

Moving Toward Integration? Effects of Migration on Ethnoracial Segregation Across the Rural-Urban Continuum

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Abstract This study analyzes the impact of migration on ethnoracial segregation among U.S. counties. Using county-level net migration estimates by age, race, and Hispanic origin from 1990–2000 and 2000–2010, we estimate migration’s impact on segregation by age and across space. Overall, migration served to integrate ethnoracial groups in both decades, whereas differences in natural population change (increase/decrease) would have increased segregation. Age differences, however, are stark. Net migration of the population under age 40 reduced segregation, while net migration of people over age 60 further segregated people. Migration up and down the rural-urban continuum (including suburbanization among people of color) did most to decrease segregation, while interregional migration had only a small impact. People of color tended to move toward more predominantly white counties and regions at all ages. Migration among white young adults (aged 20–39) also decreased segregation. Whites aged 40 and older, however, showed tendencies toward white flight. Moderate spatial variation suggests that segregation is diminishing the most in suburban and fringe areas of several metropolitan areas in the Northeast and Midwest, while parts of the South, Southwest, and Appalachia show little evidence of integration.

Keywords Segregation · Net migration · Suburbanization · Rural-Urban continuum · Retirement migration

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Introduction

Growing evidence has shown that neighborhood racial/ethnic segregation in metropolitan areas is generally declining across the United States. Black–white segregation has been slowly declining since the 1970s (Farley and Frey 1994; Fischer et al. 2004; Glaeser and Vigdor 2012; Logan and Stults 2011). Segregation between Hispanics and whites and between Asians and whites has been relatively stable (Logan and Stults 2011; Parisi et al. 2011) since 1990. The findings have led to tempered optimism that slowly but surely, our neighborhoods and communities are becoming more integrated.

If we are concerned about racial differences in broad residence patterns (Lichter 1985), then we must also consider the racial distribution of the population across larger areal units, such as counties and regions. Diversity differs substantially across different metropolitan areas and between metropolitan and nonmetropolitan areas (Lee et al. 2013). Some regions of the United States have very little ethnoracial diversity. Research that focuses only on neighborhood-level segregation in large cities and metropolitan areas ignores the possibility that observed integration reflects the migration of the white population out of diverse cities or metropolitan areas entirely (Crowder et al. 2011; Frey 1979, 1996; Lichter 2013; Lichter et al. 2015; Logan and Zhang 2011). Segregation at these larger areal scales would presumably reduce opportunities for social interaction beyond neighborhood segregation.

Migration is generally presumed to influence changes in segregation over time at both neighborhood and larger units, yet few studies have directly measured the role of migration. Researchers have assumed that migration is important with little direct empirical evidence to support the argument. For instance, Vigdor (2013:176) argued that the “pervasive trends of suburbanization and Sun Belt migration have eroded the monolithic ghettos of the mid-20th century, leaving them largely in place but slowly draining them of their residents”; but he offered only minimal evidence on total population change (and not migration specifically) to support the argument that black suburbanization and migration from the Rust Belt to the Sun Belt¹ are driving segregation decline. Other studies showed that regional population shifts alone “would result in miniscule decline in segregation” (Logan 2013:166) or that changes in regional population distribution had a modest effect on segregation decline in the last several decades (Iceland et al. 2013); however, these studies relied on indirect analysis rather than direct observations of migration. These studies are important because they attempt to examine what causes segregation to decline and to understand the relationship between population shifts and segregation change. However, we could learn more by focusing explicitly on the role of migration.

Migration can serve an integrating function, redistributing America’s racial and ethnic populations and reducing the segregation between them, or it can reinforce existing racial boundaries. Early segregation studies noted that white flight and suburbanization played an important role in segregating urban core neighborhoods in the 1950s and 1960s (Tauber and Tauber 1965). Beginning in the 1970s, the American

¹ The Rust Belt refers to the region of the Northeastern and Midwestern United States that was characterized by heavy industry and manufacturing employment in the late nineteenth and early twentieth centuries. The region is characterized by cold and snowy winters. The Sun Belt refers to the Southeastern and Southwestern regions of the United States that have mild winters and a good deal of sunshine. The Sun Belt has been attracting migrants from other U.S. regions, and especially retirement-age migrants, for decades.

population began deconcentrating out of urban core counties fueled by migration to suburban, exurban, and even remote rural areas (Johnson et al. 2005; Long and Nucci 1997). If counterurbanization is driven by whites moving from more diverse urban areas to more homogenous outlying areas, then county-level migration would further segregate communities and regions into diverse urban core counties and white-dominated exurban and rural regions.

Some evidence suggests that this has been the case. During the “nonmetropolitan turnaround” of the 1970s, blacks continued to concentrate in urban counties, while whites moved toward nonmetropolitan counties (Lichter 1985). General population deconcentration continued in the 1990s (Long and Nucci 1997; Schachter et al. 2003) and in the first decade of the 2000s (Johnson 2006, 2013). Frey (1995) and Frey and Liaw (1998) suggested that this pattern was associated with white flight from immigrant destination metropolitan areas toward nonmetropolitan areas. In contrast, evidence of increasing black and Hispanic migration out of central-city core counties toward less populated and more predominantly white counties during the 1990s and 2000s (Johnson and Winkler 2015) supports the argument that black suburbanization is decreasing segregation (Glaeser and Vigdor 2012; Vigdor 2013).

This descriptive study examines how recent county net migration is impacting residential segregation of blacks, Hispanics, and whites. We use data on net migration by age, race, and Hispanic origin for U.S. counties during 1990–2000 (Voss et al. 2004) and 2000–2010 (Winkler et al. 2013) to measure changes in county-level segregation and diversity due to net migration across the rural-urban continuum and between regions of the country. These detailed migration data provide the first opportunity to examine the possibility that relationships between migration and segregation differ by age, by race/ethnicity, and across space. The analysis contributes to a more comprehensive understanding of how migration influences the segregation of the American population and provides insights for theorizing about social and economic drivers of segregation change.

Segregation Theory and Scale

Spatial assimilation theory argues that social mobility and acculturation contribute to the geographic dispersion of minority groups and encourage whites to have more accepting attitudes (Massey and Denton 1985), leading to increasing residential integration. Some evidence suggests that assimilation is occurring (Charles 2003), although to different extents for different groups (Lichter et al. 2010, 2015). Assimilation is reflected in policies that promote fair housing practices and anti-discrimination (e.g., the Fair Housing Act in 1968), gains in minority incomes relative to whites (Alba et al. 2000), and surveys indicating that whites are becoming more accepting of minorities (Dovidio and Gaertner 2004). The spatial assimilation argument has primarily focused on neighborhood-level residential patterns, and research indicating declining black-white segregation within metropolitan areas generally supports the theory (Charles 2003). Extending the logic to other spatial levels implies a future in which ethnoracial groups are similarly distributed across metropolitan areas, counties, rural areas and regions as well as neighborhoods (Lee et al. 2013). Lee et al. (2012) showed that communities across the United States and across the rural-urban continuum are

diversifying. Blacks are suburbanizing to diverse counties outside central-city core counties (Johnson and Winkler 2015), and Hispanics are dispersing to new destinations in rural areas, suburbs, and nongateway states and metropolitan areas, thereby diversifying populations that were previously predominantly white (Durand et al. 2006; Kandel and Cromartie 2004; Lichter and Johnson 2006, 2009).

Taking an alternative perspective, stratification theories argue that significant barriers to spatial assimilation remain. Barriers such as housing market discrimination, density zoning, and preferences for own-group neighbors contribute to demographic segmentation whereby people from similar ethnoracial, political ideology, socioeconomic status, and age groups continue to cluster in similar neighborhoods (Bishop 2009; Frey 1996; Lichter 2013; Massey and Denton 1993; Quillian 2002; Winkler 2013). This perspective predicts that racial and ethnic groups will continue to live in places where they have little interaction with one another: in separate neighborhoods, communities, rural versus urban areas, and regions of the country. Preference studies have suggested that one of the underlying reasons for continued segregation is that white Americans (especially those with children under age 18) do not want to live with blacks (Clark 1991; Emerson et al. 2001; Fossett and Waren 2005). Evidence demonstrating instances of white flight or avoidance of mixed-race neighborhoods (Crowder et al. 2011; Frey 1979; Quillian 2002; Singer 2005), the slow speed of decline in black-white segregation over the decades (Logan 2013; Logan et al. 2004), and stable or increasing Hispanic-white and Asian-white segregation are consistent with stratification models.

Emerging segregation research extending the scope (beyond metropolitan areas) and scale (“beyond the census tract”; Lee et al. 2008) has brought a new, geographically oriented perspective to this debate (Fischer et al. 2004; Iceland et al. 2013; Lee et al. 2012, 2008; Lichter et al. 2007; Parisi et al. 2011; Reardon et al. 2008; Reardon and O’Sullivan 2004; Wahl et al. 2007). These studies have focused on how space and place matter, showing that segregation can be just as pervasive in nonmetropolitan as metropolitan America and that Americans experience residential segregation at multiple levels ranging from micro segregation in their immediate neighborhoods to segregation between broad geographic regions (Lee et al. 2008). *Micro segregation* occurs at scales as small as the census block or between neighborhoods. *Macro segregation* refers to segregation among communities, counties, and/or regions—for example, differences between municipal jurisdictions (e.g., incorporated places), between larger areas (metropolitan areas and counties), and between broad geographic regions (Fischer et al. 2004; Iceland et al. 2013; Lee et al. 2008, 2013; Lichter et al. 2007; Parisi et al. 2011). As segregation accumulates across these multiple levels, it creates neighborhoods, communities, and whole regions of the country across which people of different ethnoracial groups have little opportunity for regular interaction. This outcome is critical because spatial proximity is necessary for intergroup contact and development of shared community and social identities (Lichter 2013; Putnam 2000).

A growing body of research has found that although segregation within neighborhoods (micro level) is declining (consistent with spatial assimilation theory), segregation between larger-scale geographies (macro level) is persistent or increasing (consistent with a stratification model). Macro segregation between larger geographic areas (such as incorporated places, metropolitan areas, counties, and regions) accounts for roughly one-half of the ethnoracial segregation in the United States (Fischer et al. 2004; Lee et al. 2008; Parisi et al. 2011). Mounting evidence has shown that macro

segregation has increased or remained relatively constant since the 1990s (Lichter et al. 2015; Parisi et al. 2011; Reardon et al. 2009). Lichter et al. (2015) discussed the parallel patterns of micro segregation decline and macro segregation increase, arguing that spatial assimilation can occur simultaneously with place-based ethnic stratification. While individuals and households “move up” into more integrated neighborhoods, municipalities compete in the political economy of place and become known as “white,” “black,” or “Hispanic” places based partly on their political decisions and economic base.

Research Objectives

This study’s objective is to analyze how net migration serves to integrate (or segment) the U.S. population at the macro level of counties and regions in the 1990s and 2000s. In addition, we have two secondary aims: (1) to understand how age impacts the relationship between migration and segregation; and (2) to test the claims that black suburbanization and interregional migration are key causes of segregation decline. To do so, we examine the influence of white, black, and Hispanic migration on county-level segregation across the rural-urban continuum and from region to region. We also explore how spatial patterns of net migration impact county-level segregation and diversity to understand geographic and regional variation in diversity across the United States.

Migration by Age and Across Space

Migration tendencies and patterns vary across the life course (Johnson and Winkler 2015; Johnson et al. 2005; Shryock 1964), with young adults having a greater propensity to migrate than people at other ages. Motivations for migration and the direction of moves up and down the urban hierarchy also vary by age and life cycle stage. Young, single, and college-educated people tend to move toward the largest urban cores and away from more rural areas, while persons in their late 50s to early 70s tend to move away from large urban cores toward more rural areas (Johnson et al. 2005, 2013; Plane et al. 2005). If these age-specific patterns are driven by whites, then the directionality of young adult migration would increase ethnoracial integration as young whites move into relatively diverse urban cores, whereas retirement migration (toward relatively white rural areas) would decrease integration.

However, little is known about the interaction between race and age in migration patterns across the rural-urban continuum, or the extent to which the patterns described earlier are, in fact, driven by whites. Recent empirical work has suggested that in the 1990s and 2000s, black age-specific net migration was similar to that of whites (Beale and Fuguitt 2011; Johnson and Winkler 2015). In contrast, the younger, more mobile Hispanic population had positive net migration rates into counties at all levels of the rural-urban continuum (Johnson and Winkler 2015). These findings suggest that race- and age-specific migration patterns may serve an integrating function, with black and/or Hispanic suburbanization (and migration to more rural areas) being a key factor contributing to segregation decline.

Exploring spatial patterns of migration may provide further insights into how movements across the rural-urban continuum and between regions are changing the

ethnoracial population structure of the country. We know that migration patterns across the rural-urban continuum vary across space: nonmetropolitan counties proximate to large metropolitan areas, as well as those with natural amenities and recreation opportunities, are most likely to attract migrants (Johnson et al. 2005). We also know that neighborhood segregation varies regionally. For example, historical patterns of housing settlement and development resulted in metropolitan areas of the Midwest and Northeast generally being more segregated than those in the South and West (Farley and Frey 1994). Thus, the relationship between migration and changes in diversity is likely to be more consistent among spatially proximate counties. Uncovering patterns of spatial variation could help us to identify the causal mechanisms that explain relationships between migration and segregation.

Segregation and Diversity

It is important to clarify some key language used throughout this article and contextualize it in the broader literature on residential segregation and diversity. In addition to the research on macro segregation described earlier, another body of literature considers population integration (or lack thereof) using the language and measurement tools of diversity (for a review and analysis, see Lee et al. 2013). Some communities, counties, metropolitan areas, and regions are more diverse than others, and this variation in diversity exemplifies macro segregation. These two closely related terms are both important to the present research and therefore warrant further discussion. *Diversity* refers to the racial composition of a larger area's population and is often measured using the entropy index (E), which gauges how uniformly members of a population are spread (Lee et al. 2013; Reardon and Firebaugh 2002; Theil 1972). *Segregation* refers to the spatial distribution of different population groups within the smaller units of analysis that together compose the larger geographic area, and is most typically measured using a segregation index, such as the dissimilarity index (D ; Duncan and Duncan 1955) or the Theil index (H ; Theil 1972). When the larger geographic area of interest is as broad as the entire United States and the smaller units of analysis are themselves relatively large areas (e.g., counties, metropolitan areas, regions), these two terms are conceptually the same. Here, we use the term "segregation" as others have to refer to the (un)evenness with which the United States population is dispersed across counties and regions (units of analysis) using Theil's segregation index (H). We use the terms "diversity" or "diversification" to refer to changes in the ethnoracial makeup of counties and regions, as measured using diversity scores (the entropy index, E). Both reduced segregation and increased diversity contribute to residential population integration.

Research Design

Data

We use county estimates of net migration by age, race, and Hispanic origin for 1990–2000 (generated by Voss et al. 2004) and 2000–2010 (generated by Winkler et al.

2013).² The data provide reliable estimates of net migration by five-year age group, race, and Hispanic origin for each U.S. county using a residual method. The methodology is a variation of the cohort component model. The enumerated population at the beginning of each decade (from census 1990 and 2000) is adjusted for undercount/overcount and then is aged forward 10 years by subtracting deaths and adding births (county-level vital statistics records provided by the National Center for Health Statistics). This process constructs an expected population at the end of the decade for each age, race/Hispanic origin, and sex. The expected population is then subtracted from the observed census population at the end of the decade (adjusted for undercount/overcount) to estimate net migration (for details, see Winkler et al. 2013). The expected population is of particular interest for our purposes because it provides a counterfactual population structure of what would have been in the absence of any net migration.

The data allow for the classification of migration by race/ethnicity and age with little error because they are based on a complete enumeration of the population and recorded births and deaths rather than sample data (Winkler et al. 2013). Estimates are provided by five-year age groups for four exhaustive and mutually exclusive racial/ethnic groups: Hispanics of any race, non-Hispanic blacks, non-Hispanic whites, and non-Hispanic others. “Others” primarily include Asians, Pacific Islanders, Native Americans, and Alaskan Natives, but the exact population makeup of the “others” group varies considerably from county to county.³ Each of the ethno/racial groups includes both immigrants and domestic migrants; and because of how the data are generated (using residual methods), we cannot distinguish between the impacts of domestic migration and immigration.

The four groups (hereafter referred to as Hispanic, black, white, and other) are used in the multigroup segregation and diversity indexes. In addition, we analyze patterns of black-white, Hispanic-white, and black-Hispanic segregation. Age is reported at the end of the decade such that the age group 25–29 in the 1990s represents net migration among the cohort aged 15–19 in 1990 and aged 25–29 in 2000. All U.S. counties are included, but Puerto Rico is omitted.

Measuring Segregation and Diversity Across the Rural-Urban Continuum

Counties are the primary unit of analysis. To measure segregation, we rely on the Theil index (H ; see Eq. (2)) and its multigroup variant, sometimes referred to as the “multigroup information theory index” (Iceland 2004; Reardon and Firebaugh 2002). H measures how evenly multiple ethnoracial groups (Hispanic, black, white, and other) are distributed across counties and regions within the United States. In other words, it measures how much less diverse individuals in a county (or region) are, on average, than the total U.S. population. H ranges from 0 (no segregation) to 100 (complete segregation). It is preferable to the dissimilarity index (D) and other segregation indexes because it (1) has been shown to statistically outperform alternative measures in the multigroup case, and (2) it can be additively decomposed into segregation observed at multiple geographic levels (Parisi et al. 2011; Reardon and Firebaugh 2002).

² These estimates are available online (www.netmigration.wisc.edu).

³ Although Asians and Native Americans are distributed very differently across the United States, the data group them together into this “others” category because of the small population sizes in many counties.

Geographic decomposition is key because it helps us to understand how net migration between regions (census regions = Northeast, Midwest, South, and West) and across the rural-urban continuum impacts segregation. To define the rural-urban continuum, we use a modified version of the Rural-Urban Continuum Code (RUCC) developed by USDA Economic Research Service (2013). The RUCC is a classification scheme for U.S. counties that distinguishes metropolitan counties based on their population size at Census 2010 and the size of the greater metropolitan area, and nonmetropolitan counties based on the size of their urban population and on their proximity to metropolitan areas of various sizes. It is a more recent version of what is often referred to as the “Beale Codes” (Butler and Beale 1994).

In order to separate urban cores from suburbs, small metropolitan areas, smaller cities, and more outlying areas, we modify the RUCC in the following ways. First, we create a new code for *central city* counties that includes any county that hosts a single city with a population of at least 250,000 residents at Census 2010 ($n = 68$). Second, we classify counties surrounding the central-city counties and located within the same metropolitan statistical areas as *suburban fringe* ($n = 371$). Thus, suburban fringe counties are restricted to the outer counties (those not classified as central cities) that fall within metropolitan areas with a central city of at least 250,000 residents. Any county that falls within a metropolitan area without any central city of at least 250,000 people is then classified as *small metropolitan* ($n = 737$). We combine RUCC categories 4, 6, and 8 to generate an *adjacent nonmetropolitan* grouping that includes all nonmetropolitan counties that are adjacent to a metropolitan area, regardless of population size ($n = 1,018$). We combine RUCC codes 5 and 7 to create a grouping for *nonadjacent small town* counties, which includes nonmetropolitan, nonadjacent counties with an urban population of at least 2,500 ($n = 525$). Finally, we use the RUCC = 9 group to note *remote rural* counties that are nonadjacent and have an urban population less than 2,500 ($n = 418$). County classifications are shown in Fig. 1.

Central city counties are by far the most populous and most diverse, with a mean population of 1.3 million and only 54.6 % white. *Suburban fringe* counties have a mean population of about 231,000 and are, on average, about 80 % white. About 29 % of the total U.S. population resides in *central city* counties, and another 28 % resides in *suburban fringe* counties. *Small metropolitan* counties have a mean population of almost 118,000 and average 80 % white. They account for about 28 % of the total U.S. population. *Adjacent nonmetropolitan* (mean population = 29,748) and *nonadjacent small town* counties (mean population = 25,170) also average about 80 % white. About 10 % of the total U.S. population lives in *adjacent nonmetropolitan* counties, and 4 % live in *nonadjacent small town* counties. *Remote rural* counties are the least populous (mean population = 6,194) and least diverse ($m = 86$ % white), and account for only 1 % of the total U.S. population.

Segregation indexes (e.g., H) are useful at the global level for reducing the complexity of county-level variation into a single measure (or small set of measures in the case of multilevel), yet they are inadequate for analyzing spatial variation in segregation patterns with much detail (Brown and Chung 2006). For this purpose, we calculate diversity scores for each county in the United States using entropy (E) (for descriptions, see Iceland 2004; Lee et al. 2013; Massey and Denton 1988). Entropy measures the

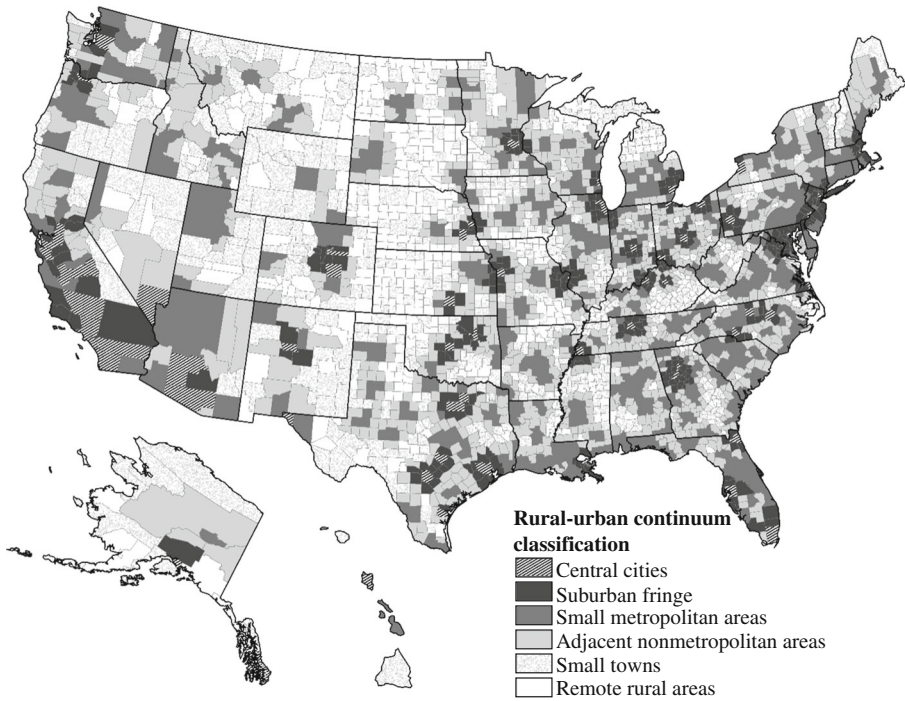


Fig. 1 Map of county-level classification scheme for the rural-urban continuum. Note that Alaska and Hawaii are not drawn to scale and are not represented in their physical location

extent to which the four ethnoracial groups are present. The entropy score is defined by the following formula, from Massey and Denton (1988):

$$E_i = \sum_{r=1}^r (\Pi_{ri}) \ln [1/\Pi_{ri}], \tag{1}$$

where Π_{ri} refers to a particular racial group’s proportion of the county’s population. The measure is standardized by dividing each score by its maximum value (with four groups, as is the case here, the maximum value is 1.386) and then multiplying by 100, so that it ranges from 0 to 100. The higher the value, the more diverse the county.

E is a component of the multigroup entropy index (H) discussed previously. The difference is that a distinct diversity score (E_i) is available for each unit of analysis (here, counties), while the H index integrates the information from the set of E_i to an aggregate unit measuring the weighted average difference between the county E_i and the diversity of the United States as a whole (Reardon and Firebaugh 2002). The multigroup entropy index is thus calculated as follows:

$$H = \sum_{i=1}^n \left[\frac{t_i(E - E_i)}{ET} \right], \tag{2}$$

where t_i refers to the total population of county i , T is the U.S. total population, n is the number of counties, and E_i and E represent county i 's diversity (entropy) and U.S. diversity, respectively. When multiplied by 100, the index varies between 0 (maximum integration) and 100 (maximum segregation). Higher values of H indicate *less* integration (more segregation), which is opposite that for the diversity index.

Our primary focus is on changes in diversity and segregation due to net migration and on how these patterns vary by age and across space. To measure changes in diversity and segregation due to net migration, we calculate H and E_i for the observed population at the end of the decade and for the expected population at the end of the decade. Because the expected population reflects population change that is due only to population aging, fertility, and mortality, the difference in values between the observed and the expected population in diversity (E) and segregation (H) reflects change in diversity and segregation due to net migration. It is this difference that is central to our analysis. We employ the multigroup entropy index (H) to measure change in segregation due to net migration at multiple geographic levels, including between regions, across the rural-urban continuum, and between counties. We also show results of dual group H values that measure segregation between blacks and whites, Hispanics and whites, and blacks and Hispanics to better understand which of the largest ethnorracial groups are most affected. We employ diversity scores (E) to explore spatial patterns of change in segregation due to net migration.

Results

Changes in Segregation Resulting From Net Migration by Age and Ethnorracial Group

Net migration led to overall decline in segregation in both the 1990s and 2000s. At the 1990 census, U.S. counties were moderately segregated, with a multigroup H value of 22.6, which indicates that the population in the average county was about 22.6 % less diverse than the United States as a whole.⁴ Segregation declined to $H = 21.3$ in 2000 and to $H = 19.6$ in 2010. The decline was fueled by race/ethnicity-specific net migration.

Figure 2 shows the county-level segregation index (multigroup H ; black, Hispanic, white, other) for the starting population (at the beginning of the decade), the expected population in the absence of net migration, the observed population at the end of the decade, and the change in H due to net migration. The difference between the starting and expected populations indicates that population aging and differential mortality/fertility alone would have slightly increased segregation (or held it constant in 2000–2010), but net migration generated a moderate decline in the H index.

Investigating these patterns by age reveals clear differences in how net migration impacted segregation. Table 1 shows observed and expected county-level segregation indexes in 1990, 2000, and 2010 by 20-year age group using multigroup (Hispanic,

⁴ The corresponding dissimilarity index (D) value is 45.2, indicating that in order to evenly distribute the population by race/ethnicity across counties, about 45 % of the population would have to move to a new county.

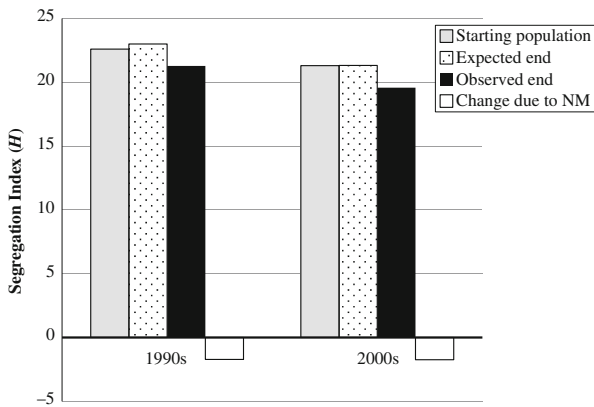


Fig. 2 Multigroup county-level segregation index (H), 1990–2010. The figure shows the authors' calculations of the Theil's H multigroup segregation index as observed at the beginning of decade (light gray), expected at end of decade had there been no net migration (dots), observed at end of decade (solid black), and the change in segregation due to net migration (NM) during the decade (solid white)

black, white, other), black-white, Hispanic-white, and black-Hispanic comparisons. It also shows change in segregation due to net migration in the 1990s and 2000–2010 (see the second set of highlighted columns). For the total population, net migration reduced segregation for all ethnoracial groups in both the 1990s and 2000s. Differences by age, however, are stark. Migration among younger people (under age 40) clearly integrated ethnoracial groups, and migration among those aged 40–59 had little impact on segregation. However, for the population over age 60, net migration increased segregation.

The last two columns in Table 1 estimate the change in segregation due to natural processes, including population aging and differential mortality and fertility. These values are included for comparison to provide a gauge for determining how important net migration is (or is not) for population integration. Positive values in these columns indicate that natural processes (absent net migration) worked to increase segregation, while negative values indicate that natural processes worked to decrease segregation. Absolute values for change attributed to natural processes are generally one-half or less of values for change attributed to net migration, highlighting the importance of migration for population redistribution. Frequently, natural processes have the opposite sign as net migration, indicating that while net migration is working to integrate the population, this may not be evident in studies that do not separate these components because natural aging and mortality contribute to further segregation and mask (or moderate) overall declines. This is particularly true among young adults (aged 20–39), for whom multigroup segregation declined considerably in each decade but would have declined almost twice as much had net migration been the only demographic process involved. In contrast, natural processes that diminished segregation among people aged 60 and over moderated the negative effect of net migration on population integration.

Figure 3 shows a more detailed age breakdown. It illustrates change in the segregation index due to net migration by five-year age group during 2000–2010 for the multigroup, black-white, and Hispanic-white cases (findings for the 1990s are similar but are not shown). Again, we see that net migration among younger people (especially young adults aged 15–34) clearly drove declines in county-level segregation for all

Table 1 County-level segregation due to net migration (NM) for multigroup and dual groups by age, 1990–2010

	Observed			Expected (no NM)		Change Due to NM		Change Due to Natural Processes	
	1990	2000	2010	2000	2010	1990s	2000s	1990s	2000s
Total Population									
Multigroup	22.6	21.3	19.6	23.0	21.3	-1.7	-1.7	0.4	0.0
Black-white	20.9	21.1	20.2	21.3	21.4	-0.1	-1.2	0.4	0.2
Hispanic-white	29.3	27.3	24.7	30.1	27.2	-2.8	-2.5	0.8	-0.1
Black-Hispanic	37.5	33.7	29.5	37.7	33.0	-4.0	-3.6	0.2	-0.6
Under Age 20									
Multigroup	25.5	23.6	20.8	25.6	22.9	-2.0	-2.0	0.1	-0.7
Black-white	24.2	23.8	21.8	24.1	23.3	-0.3	-1.5	-0.1	-0.5
Hispanic-white	33.3	30.3	26.5	33.4	28.9	-3.1	-2.3	0.1	-1.5
Black-Hispanic	39.8	35.1	29.9	39.6	33.0	-4.4	-3.1	-0.2	-2.1
Aged 20–39									
Multigroup	24.4	20.2	18.1	23.3	21.8	-3.1	-3.6	1.9	1.6
Black-white	19.7	19.9	18.7	21.2	21.7	-1.3	-3.1	1.5	1.8
Hispanic-white	28.6	26.5	23.6	31.4	28.4	-4.9	-4.9	2.8	1.9
Black-Hispanic	35.2	31.2	26.8	37.5	32.5	-6.3	-5.7	2.3	1.3
Aged 40–59									
Multigroup	22.1	21.3	20.5	21.4	20.7	-0.1	-0.2	-0.7	-0.6
Black-white	20.9	21.4	21.1	20.4	20.7	1.0	0.4	-0.5	-0.7
Hispanic-white	28.8	27.5	26.2	28.0	27.0	-0.6	-0.8	-0.8	-0.5
Black-Hispanic	36.5	34.6	31.2	35.6	36.4	-1.0	-5.2	-0.9	1.8
Aged 60 or Older									
Multigroup	24.1	23.7	22.7	22.7	22.1	1.0	0.6	-1.4	-1.6
Black-white	21.1	21.5	21.7	20.3	21.2	1.2	0.5	-0.8	-0.3
Hispanic-white	28.6	29.8	28.4	28.0	28.2	1.9	0.3	-0.7	-1.6
Black-Hispanic	43.0	40.0	36.8	38.7	33.0	1.3	3.7	-4.3	-7.0

cases. In the Hispanic-white case, net migration consistently (across age groups) served to integrate the population. In the black-white case, however, net migration among people age 35 and older at the end of the decade increased segregation.

The findings so far show that migration over the last two decades decreased segregation, generally supporting spatial assimilation theory and adding credence to a general shift toward segregation decline at both the neighborhood level (documented elsewhere) and between counties (shown here). However, there are striking age-specific differences. Net migration by younger people (under age 40) is integrating the population, net migration at the middle ages (ages 40–59) is affecting little change, and retirement-age migration is increasing segregation. A key question is how these patterns play out across region and county type. The next sections analyze how age-specific net migration across the rural-urban continuum and across regions impacts

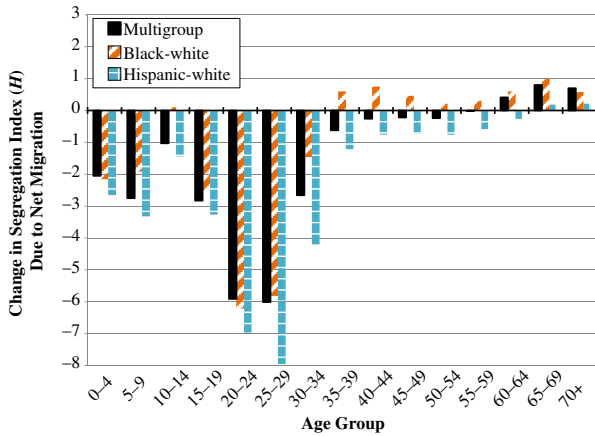


Fig. 3 Change in segregation due to net migration by five-year age group, 2000–2010. The figure shows the authors’ calculations of change in the multigroup (solid black), black-white (diagonal stipe), and Hispanic-white (boxed bars) Theil’s *H* segregation index between 2000 and 2010 that was due to net migration by five-year age group. Age is the age at the end of the decade. Values above 0 indicate that net migration increased segregation, and values below 0 demonstrate segregation decline due to net migration

diversity and segregation, testing the notion that black suburbanization and interregional migration are decreasing segregation.

Migration Across the Rural-Urban Continuum and Across Regions

Movements across the rural-urban continuum (RUC) have significant implications for county diversity because of the current disparities in the distribution of the ethnoracial population by level of urbanicity. Table 2 shows the average level of multigroup diversity (*E*) observed at Census 2010 for counties by their location along the RUC and average changes in diversity due to net migration during 2000–2010. On average, net migration increased diversity for counties at all levels of urbanicity. It tended to increase diversity the most among *suburban fringe* counties and least among *adjacent nonmetropolitan* counties. Such averages, however, mask a great deal of variation between counties at the same level of urbanicity. Standard deviations of the change in diversity due to net migration are relatively high (77 % to 126 % of the mean), and

Table 2 Change in average county diversity due to net migration (NM) across the RUC, 2000–2010

	<i>n</i>	Observed <i>E</i> (2010)	Change in <i>E</i> (2000–2010) Due to NM	SD	Min.	Max.
Central Cities	68	73.19	5.15	4.36	–8.63	19.03
Suburban Fringe	371	45.93	7.43	5.77	–9.59	30.56
Small Metropolitan Area	737	41.76	5.28	4.07	–15.93	28.96
Adjacent Nonmetropolitan Area	1,018	35.29	3.71	3.61	–16.87	35.25
Nonadjacent Small Town	525	35.31	4.54	5.11	–21.76	52.47
Remote Rural	418	25.66	4.70	5.90	–13.65	50.87

value ranges indicate that some counties at each RUC level experienced decreases, while most saw increased diversity. These variations are explored in detail in the upcoming section on spatial variation.

Table 3 shows the decomposition of change in segregation (H) due to net migration into that which is associated with net migration between regions, net migration from one level on the rural-urban continuum to another (across the RUC), and between counties at the same level on the RUC in the same region. The decomposition reveals that net migration at each of these geographic levels reduced segregation, but again variation by age group is significant.

For those under age 40, net migration at each geographic level integrated the population. Young peoples' movements between regions, up and down the rural-urban continuum, and between counties all had a net impact of decreasing ethnoracial segregation. Moves across the RUC and between counties had the biggest impact on reducing segregation, about twice as much as interregional migration. Among those aged 40–59, net migration between counties at the same RUC level and in the

Table 3 Geographic decomposition of change in multigroup segregation due to net migration (NM) by age, 2000–2010

	Expected 2010	Observed 2010	Difference Due to NM
Total Population			
Total H	21.32	19.58	-1.74
Between regions	4.81	4.43	-0.38
Across RUC	9.08	8.34	-0.74
Between counties	7.43	6.81	-0.62
Under Age 20			
Total H	22.85	20.84	-2.01
Between regions	5.27	4.90	-0.37
Across RUC	9.67	8.83	-0.84
Between counties	7.91	7.11	-0.80
Aged 20–39			
Total H	21.75	18.13	-3.62
Between regions	5.07	4.25	-0.82
Across RUC	9.30	7.49	-1.81
Between counties	7.38	6.39	-0.99
Aged 40–59			
Total H	20.71	20.49	-0.22
Between regions	4.57	4.50	-0.07
Across RUC	8.64	8.67	0.03
Between counties	7.50	7.32	-0.18
Aged 60 or Older			
Total H	22.07	22.66	0.59
Between regions	4.19	4.36	0.17
Across RUC	9.23	9.55	0.32
Between counties	8.65	8.75	0.10

same region reduced segregation slightly. Migration across the RUC, on the other hand, had a slight net impact of increasing segregation. For the population over age 60, net migration across regions, across the RUC, and between other counties all increased segregation. Together, these findings show that urbanization/suburbanization/counterurbanization and interregional migration integrated younger populations (under 40). For people aged 60 and older, however, interregional migration and especially movements across the RUC (suburbanization included) *increased* segregation.

Ethnoracial Group Migration and Segregation Outcomes

To test the black suburbanization claim, we delineate which ethnoracial groups' migration is driving changes in multigroup segregation by testing counterfactuals. One at a time, we assume that each group's net migration (2000–2010) equals 0 while the other ethnoracial groups' net migration patterns are as observed. We then calculate the corresponding H value for 2010 and call this the *counterfactual H*. Subtracting the *counterfactual H* from the *expected H* measures the change in segregation due to net migration during 2000–2010 of all ethnoracial groups except for the test group (i.e., the change in segregation that would have occurred due to net migration if there had been no black net migration). Finally, we shift to focus on the change in segregation due to the test group's net migration by subtracting it from the overall change in segregation due to net migration. The goal is to investigate the importance of net migration by specific groups (each ethnoracial and 20-year age group) for increasing multigroup diversity.

Table 4 shows that net migration of whites alone would have increased segregation, except among those aged 20–39. This finding supports claims of white flight and stratification theory. In contrast, migration among people of color (all other groups) decreased segregation at all ages, suggesting that spatial assimilation is occurring. Multigroup segregation among those under age 60 diminished because migration among the combination of black, Hispanic, and other groups under age 60 was great enough to offset whites' segregating migration. Among those over age 60, however, net migration among people of color only dampened the impact of whites' tending to move toward more white areas. The evidence also supports the claim that black migration into more

Table 4 Impact of ethnoracial net migration (NM) on segregation decline, 2000–2010

	Change in H Due to NM	Change Due to Net Migration by Ethnoracial Group			
		Black	Hispanic	White	Other
Total Population	–1.7	–0.8	–1.2	0.7	–0.5
Under Age 20	–2.0	–1.2	–1.6	1.2	–0.6
Aged 20–39	–3.6	–0.9	–1.5	–0.7	–0.6
Aged 40–59	–0.2	–0.5	–0.7	1.1	–0.4
Age 60 or Older	0.6	–0.5	–0.3	1.3	–0.1

white areas is integrating the population. Black net migration accounts for almost one-half of the total decline in segregation due to net migration. Migration among Hispanics is also important for reducing segregation, and white young adults moving toward diverse counties contributes as well.

Spatial Variation in How Net Migration Affects Diversity

According to the multigroup diversity scores (E) for individual counties, net migration increased diversity in 93 % of all counties in the 1990s and 91 % of counties in 2000–2010. Figure 4 shows the spatial distribution of change in diversity attributed to net migration in 2000–2010. It reflects the high proportion of counties that saw increased diversity due to net migration as well as their wide spatial distribution. Still, there is some evidence of regional clustering. The Northeast and Midwest experienced the most redistribution due to net migration—an interesting finding, given that these regions have historically been the most segregated at the neighborhood level (Farley and Frey 1994). Counties along the suburban/exurban fringe of metropolitan areas, especially east of the Mississippi River, experienced relatively large increases in diversity fueled by net migration. Less integration from migration occurred in scattered areas of the Southwest, the Mississippi Delta, Appalachia, and in Northern Michigan.

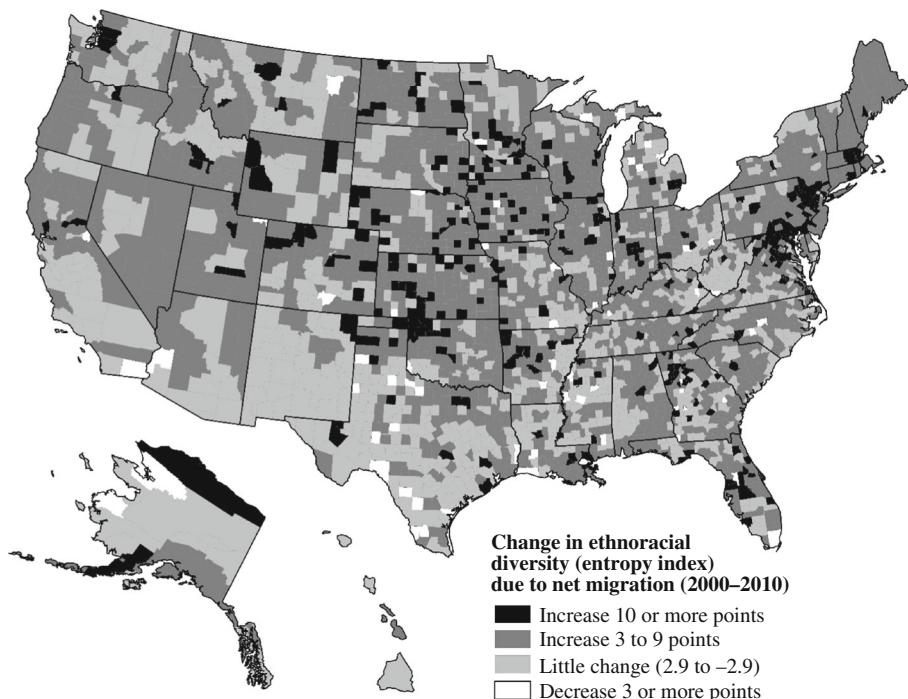


Fig. 4 Map of change in multigroup diversity score due to net migration, 2000–2010. Note that Alaska and Hawaii are not drawn to scale and are not represented in their physical location

Figure 4 suggests spatial patterning in how net migration affects diversity, but interpreting choropleth maps is complicated by choice of break-points and the challenge of analyzing complex spatial patterns visually (Tobler 1973). Spatial statistics are important tools for examining spatial relationships, including spatial clustering. In this case, Moran's I ($I = 0.20, p < .001$, using a queen contiguity neighbor definition) shows that a county's change in diversity score due to net migration is moderately positively correlated with their neighbors' change. In other words, change in diversity due to net migration tends to be similar for a county and its neighbors, suggesting that some regions are integrating more through net migration than others.

Local indicators of spatial autocorrelation (LISA statistics; see Anselin 1995) identify regions where counties and their neighbors both displayed a high degree of integration due to net migration (high-high), where counties and their neighbors both displayed a low degree of integration due to net migration (low-low), and where counties and their neighbors were statistically significantly different from one another in terms of how net migration affected diversity (high-low and low-high). Figure 5 shows that the suburban/exurban fringe counties of several major metropolitan areas experienced high degrees of integration due to net migration, especially in the Northeast and around Minneapolis/St. Paul, Chicago, Atlanta, and Indianapolis. Areas experiencing less integration or even increased segregation are located in the Southwest (especially southern and western Texas, but also parts of Arizona, New Mexico, California, Mississippi, and Louisiana), pockets in Appalachia, and in northern Michigan.

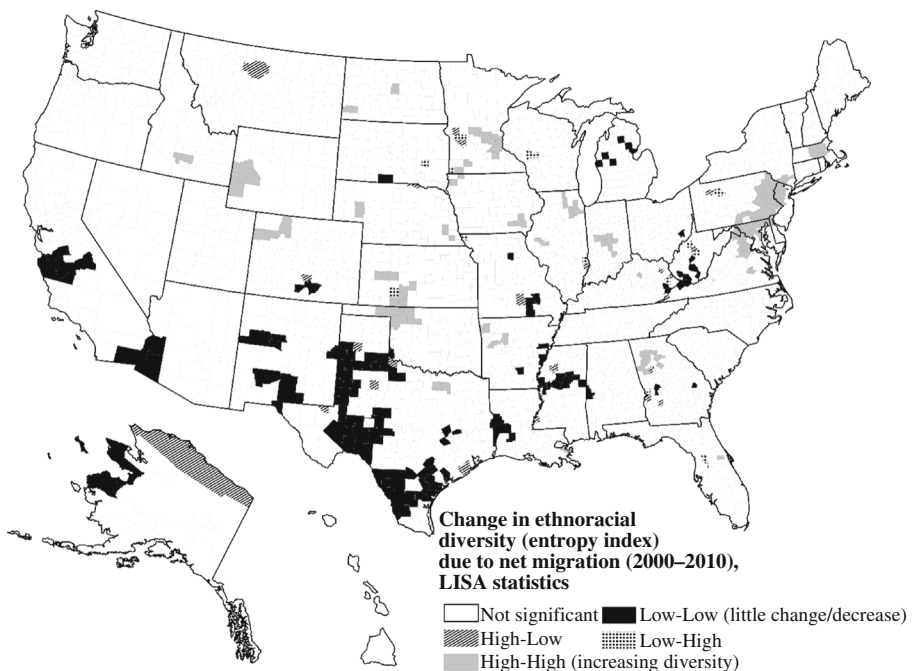


Fig. 5 Spatial clustering of change in multigroup diversity score due to net migration, 2000–2010. Note that Alaska and Hawaii are not drawn to scale and are not represented in their physical location

Discussion

Residential segregation is an enduring cause and consequence of racial inequality in the United States. This study illustrates the complexity of how county-level migration patterns both reinforce and challenge segregation. Our examination of detailed age-specific net migration data quantifies the impact of migration along the rural-urban continuum as well as the influence of interregional migration on changes in levels of segregation while focusing on variability by age and across space. The results generally show that county-level migration patterns during 1990–2010 integrated the population, providing some support for spatial assimilation theory. However, age differences are striking, spatial patterns suggest that some regions of the country are integrating more than others, and we see continuing evidence of white flight—all of which suggest that stratification processes are at play.

In net, white young adults (ages 20–39) moved to more diverse counties and regions (mostly central cities), while blacks and Hispanics across the life course moved into more predominantly white (mostly less urban) areas. These parallel trends drove segregation decline and were sufficient to offset white migration among family-age and older whites to less diverse counties. Net migration integrated populations under age 40, while migration among people over age 60 increased segregation. This was evident in the multigroup case and was more pronounced for black-white segregation. These findings are consistent with residential preferences literature, which has found that blacks are willing to move into largely white areas if there is a visible black presence and they feel reasonably well accepted (Krysan and Farley 2002) but that whites, especially those with children, perceive the presence of blacks as a threat and avoid neighborhoods with a visible black presence (Emerson et al. 2001). They are also consistent with Beale and Fuguitt's (2011) finding that older blacks moving to the South moved to different retirement destinations than did older whites.

In contrast, net migration across the life course generally decreased Hispanic-white segregation. This difference between the black and Hispanic experiences is important because neighborhood-level studies in metropolitan areas have indicated steady or increasing Hispanic-white segregation, while black-white segregation has declined (e.g., Logan and Stults 2011). Our findings that Hispanics have been integrating more broadly at larger geographic scales than blacks in recent decades lend support to research on the prevalence of new Hispanic destinations (Lichter and Johnson 2009; Massey 2008). Still, we do not know how much of the Hispanic migration observed here is due to immigration and how much is due to domestic migration. International migrants may be integrating less (less spatial assimilation) than Hispanics who have been in the United States for longer periods (see Lichter et al. 2010).

The findings demonstrate that while people of color are migrating into predominantly white counties, whites are generally moving out of more diverse counties and concentrating in counties with higher proportions of whites (white flight). Results suggest that whites at family ages (children and adults aged 40–59) are moving toward relatively white counties, presumably toward less urban (and less diverse) areas. Whites' retirement-age migration from more diverse to less diverse counties is also important and continues to separate different ethnoracial groups. Although we do not have data on migration flows and cannot say conclusively, it appears that a relatively common pattern of older whites moving from relatively white suburbs in Midwestern

and Northeastern suburban and exurban counties toward the Sun Belt might increase diversity in their counties of origin (the Rust Belt) by decreasing the concentration of whites at the same time that people of color are moving in. Yet, because whites are moving to predominantly white counties in the destination region, the net migration would not integrate the destination counties in the Sun Belt and may even decrease diversity there.

White young adults are an exception. They are moving from less diverse to more diverse counties in large numbers. This trend is consistent with the long-established pattern of young adults moving toward urban centers. Johnson and Winkler (2015) showed that white young adult net migration into diverse central-city counties increased the white young adult population there by approximately 20 % between 2000 and 2010. They also showed that this pattern accelerated between the 1990s and 2000s. Our findings also show a greater decline in young adult black-white segregation in the 2000s than in the 1990s (see Table 1). This coupled with our finding that older adult migration increased segregation less in the 2000s than in the 1990s suggests that county migration patterns may be starting to shift more toward ethnoracial integration.

We cannot tell whether the age patterns shown here are really rooted in age effects or life course-related processes or whether they are indicative of cohort effects. A recent study by Wagmiller (2013) took a cohort perspective and showed that more recent cohorts of both whites and blacks live in more diverse neighborhoods than did prior generations. If cohort effects are at work, a significant and ongoing shift toward population integration should be evident over the next several decades as older cohorts are replaced. Finding such cohort effects would support spatial assimilation theory, as newer generations are increasingly integrated. If, however, these findings are related to age or life course experiences, migration might further increase segregation as the large cohorts of white Baby Boomers age into retirement. If Baby Boomers increasingly move toward nonmetropolitan (and relatively white) counties (as predicted by Cromartie and Nelson (2009)), then older whites are likely to continue to concentrate in areas separate from people of color. Additional research investigating segregation and migration from a cohort perspective is important for understanding whether populations are, in the long term, really integrating. And, just as prior research on suburbanization examined its impact on racial segregation and resource inequalities, research on newer phenomena like “exurbanization,” “amenity migration,” and “retirement migration” should consider distributional impacts on both origin and destination communities.

In more than 90 % of counties, net migration increased diversity over the past two decades, but there was considerable spatial variation in the magnitude of integration. Spatial differences suggest that local socioeconomic conditions, housing markets, and cultural contexts might well predict change in diversity due to net migration. Future studies are needed to investigate these relationships so that we can better understand the causal mechanisms fueling integration/segregation across counties. If spatial assimilation processes are at work, we should expect to find that counties with more equal minority-white income ratios would see greater increases in diversity due to net migration. If place stratification processes are driving these patterns, we would expect that counties with more exclusive zoning policies (requiring larger lot sizes, lack of multifamily zoning, and so on) and less affordable housing would see less integration, and that counties with clearly specified inclusionary zoning policies would see more

integration. Residential preference studies might attempt to unpack complex relationships between preferences for more or less urban environments with preferences for more or less racial/ethnic diversity in communities and to explore how these relationships vary by age and family status.

In sum, our results suggest that spatial assimilation and place stratification processes likely simultaneously impact county-level net migration patterns. Evidence of assimilation is seen in the near universal increase in ethnoracial diversity due to county-level net migration over the last 20 years. However, clear findings of white flight and age-based differences suggest that stratification processes might also be underway. County-level cultural and economic differences, planning and zoning processes and related use of space, and natural and built amenities may make some counties more or less desirable and/or accessible than others for people of different racial/ethnic backgrounds at different points in the life course. These complex relationships could very well play out to diversify some counties and communities by race/ethnicity and age, while others Balkanize. Moving forward, it will be important to understand relationships between racial/ethnic segregation and age segregation at multiple geographic levels from local neighborhoods to places, counties, and regions. Counties are likely not the best unit of analysis for understanding place stratification because incorporated places within the same county compete with one another in growth machine endeavors (Lichter et al. 2015; Winkler 2013). Future studies investigating the role of age-specific migration in diversifying/Balkanizing places within counties would be necessary to understand the tradeoffs between spatial assimilation and place stratification.

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