and the rules used to count members of mixed households in the evaluation of neighborhood preferences. We produced 1,000 simulations of each of these scenarios at each permutation of G's percentage of the total population and by 5 percent increments in the percentage of households that are mixed race. Paralleling the census analysis, each run generated two segregation (dissimilarity) scores—one for the total population of R and G (i.e., including

Table 2. Simulation scenarios

Scenario	Preferences		How those in RG households are counted in evaluations of neighborhood preferences
	R and G households (single-race)	RG households (mixed-race)	
1	Rs prefer neighborhoods > 50% R Gs prefer neighborhoods > 50% G	Prefer neighborhoods at maximum diversity/entropy (E_i)	Rs as Rs, Gs as Gs
2	Rs prefer neighborhoods > 50% R Gs prefer neighborhoods > 50% G	Prefer neighborhoods at maximum diversity/entropy (E_i)	Rs and Gs counted as Gs
3	Rs prefer neighborhoods > 50% R Gs prefer neighborhoods > 50% G	Prefer neighborhoods > 50% G	Rs as Rs, Gs as Gs
4	Rs prefer neighborhoods > 50% R Gs prefer neighborhoods > 50% G	Prefer neighborhoods > 50% G	Rs and Gs counted as Gs

Note: Simulations of these four scenarios are run varying two conditions: (1) the percentage of G in the total population (10%, 25%, 50%); and (2) the fraction of G's households that are mixed race (i.e., RG households as a percentage of all households that include a G person) from 0% to 50% in 5% intervals. R and G are arbitrary group labels.

single- and mixed-race households) and the other for the single-race household population of R and G. To calculate "neighborhood" segregation, we partitioned the simulation grid into 100 five by five cell groups.

The four panels in Figure 6 correspond to the four preference scenarios; each one plots means of these 1,000 segregation scores against the percentage of G's households that are mixed race. All four panels chart

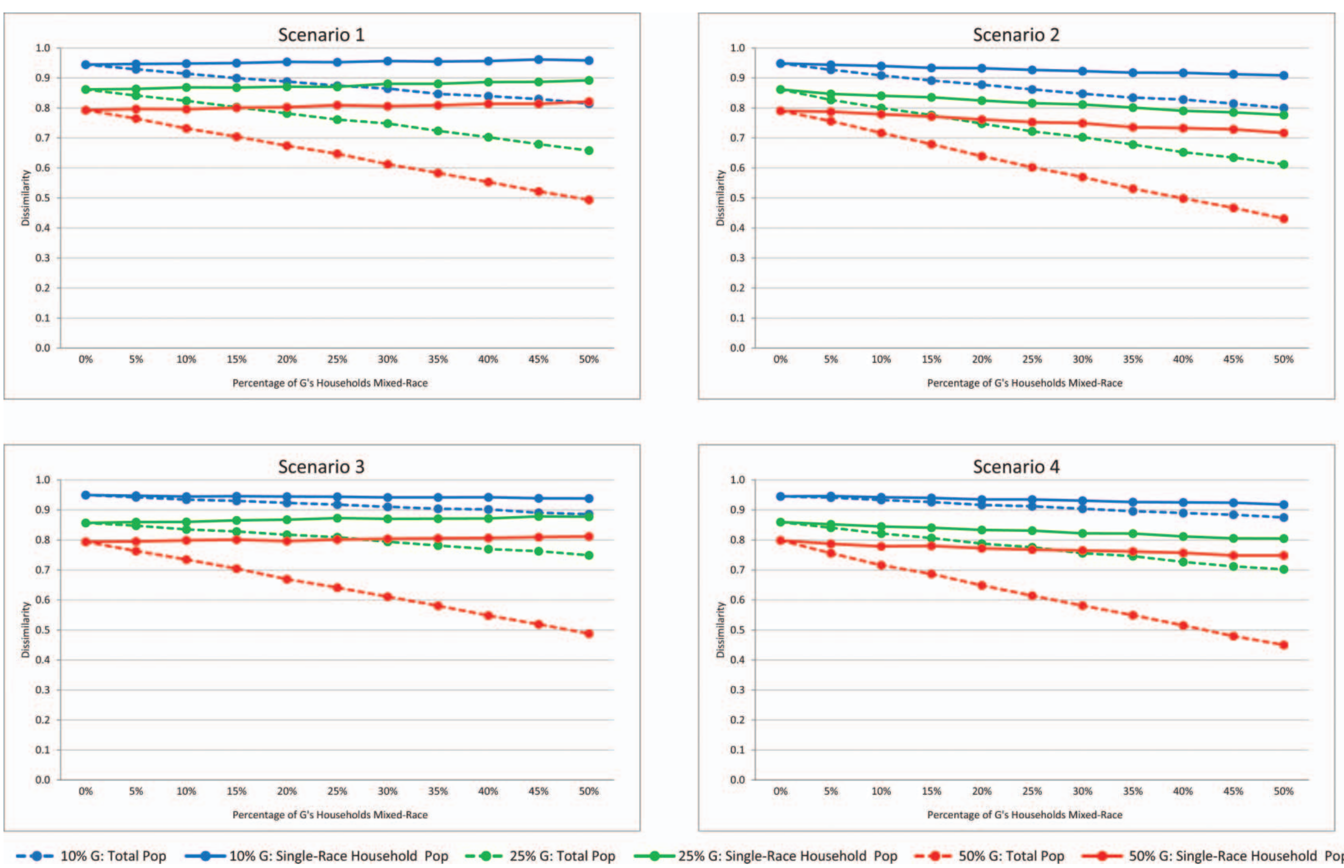

Figure 6. Four simulation scenarios showing the effect of rising percentages of mixed-race households on segregation. (Color figure available online.)

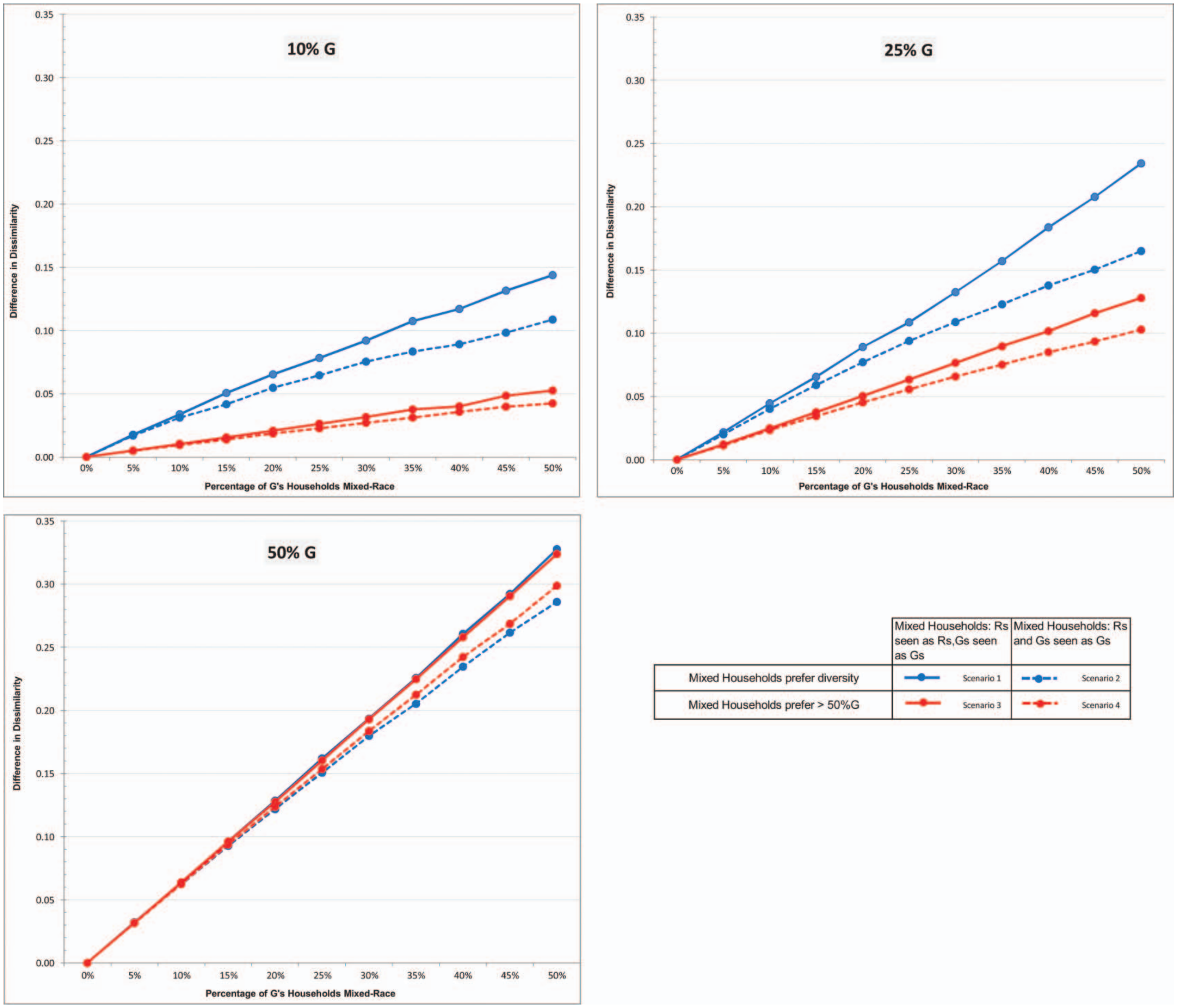

Figure 7. Difference in dissimilarity between single-race household and total population by scenario and G's percentage of the population. (Color figure available online.)

three pairs of slopes; each of these pairs plots total population and single-race household population segregation for a specific percentage of G in the total population—10 percent, 25 percent, and 50 percent. Regardless of scenario, three results are conspicuous. First, as the percentage of G's households mixed with R's increases, total population segregation between G and R decreases; that is, growth in mixed-race households drives down segregation in a preference environment known to promote segregation between group members who live in single-race households. Second, single-race households remain highly segregated even as total population segregation declines with increases in the propensity to live in mixed-race households. In other words, growth in the fraction of the population in mixed-race households has little or no effect on the high level of residential segregation of those in single-race households. Scenario does affect this result—single-race household segregation declines slightly with increased percentages of mixed-race households in the household one-drop rule scenarios (2 and 4)—but not enough to challenge the general tendency of single-race households to remain segregated while total segregation drops. Third, as the minority population approaches a 50 percent share of the total population, the mixed-race household effect—the gap between single-race household and total population segregation—becomes more pronounced at any given percentage of mixed-race households. This is logical; as G's population approaches half of the total population, then the fraction of R's population that can live in mixed-race households necessarily increases. This renders a larger fraction of all households mixed race and therefore increases the size of the mixed-race household effect on total population segregation.

To explore mixed-race household preferences and counting rules some more, Figure 7 charts the difference between single-race household and total population segregation by scenario. The three panels depict this difference by the percentage of G's households that are of mixed race. This yields four plotted lines—one for each scenario—in each panel. In effect, Figure 7 is the simulation's version of the difference between single-race household and total population segregation plotted from census data in Figure 2. When Gs are in the minority—10 percent or 25 percent of the population—a mixed-race household preference for diverse residential space (scenarios 1 and 2) generates a much larger gap between the measurement of single-race household and total population neighborhood segregation than does a preference to be in minority neighborhoods (scenarios 3 and 4). This gap exists regardless of counting rules, but it is smaller when Rs who live in mixed-race households are counted or racialized as Gs (i.e., the household one-drop rule is in effect).

These findings imply, first, that the neighborhood preferences of mixed-race households condition the mixed-race household effect on total population segregation. If these households seek out diverse rather than minority-dominated (i.e., G) neighborhoods, then the mixed-race household effect on total population segregation will be more substantial than without this preference. If, though, mixed-race households gravitate to minority neighborhoods, then the segregation-reducing effects of an increase in their frequency will be attenuated. Second, this neighborhood preference effect interacts with how people in mixed-race households are racialized. Mixed-race household effects on measures of neighborhood segregation are smaller when all those living in a mixed-race household arrangement are racialized as minorities. In this complex dynamic, mixed RG households seek out diverse spaces; applying the notion of hypodescent, the resulting congregations of mixed households appear as a cluster of Gs, which attracts single-race household Gs but repels single-race household Rs. In effect, diverse neighborhoods are unstable, always trending toward domination by Gs. Thus at any given percentage of mixed-race households, the one-drop counting rule generates greater segregation than the alternative individual counting rule.

When Gs comprise 50 percent of the population these patterns of results almost evaporate. Scenario hardly affects segregation when levels of household-scale racial mixing equal 50 percent. Under conditions of equal population share there is no constraint of minority group size on the majority's odds of finding a minority housemate; accordingly, the effect of the percentage of households that are racially mixed overwhelms any influence of variation in mixed-race household preference or counting rules.

Conclusion

Current understandings of neighborhood racial segregation largely rest on two forces: discrimination in housing market institutions and preferences for neighborhoods with particular racial compositions. Reductions in segregation occur when shifts in these forces change residential mobility patterns sufficiently to increase neighborhood mixing. The results in this article show that mixed-race households can also drive change in segregation. Alterations in the propensity to mix racially at the household scale can change residential segregation in neighborhoods; where mixed-race households prefer to live and how others perceive them also plays a role.

Our analysis of U.S. Census data shows that those who live in single-race households, who constitute the bulk of the population, are more segregated than indicated by measures of total population segregation. Without mixed-race households, dissimilarity measures of segregation between Whites and Blacks and Whites and Latinos would be higher by nontrivial quantities. Counterfactual methods show that in the broadest terms, changes in the extent of household-scale racial mixing during the 1990s affected the magnitude of changes in neighborhood-scale segregation between 1990 and 2000. In this decade, Black–White neighborhood segregation would have declined by a considerably smaller magnitude than recorded—about a third less on average—if not for increases in the percentage of those groups living in Black–White households. Conversely, decreases in household-scale racial mixing had a segregative effect for the White–Latino pairing. Between 1990 and 2000, White–Latino neighborhood segregation increased overall and in most metropolitan areas; a nontrivial share of that increase was due to the increased percentage of Latinos living in Latino-only households.

Miami and New York are the only metropolitan areas where changes in rates of White–Latino household mixing in the 1990s had an integrative impact, contributing to the decline in White–Latino residential segregation in those metropolitan areas. Changes in White–Asian mixed-race household percentages in the 1990s generally had an integrative effect, either accelerating declines or slowing increases in White–Asian dissimilarity. This integrative effect is present even in metropolitan areas where the percentage of Asians living with Whites declined; it appears that small increases in the percentage of Whites living with Asians were more than enough to cancel out the segregative impact of the larger percentage declines in Asians living with Whites. This result is possible because the White population is much larger than that of Asians in most places.

Our results also illustrate that the percentage living in mixed-race households does not always increase for non-White groups. For Latinos, ten out of twelve metropolitan areas sampled experienced a decline in the percentage living with Whites. We suspect that this reflects the impact of the considerable immigration of single-race households in the 1990s. The impacts of this demographic shift are legible in the neighborhood segregation statistics—when non-Whites become less likely to share households with Whites, White–non-White residential segregation either increases or it declines with smaller magnitude.

Our simulation experiment revises Schelling's classic conclusions. We show how growing shares of a population in mixed-race households lower segregation even under neighborhood preference conditions known to be segregation inducing. In other words, if mixing at the scale of the household is increasing then segregation declines even when single-race households prefer to live in neighborhoods in which they are the majority. This trend is moderated by where mixed-race households prefer to live. If racially mixed households opt for diverse neighborhoods, segregation between minority and majority drops more than if they prefer to live in minority neighborhoods.

The significance of these results is in their demonstration that mixed-race households can lower overall segregation even while the segregation of single-race households remains constantly high. More specifically, researchers must be cautious about interpretations of declining segregation in the presence of growing fractions of the population living in mixed-race households. These declines might emanate in large part from increases in the portion of each racial group sharing households rather than from increasing preference for neighborhood diversity by single-race households or by reductions in housing market discrimination. Growth in the number of mixed-race households is unquestionably an expression of greater interracial tolerance and understanding. This outcome, however, might muddy the waters when it comes to making sense of change in neighborhood-scale segregation for the majority who live in single-race households.

This investigation should be seen as a sketch for a much broader research agenda. We need to know more about where mixed-race households locate; about how these locations depend on factors such as income; and about how key housing market agents, such as realtors and lenders, treat mixed-race versus single-race households. Ideally, any assessments of change in neighborhood racial segregation between 2000 and 2010 should take account of changes in the propensity to live in mixed-race households. More generally, the idea that households matter for neighborhood racial change needs greater empirical excavation. In this regard, our study underlines Buzar, Ogden, and Hall's (2005) call for greater attention to how the dynamics of household configurations and urban structure interrelate.

Acknowledgments

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Notes

1. The current segregation debate does not engage much explicitly with issues of class, even though these issues have been of great concern in past work (Kaplan and Holloway 1998). Although some research continues to explore the persistence and decline of racial segregation by income strata (e.g., Darden and Kamel 2000), most current work tends to subsume such questions within the preferences versus discrimination rubric. We do not minimize class issues (whether understood in Marxian or Weberian terms) but rather situate our analysis in the context of the segregation debates that currently dominate the literature.
2. We define metropolitan areas in accordance with U.S. Census definitions as Consolidated Metropolitan Statistical Areas (CMSAs) that encompass groups of spatially contiguous and economically linked metropolitan regions (e.g., New York and Los Angeles) and Metropolitan Statistical Areas (MSAs) for smaller free-standing metropolitan regions.
3. These categories are consistent with those in use in the 1990 Census. Because we also use 2000 Census data to assess the effect of mixed-race households on decadal segregation trends, we shoehorn changes in racial categorizations from that census back into 1990 categories. Some of these recategorizations are simple (e.g., merging Pacific Islanders and Asians into an aggregate Asian-Pacific Islander category). Reassigning the 2.4 percent of those who chose more than one race in 2000 into a single-race category consistent with 1990 data is more complex. We opted for one of the deterministic whole-race assignment methods recommended by the Office of Management and Budget (OMB). This method—Largest Group Other than White—"assigns responses that include White with some other racial group, to the other group, but responses with two or more racial groups other than White are assigned into the group with the highest single-race count" (U.S. Office of Management and Budget 2000, 88). Regardless of method, these assignments are at best awkward and no doubt offensive to many multiracial people. If one is to undertake any analysis of segregation over time, however, the use of such assignment methods is, unfortunately, a necessity.
4. We used the ubiquitous dissimilarity index (D) to capture unevenness in residential distributions between mixed-race and same-race households:

$$D = .5 * \sum_{j=1}^{J} \left| \left(\frac{w_j}{W} - \frac{x_j}{X} \right) \right|$$

   where j indexes census tracts, and w and x index two racial groups. W and X are the total populations of groups w and x, respectively, across all tracts, and w_j and x_j are tract counts of the respective groups. Values of D range between 0 (no segregation) and 1 (maximum segregation).
5. The counterfactual procedure adjusts the 2000 census tract populations of each race group living in single- and mixed-race households to levels that, when summed across a metropolitan area, produce the same percentage of population living in mixed-race households—for each race group in each metropolitan area—that existed in 1990. The 2000 tract data are adjusted thus:

$$W^c_{s_j} = \left[(1 - M_{9w}) \sum\nolimits_j W_{0j}\right] \cdot q0w_{s_j}$$

$$W^c_{m_j} = \left[M_{9w} \sum\nolimits_j W_{0j}\right] \cdot q0w_{m_j}$$

   where $W^c_{s_j}$ is the 2000 single-race household counterfactual population of group W in tract j; $W^c_{m_j}$ is the 2000 mixed-race household counterfactual population of W living in the same tract; M_{9w} is the fraction of the metro area population of W living in mixed-race households in 1990; W_{0j} is the population of W in tract j in 2000; $q0w_{s_j}$ is the fraction of W's metro area population who live in single-race households in tract j in 2000; and $q0w_{m_j}$ is the fraction of W's metro area population who live in mixed-race households in tract j in 2000.
6. There is ample evidence that although both Whites and non-Whites prefer neighborhoods in which their own racial group is in the compositional majority, there are distinct differences in their preferences. Blacks, for example, report that they prefer neighborhoods that are relatively evenly mixed (i.e., 50 percent White and 50 percent Black), whereas Whites prefer neighborhoods in which the White share never falls below 80 or 85 percent.
7. The entropy of neighborhood i's racial mix is calculated as:

$$E_i = \sum_{m=1}^{M} \pi_m * ln\left(1/\pi_m\right)$$

   where π_m is the proportion of the population of group m in the neighborhood i. E_i is maximized when there is an equal probability in i of being from any of the M groups. $E_i = 0$ when only one race is found in a neighborhood.
8. We conducted sensitivity analyses employing Queen's first-, third-, and fourth-order contiguity rules. Although these assumptions do alter the results in terms of magnitude of the effects (larger vision equates to larger effect), they do not change the ordering or direction of the effects or change the arguments and conclusions we can draw from the results.

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