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White and Latino Locational Attainments: Assessing the Role of Race and Resources in U.S. Metropolitan Residential Segregation

Amber R. Crowell[1] and Mark Fossett[2]

Abstract

This study examines White-Latino residential segregation in six U.S. metropolitan areas using new methods to draw a connection between two dominant research traditions in the segregation literature and empirically analyze prevailing conceptual frameworks. Based on microlevel locational attainment analyses, we find that for Latinos, acculturation and socioeconomic status are positively associated with greater residential contact with Whites and thus promote lower segregation consistent with predictions of spatial assimilation theory. However, standardization and decomposition analysis reveals that a substantial portion of White-Latino segregation can be attributed to White-Latino differences in the ability to translate acculturation and socioeconomic assimilation into co-residence with Whites. Thus, consistent with predictions of place stratification theory, evidence suggests that spatial assimilation dynamics are limited by continuing race-based factors leading to the expectation that segregation will persist at moderate to high levels even after Latinos reach parity with Whites on social and economic resources that shape locational attainments. Therefore, we offer two conclusions. First, contemporary White-Latino segregation is due in part to group differences in social and economic resources that determine locational attainments and that this component of White-Latino segregation will continue to be significant so long as Whites and Latinos differ along these social and economic characteristics. Second, while spatial assimilation dynamics can promote partial reductions in White-Latino segregation, we expect segregation to continue at moderate to high levels because place stratification dynamics limit Latino residential integration even when Latinos and Whites are comparable on relevant resources.

Keywords

segregation, racial segregation, place stratification, spatial assimilation, Latinos

INTRODUCTION

In this study, we set out to accomplish two goals, the first of which allows the possibility for the next: (1) Draw a direct connection between the two dominant research traditions in the segregation literature and (2) explore in greater detail than before the role of spatial assimilation and place stratification dynamics in determining White-Latino residential segregation patterns in select metropolitan areas. Until now, research investigating residential segregation has followed one or the other of two distinct traditions. One is the tradition of locational

[1]California State University, Fresno, CA, USA
[2]Texas A&M University, College Station, TX, USA

Corresponding Author:
Amber R. Crowell, Assistant Professor of Sociology, California State University, 5340 N. Campus Drive M/S SS97, Fresno, CA 93740, USA.
Email: acrowell@csufresno.edu

attainment studies that examine how the social characteristics of individuals or households relate to neighborhood-level residential outcomes such as ethnic composition or percent in poverty. These studies provide valuable insights about the microlevel attainment process that ultimately gives rise to segregation, but they have not been used to directly analyze aggregate-level segregation. The second tradition is to study segregation by investigating the level and variation in the uneven distribution of groups across residential areas of metropolitan areas and other aggregate units. These studies provide insights about the macrolevel consequences of individual-level attainment processes for different communities, but this approach is limited in its ability to precisely delineate the separate roles that race and other social and economic characteristics may play in determining the overall level of segregation.

These two research traditions complement each other, each one addressing limitations of the other, to increase our sociological understanding of racial residential patterns. We are still left with the problem that it has not been possible to draw direct quantitative connections between microlevel processes of locational attainments and macrolevel patterns of residential segregation. Our study addresses and overcomes this limitation by drawing on new methods for segregation analysis that allow us to establish how aggregate-level segregation is directly determined by the parameters of microlevel processes of the locational attainments of households. Specifically, we draw on a new formulation of the dissimilarity index, a well-known measure of uneven distribution, where the index is recast in terms of individual-level residential outcomes that additively determine the aggregate-level index score. This innovation in methods for analyzing segregation allows us to draw conclusions about how the extent of segregation between two groups is driven not only by the impact of race group membership but also by group differences in individual-level resources and the rates of return on those resources. These are two important aspects of residential segregation that previously have not been empirically assessed together.

We focus on White-Latino segregation in metropolitan areas because Latinos are one of the most sociodemographically dynamic major racial groups in the United States and have residential outcomes that can be explained by both spatial assimilation and place stratification frameworks. With a selection of six major metropolitan areas in 2010 as case studies, we conduct our analysis using restricted-use microdata from the 2010 decennial census and the 2008–2012 American Community Survey. Combining new methods of analysis with the richness of the restricted-use microdata enables us to quantitatively analyze how the impact of relevant indicators of social status and acculturation join with the impacts of race to determine the level of White-Latino segregation in the metropolitan area.

BACKGROUND

The Latino Population: Demographics and Residential Segregation

We focus on White-Latino segregation given that Latinos are the most dynamic population in the United States, driving a wide range of major demographic shifts. Of particular interest to us, White-Latino segregation is substantial in most metropolitan areas, but it varies significantly across areas. In addition, the Latino population exhibits great internal diversity with respect to social and economic characteristics that are relevant in individual-level locational attainment processes, and these differences also vary across metropolitan areas. Thus, the complexities of White-Latino segregation present an intriguing opportunity to investigate how segregation at the aggregate level arises out of White-Latino differences in the parameters of individual-level locational attainment processes and White-Latino differences in the inputs to the attainment process.

Over the past several decades, the Latino population has grown nationally due to immigration and natural growth (Saenz 2010). Today Latinos are the largest ethnic minority group in the United States. As of 2010, Latinos of all races and nationalities comprise over 16 percent of the total U.S. population, up from 12.5 percent in 2000. As Saenz (2010) and others have noted, due to historical factors and immigration trends, the Latino population is highly diverse in language usage and ability, immigration status, and levels of socioeconomic status. In general, foreign-born Latinos have lower levels of education, lower levels of income, and are less likely to speak English in comparison to native-born Latinos (Saenz 2010). The implications for Latino residential outcomes is that we may expect to see a wide dispersion of residential outcomes based on levels of socioeconomic status and social distinctiveness from Whites. This is important to note because the consequences of racial residential segregation are widely documented and are known to impact multiple aspects of life, including socioeconomic opportunities, health outcomes, and exposure to crime (Sharkey 2013).

To place Latino segregation in perspective, the consistent finding in the literature is that Latinos are less segregated from Whites than are Blacks, but more segregated than Asians (Charles 2003; Iceland 2004; Iceland, Weinberg, and Hughes 2014; Iceland, Weinberg, and Steinmetz 2002; Zubrinsky and Bobo 1996). Previous research also indicates that while White-Black segregation has been slowly declining over the past several decades, Latino segregation from Whites has stayed stable or has slightly increased on the dimension of evenness[1] while the residential isolation of Latinos has increased markedly (Charles 2003; Farley and Frey 1994; Iceland et al. 2002, 2014). These unique aspects of trends in Latino residential segregation have prompted researchers to consider a variety of explanations. Much of the focus has been on how Latino population growth, and especially the role of immigration, shapes changes in Latino segregation over time (Charles 2003; Massey 2001; Massey and Denton 1987).

Trends in both uneven distribution and isolation for Latinos have been seen as impacted by Latino population growth based on consequences of immigrant settlement and community (Iceland et al. 2002; Massey and Denton 1987) and competitive ethnic relations and place stratification (Blalock 1967; Marshall and Jiobu 1975; Tienda and Lii 1987). The consensus in the literature is that Latinos' decreased exposure to Whites results in part because Latino population growth is producing changes in ethnic composition in metropolitan areas. All else equal, the necessary result is that Latinos have more residential contact with each other and a lessening amount of contact with Whites (Charles 2003; Iceland 2004; Iceland et al. 2002, 2014; Massey 2001; Massey and Denton 1987). There is also more attention in the literature being given to the outcomes of Latinos in nonmetropolitan areas as the Latino population continues to grow in "new destinations" located primarily in the Midwest and South (Lichter et al. 2007, 2010). While we include one Southern metropolitan area in this study (Atlanta), we do not give attention to nonmetropolitan areas—despite their increasing relevance for Latino social outcomes—so that we may focus on accomplishing the goals of this paper without overcomplicating the analysis and results.

Arguments suggesting that foreign-born presence in the Latino population may account for why uneven distribution of Latinos has been stable and even rising are more complex. They point to the impact of immigration in maintaining White-Latino differences in socioeconomic characteristics, immigrant settlement on White-Latino residential distributions, and the growing size and social distinctiveness of the foreign-born Latino population on White-Latino group relations (Lichter et al. 2010). It is plausible that all of these factors may be relevant. Aggregate-level analyses are not well suited for sorting through these kinds of hypotheses as they involve complex interconnections between the inputs to and the parameters of the attainment processes, a limitation we address.

Conceptual Frameworks: Spatial Assimilation Theory

The first conceptual framework that we draw on is the spatial assimilation perspective, which predicts that residential integration follows when a minority group makes gains in socioeconomic status and acculturation as part of a more general process of assimilation and incorporation (Massey 1985; Massey and Mullen 1984). Thus, acculturation and gains in socioeconomic status occurring within and across generations are seen as enabling minority households to experience locational attainments in the form of access and movement to more desirable neighborhoods and co-residence with higher status groups, typically operationalized as living in neighborhoods with a higher proportion of Whites (Alba and Logan 1991; Charles 2003; Duncan and Lieberson 1959; Massey 1985). Using neighborhood proportion White as a metric for locational attainment has its limitations, but the practice is widely accepted because neighborhood percent White is often a correlate of neighborhood advantage. On a more practical note, this measure also has clear relevance for residential segregation at the aggregate level as minority movement to neighborhoods where proportion White is higher is the fundamental mechanism for bringing about even distribution.

There has been mixed support for the spatial assimilation model in the literature where research findings show it to be most relevant for the case of European ethnic groups for whom immigration and nativity played a major role in shaping minority ethnic status (Lieberson 1981; Massey 1985). Contemporary research indicates spatial assimilation theory is also relevant for explaining the residential outcomes of Latinos. In general, studies show that with acculturation and socioeconomic gains, Latinos experience locational attainment and increased contact with Whites (Alba and Logan 1993; Charles 2003; Iceland et al. 2014; Iceland and Nelson 2008; Iceland and Scopilliti 2008; Massey 1985; Yu and Myers 2007). In particular, past research has devoted considerable attention to how immigration impacts the

trajectory of residential outcomes for Latinos, arguing that at first immigrant settlement and enclave formation causes a succession process where the neighborhoods that immigrants inhabit are abandoned by native-born Whites and areas of ethnic concentration emerge. Later, after immigration slows, the process of spatial assimilation accelerates and integration occurs as the social distance from native-born Whites decreases (Massey 1985). Contemporary studies also note that the spatial assimilation perspective anticipates that segregation may initially be high for immigrant groups due in part to the desire to at first reside in ethnically homogenous communities where social support in the form of ethnic-serving community institutions offer practical advantages for settlement and adaptation to life in the United States (Clark 2002; Hall and Stringfield 2014; Iceland et al. 2014; Iceland and Nelson 2008; Iceland and Scopilliti 2008; Lichter et al. 2010; Massey 1985; Yu and Meyers 2007; Zubrinsky and Bobo 1996).

The spatial assimilation perspective suggests a number of variables as being relevant for locational attainment research. Massey (1985), Massey and Denton (1987), and Alba and Logan (1991, 1992, 1993) emphasize socioeconomic status and acculturation as primary factors. Standard measures of socioeconomic status include variables such as education and income. Measures of acculturation include nativity as an important marker, with English ability and naturalization being related considerations. Overall, studies have found positive relationships between socioeconomic gains and acculturation with locational attainments whether it is defined as suburbanization or residential contact with Whites (Alba and Logan 1991, 1992, 1993; Massey and Denton 1987; Yu and Myers 2007).

To conclude, this framework will provide the primary guidance for the research design of the analyses conducted in this study. However, it is important to note that while spatial assimilation dynamics are evident for Latinos, overall segregation between Latinos and Whites is persisting over time. In the following, we review a perspective that raises the alternative possibility that segregation may persist despite Latino spatial assimilation trends.

Conceptual Frameworks: Place Stratification

The place stratification perspective is sometimes framed as a counter-theory to spatial assimilation given its emphasis on discrimination and barriers to integration, but the two are not necessarily mutually exclusive. If spatial assimilation dynamics are weak, place stratification concerns naturally become the main focus. However, when both place stratification and spatial assimilation dynamics are evident, place stratification can also serve as a complementary theory to help explain residential dynamics where spatial assimilation stops short (Alba and Logan 1991; Charles 2003). Place stratification is a theory of discrimination focusing on residential segregation that essentially addresses the role of group membership and race in determining residential patterns. At the micro level of analysis, the key explanatory variable is race both in its additive effect and its interaction with other relevant factors.

Under place stratification theory, racial prejudice and notions of racial hierarchy and concern for maintaining group advantage motivates the White majority group to minimize minority presence in their neighborhoods through a welter of practices, ranging from formal and informal housing market discrimination against minority households to hostility toward minority households in White residential areas to White avoidance of predominately non-White neighborhoods (Ellen 2000; Logan 1978; Massey and Denton 1993). Previous research provides compelling documentation of past and ongoing discrimination (Massey and Denton 1993; Turner 1992) and thus provides a basis for predicting that minority gains in socioeconomic status and acculturation may not necessarily lead to residential integration and co-residence with Whites.

Studies have found evidence that gains in socioeconomic status and acculturation do not provide returns on residential outcomes equally across all racial and ethnic groups (Bobo and Zubrinsky 1996; Denton and Massey 1989; Rosenbaum 1996; Zubrinsky and Bobo 1996). Audit studies provide some of the more compelling cases of direct evidence of race-based discrimination in the housing market at levels highly relevant for explaining segregation (Galster 1990; Massey and Lundy 2001; Purnell, Idsardi, and Baugh 1999; Turner 1992). Other studies (Desmond 2016; Ross and Turner 2005) indicate that while discriminatory practices may be declining, they are hardly negligible and remain relevant for explaining segregation. In addition, declines in formal and overt institutional discrimination do not necessarily blunt the impact of institutional racism.

To summarize, place stratification points to the role of race-based factors, both attitudinal and institutional-structural, that can hinder minority residential contact with Whites and thus limit residential integration. The place stratification perspective leads us to focus on whether White-Latino differences in segregation-determining residential outcomes

may still persist even after taking account of differences in social and economic characteristics. Given that both spatial assimilation and place stratification dynamics have notable theoretical implications for the Latino population, the case of White-Latino segregation is ideal for a methodological approach that can address both frameworks.

DATA, MEASURES, AND METHODS

Data Sources, Units of Analysis, and Samples

The data in this study are drawn from the restricted-use 2010 decennial census microdata and the restricted-use 2008–2012 American Community Survey (ACS) pooled microdata. The 2010 decennial census has 100 percent population coverage with information on race and ethnicity. We use these data to compute block-level[2] racial composition (i.e., pairwise proportion White) for calculating segregation scores and modeling locational attainments. With the restricted-use file, we are able to combine the results at the block level with a second data set created by pooling the restricted-use ACS for the five-year period 2008–2012. The ACS is nationally representative, and the five-year pooled restricted-use data set results in a roughly 7.5 percent sample. The ACS provides detailed social and economic information on individuals and households, relevant for our locational attainment models.

We use the merged data set to perform locational attainment analyses where the dependent variable pertaining to residential location is developed from the decennial census and independent variables relating to household-level demographic, social, and economic characteristics are developed from the ACS. The units of analysis in our locational attainment models are White and Latino householders in six metropolitan areas of interest, selected from different regions of the United States with varying levels of segregation—Atlanta, Chicago, Houston, Los Angeles, San Diego, and Seattle. This selection was motivated by a desire to include major metropolitan areas with established Latino populations[3] where spatial assimilation and place stratification dynamics have had time to unfold as well as cities where the Latino population is smaller and newer.

Measurement

The analyses we conduct draw on a new formulation of segregation indices, wherein the value of the index can be obtained as a difference of group means on index-specific scores for individual-level residential outcomes (Fossett 2017). Fossett (2017) establishes that all popular segregation indices, including the dissimilarity index, can be formulated in a common "difference-of-means" framework under which index values can be obtained from:

$$S = \bar{Y}_1 - \bar{Y}_2, \tag{1}$$

where S is the relevant segregation score (here the dissimilarity index), $\bar{Y}_1$ is the mean score on y_i for individuals in Group 1 in the analysis (here Whites), and $\bar{Y}_2$ is the mean score on y_i for individuals in Group 2 in the analysis (here Latinos).

The specific scoring of individual residential outcomes y_i varies depending on which index of uneven distribution is being used. The dissimilarity index is the best known and most widely used measure of uneven distribution (Massey and Denton 1988). The following is perhaps the most commonly used formula:

$$D = 1/2 \cdot \Sigma \left| w_k / W - l_k / L \right|, \tag{2}$$

where k is an index for areas, w_k is the count of Whites in area k, l_k is the count of Latinos in area k, and W and L are the city-wide totals for Whites and Latinos, respectively.

While this formula is attractive for some purposes, it has very limited value here because it provides little basis for understanding how the overall level of segregation for the city arises out of group differences in individual-level locational attainments. Fossett (2017) addresses this limitation of prevailing approaches by developing the difference-of-means framework, wherein D can be obtained by computing the group difference-of-means on individual-level locational attainments (y_i) scored from area proportion White (p_k).

Within this framework, index scores are obtained using the generic Equation 1 introduced earlier in combination with index-specific functions $y_i = f(p_k)$ to assign values of y_i to individuals based on the ethnic proportion p_k of the area they reside in. For D, the scoring function $y_i = f(p_k)$ for individuals is simple: assign values of 1 or 0 based on how proportion White for the individual's area of residence (p_k) compares to proportion White for the city as a whole (P).[4] If the proportion White in the neighborhood is at or above parity, that is, greater than or equal to the proportion White in the city as a whole, assign a score of 1. If the proportion White in the individual's neighborhood is

below parity, assign a score of 0. The resulting formula is:

$$D = (1/W) \cdot \Sigma w_i y_i - (1/L) \cdot \Sigma l_i y_i, \quad (3)$$

where $y_i = 1$ if $p_k \geq P$, $y_i = 0$ if $p_k < P$, and i and k index individuals and blocks, respectively. The value of D obtained using this formula is the same as that obtained by the more familiar computing formula given in Equation 2.[5]

Conceptually, the formulation explicitly links individual residential outcomes to aggregate-level segregation index scores in a mathematically simple and easy way to understand. Additionally, the formula for D given in Equation 3 has an intuitively appealing interpretation from the point of view of locational attainments; D registers the White-Latino difference in proportions residing in areas that attain parity on proportion White. This leads to the practical advantage of the formulation; one can account for the overall level of segregation as measured by D by accounting for how Whites and Latinos come to differ in residing in parity neighborhoods. Thus, this formulation makes it possible to investigate segregation in greater quantitative detail than previously possible by conducting individual-level analyses of segregation-relevant residential outcomes. Conclusively, the dependent variable for analysis is the individual scoring for D.

Another advantage of this approach is that it places the quantitative analysis of segregation on the same methodological footing as analyses of group inequality generally. For many decades, it has been routine to quantitatively explore crucial racial stratification outcomes by estimating microlevel models of individual-level outcomes to gain insight into how group differences on the outcomes that determine inequality arise from group differences in attainment processes. This was not previously possible in segregation analysis because segregation indices have not been formulated and interpreted in terms of group differences on individual-level locational attainments (Fossett 1988; Fossett and Cready 1998). The difference-of-means framework addresses this and gives researchers new options for segregation analysis while maintaining complete continuity with previous options for segregation analysis.

At this point, we clarify that in using a scoring based on parity on percent White as the outcome for our individual-level analysis, we are not attempting to make any normative evaluations of neighborhoods or imply that reaching parity on percent White is the desired neighborhood outcome. The use of this individual scoring based on parity is necessary as it is the individual component of the dissimilarity index and equal outcomes on parity is the condition under which even distribution can occur. Thus, in discussing White-Latino differences in parity, we are addressing deviances from even distribution rather than suggesting any normative prescriptions for social mobility. Consistent with the literature, we refer to attainments toward neighborhood parity as locational attainments.

Finally, we adjust the scoring of the residential outcomes that determine the dissimilarity index to remove a source of upward bias that can be problematic when segregation is assessed using small spatial units, which is a well-known issue in segregation measurement (e.g., Winship 1977). The solution is simple but highly effective; it involves the adjustment of removing the reference individual from the calculation of proportion White (p_k) (Fossett 2017). We do not discuss the issue at length because while the adjustment can have important consequences in the analysis of segregation, it does not have important implications for this study.

Independent Variables

Spatial assimilation theory provides the basis for developing the set of independent variables to include in the locational attainment models we estimate. The variables reflect selected aspects of acculturation and socioeconomic status as well as other factors that might affect where one lives in a way that might shape White-Latino segregation. For the sake of brevity, we refer to the full set of variables as *resources*. We review the independent variables as follows.

Socioeconomic status. We measure socioeconomic status with educational attainment and income. We measure education using a six-category ordinal variable with the lowest category being those who did not attend high school and the highest being those who completed a postgraduate degree. We measure income as the natural logarithm of household income to better capture the effects of income, which are nonlinear when income is measured in dollars.[6]

Acculturation. We include several indicators of acculturation relevant for White-Latino segregation. The first is English ability, coded as a four-category measure ranging from "Speaks English not at all" to "Speaks only English/speaks English very well." For immigration status, we use U.S.-born as the reference group and include dummy variables for foreign-born noncitizens and naturalized U.S. citizens. We also include dummy

variables to control for having immigrated within the last 15 years[7] and recent migrant (moved within the last year).

Other. We include controls for military participation, age, and family structure as these variables have been found to be associated with locational attainments.

Model Estimation and Standardization and Decomposition Analysis

We use fractional logit regression to estimate location attainment models assessing how social characteristics affect segregation-relevant residential outcomes for Whites and Latinos. The method draws on the generalized linear modeling (GLM) framework and was first introduced by Papke and Wooldridge (1996), having gained popularity since that point (Kieschnick and McCullough 2003). It is specifically geared to modeling the mean of a bounded variable, and so it is well suited for the needs of our analyses. Estimated coefficients are similar to logit-style coefficients with the key difference being that the model is predicting the logit of the mean of the original scores rather than the mean of logit scores. The regression equations can be used to obtain predicted values for the mean in the dependent variable's original metric, bounded between 0 and 1 (based on applying the inverse logit transformation). Accordingly, it is a good choice for modeling scores that determine the dissimilarity index.

While the locational attainment models are necessary to build on the tradition of previous research, our more informative findings are drawn from analysis procedures that make use of the model estimates to decompose segregation outcomes. We use the results of the regression models to perform regression standardization and decomposition to assess how segregation is shaped by the separate impacts of group differences in resources (i.e., distributions on the independent variables) and group differences in "rates" (i.e., the effects of the independent variables). Variations on this technique have been implemented since Kitagawa (1955), illustrating how standardization and decomposition analysis can be used to partition a group difference-of-means on an outcome into separate components. Althauser and Wigler (1972) and Jones and Kelley (1984) extended the Kitagawa method to regression-based analysis, and Powers, Yoshioka, and Yun (2011) extended application of these methods with nonlinear regression models.

We use standardization and decomposition analysis to answer two questions. The first is: How does the average Latino residential outcome change when Latinos are matched with Whites on social characteristics? We answer this by performing regression standardization, wherein predictions are generated for the White cases in the metropolitan area based on coefficients from the attainment model for Latinos. This generates the hypothetical distribution of predicted values that would be obtained if Latinos had the exact distribution on resources observed for Whites but converted these resources into locational attainments based on the rates observed for Latinos. The second question we address is: How does the average Latino residential outcome change when Latinos are matched with Whites on rates of return? Here we generate predictions for Latino cases using the coefficients from the attainment model for Whites. These predictions can be used to assess how the average Latino residential outcome would change if Latinos converted their resources into locational attainments at the rates of return observed for Whites.

The findings from these standardization analyses allow us to assess the separate and joint contributions that White-Latino differences in resources and White-Latino differences in rates of return make to the overall level of segregation in the city. If White-Latino segregation is due primarily to group differences in resources, it will provide evidence consistent with the spatial assimilation prediction that even distribution will follow as Latinos acquire social resources relevant for locational attainments. However, if White-Latino segregation is due primarily to group differences in the ability to convert resources into locational attainments, it will provide evidence consistent with the place stratification prediction that racial dynamics prevent integration. Here we note that there are limitations to quantitatively modeling the effects of race and discrimination on patterns of segregation. Nevertheless, we believe that this exercise holds an advantage over other strategies in that we are able to assess White-Latino differences in the rates of return on other social characteristics, isolating the effect of race group membership and its interaction with other factors.

If both factors play a non-negligible role in determining the level of White-Latino segregation, as we theoretically expect they might, the decomposition will also provide an estimate of the "joint" impact of the components. This component reflects the fact that the estimated impact of equalizing resources will vary depending on whether rates are as observed or have been equalized, and similarly, the estimated impact of equalizing rates will vary depending on whether resources are as observed or have been equalized. Following the advice of

Althauser and Wigler (1972) and Jones and Kelly (1984), we report the joint component to permit flexibility in assessing its implications.

In the context of nonlinear, nonadditive multivariate attainment models, the approach we use is to perform standardization exercises based on predictions at the individual level to calculate the values of the resources and rates components and then obtain the value of the joint impact component by subtraction. The first step in the approach is to calculate values for two observed group means and two standardized group means. The two observed group means are given as:

- $\overline{Y}_{W_{Re}W_{Ra}}$ = the observed White mean (i.e., the mean of predicted values [$\hat{y}_i$] for Whites under the attainment model for Whites)
- $\overline{Y}_{L_{Re}L_{Ra}}$ = the observed Latino mean (i.e., the mean of predicted values [$\hat{y}_i$] for Latinos under the attainment model for Latinos).

The two standardized group means are given as:

- $\overline{Y}_{W_{Re}L_{Ra}}$ = the Latino mean standardized to Whites' resources (i.e., the mean of predicted values [$\hat{y}_i$] for Whites under the attainment model for Latinos)
- $\overline{Y}_{L_{Re}W_{Ra}}$ = the Latino mean standardized to Whites' rates of return (i.e., the mean of predicted values [$\hat{y}_i$] for Latinos under the attainment model for Whites).

The overall level of segregation (i.e., D) is given by the difference between the observed means for Whites and Latinos. The value of this and the three component terms can be obtained as follows:

(D) $\overline{Y}_{W_{Re}W_{Ra}} - \overline{Y}_{L_{Re}L_{Ra}}$ = observed overall segregation

(D_{Re}) $\overline{Y}_{W_{Re}L_{Ra}} - \overline{Y}_{L_{Re}L_{Ra}}$ = the resources component

(D_{Ra}) $\overline{Y}_{L_{Re}W_{Ra}} - \overline{Y}_{L_{Ra}L_{Re}}$ = the rates component

(D_J) $D - (D_{Re} + D_{Ra})$ = the joint impact component.

RESULTS

Descriptive Results

In Table 1, we present descriptive statistics for White and Latino householders in our six metropolitan areas from the 2008–2012 American Community Survey Public Use Microdata Sample.[8] The results highlight well-known disparities between Whites and Latinos, with Whites having in general a greater socioeconomic advantage. We also find that, reflecting sustained Latino immigration in recent decades, a much higher proportion of Latinos are foreign-born[9] and are either bilingual or do not speak English at all. Finally, we find notable differences between Whites and Latinos in terms of age and household structure, with Latinos being much younger than Whites and Latinos and also having larger proportions of single-mother households. These contrasts are sharper in metropolitan areas with established Latino areas such as Los Angeles, Chicago, San Diego, and Houston and less pronounced in metropolitan areas like Atlanta and Seattle, where major Latino presence is more recent by comparison.

In Table 2, we document the level of segregation across the six metropolitan areas as measured by the dissimilarity index. As noted earlier, the dissimilarity index reflects the White-Latino difference in the percent of householders residing in neighborhoods that are at or above parity with proportion White for the city overall. Accordingly, we list the dissimilarity index scores and also the White and Latino means on individual-level parity contact with Whites, the group-specific components that determine the aggregate level score. For example, in Atlanta, we find that 81 percent of Whites live in neighborhoods that are at or above parity on proportion White compared to 34 percent of Latinos, with the White-Latino difference determining the dissimilarity index score of 47. As expected, we find the highest levels of White-Latino segregation in Los Angeles, Chicago, and Houston.

The greatest disparity in White-Latino parity-contact with Whites is in Los Angeles, where only 23 percent of Latinos live in neighborhoods that are at or above parity on proportion White as compared to 84 percent of Whites. Chicago and Houston are not far behind, where 28 percent of Latinos live in neighborhoods at or above parity as compared to 81 percent of Whites. By far, the lowest level of segregation is in Seattle, where 41 percent of Latinos live in neighborhoods at or above parity compared to nearly 68 percent of Whites, producing a segregation score of only 27. The variation in the values of D across these cities is substantial and documents that our sample includes both highly segregated cities where Latinos differ greatly from Whites on parity as relevant for even distribution and also cities where these differences in parity are modest.

Table 1. Descriptive Statistics for White and Latino Householders in Metropolitan Areas.

	Atlanta		Chicago		Houston		Los Angeles		San Diego		Seattle	
	Whites	Latinos	Whites	Latinos	Whites	Latinos	Whites	Latinos	Whites	Latinos	Whites	Latinos
Education	3.25	2.01	3.26	1.97	3.27	1.83	3.43	1.87	3.41	2.18	3.34	2.35
Median income	$67,900	$36,600	$70,000	$45,000	$74,000	$40,000	$73,000	$45,000	$68,000	$44,000	$70,000	$46,200
Military (percentage)	15.93	4.37	12.59	3.84	15.87	4.35	13.14	4.02	20.82	9.87	16.00	6.94
U.S.-born citizen (percentage)	95.58	27.70	89.64	40.22	94.22	39.14	83.52	35.04	91.15	46.14	92.63	47.15
Foreign-born, U.S. citizen (percentage)	2.51	17.21	7.04	23.77	2.98	18.50	11.82	27.73	5.76	22.63	4.33	14.92
Foreign-born, noncitizen (percentage)	1.91	55.09	3.32	36.01	2.80	42.36	4.66	37.23	3.09	31.22	3.04	37.93
Recent immigrant (percentage)	2.13	44.18	3.57	20.67	2.67	26.19	4.55	15.20	2.90	15.36	3.18	29.64
English ability	2.98	2.06	2.93	2.20	2.98	2.10	2.91	2.10	2.96	2.30	2.97	2.40
Mean age	50.63	39.46	52.13	43.24	51.23	42.29	53.62	45.41	52.27	43.89	50.45	40.15
Married couple household (percentage)	57.50	58.63	53.51	57.14	55.93	58.43	47.11	53.28	49.94	54.87	49.83	48.64
Single mother household (percentage)	6.62	12.30	6.71	14.82	6.68	14.21	6.76	17.38	6.62	16.20	6.63	13.04
Other family household (percentage)	35.88	29.06	39.78	28.04	37.39	27.36	46.13	29.34	43.44	28.92	43.53	38.31
Recent mover (percentage)	12.32	20.38	10.20	13.65	14.31	18.46	12.61	12.88	14.49	15.17	15.28	23.25

Table 2. Observed Dissimilarity Index in Metropolitan Areas.

	Percent at or above Parity on Proportion White		
Metropolitan Area	Whites	Latinos	Dissimilarity Index
Atlanta	80.75	33.80	46.95
Chicago	81.29	27.89	53.40
Houston	81.22	28.05	53.17
Los Angeles	83.56	23.12	60.44
San Diego	79.61	31.46	48.15
Seattle	67.99	41.22	26.77

Micro-models of Segregation-related Locational Attainments

In Table 3 we find that generally, the estimated effects are consistent with the spatial assimilation perspective in that parity-level contact with Whites is related to indicators of socioeconomic standing, which have similar effects for both Whites and Latinos. For example, for both Whites and Latinos, income and education have positive effects on the probability of residing in neighborhoods that are at or above parity. The impact of education is substantial and statistically significant for both groups across all cities. This is similarly true for the effect of income, with the exception of Latinos in Atlanta. In contrast to education, however, the effect of income is larger for Whites in comparison with Latinos in all of the six cities. In combination, these effects indicate that parity-level contact with Whites tracks socioeconomic standing, and thus Latino socioeconomic assimilation is, all else equal, associated with greater parity-level contact with Whites and even distribution.

The estimated effects of nativity, citizenship, and English language proficiency are generally consistent with the spatial assimilation perspective, especially in the results for Latinos. The combination of effects suggests that Latinos have greater contact with Whites if they are U.S.-born and as they acculturate specifically in terms of English ability. In turn, this suggests that continuing immigration serves to sustain White-Latino segregation but may take on less importance in the future as the native-born Latino population grows. The role of these variables is both less consistent and generally less important for Whites. At least one category of being foreign-born has statistically significant negative effects in three cities, statistically significant positive effects in two cities, and no appreciable effect in one city. So it appears that the effect of being foreign-born is more idiosyncratic across cities in the low immigration context for Whites, perhaps varying with factors that we do not consider here.

Briefly we note that the effects of age and household structure operate as expected. The results indicate that younger households have a substantially lower probability and elderly households have a substantially higher probability of living in neighborhoods that are at or above parity for both groups. These age effects have relevance for segregation based on the fact that the Latino population is much more youthful than the White population. In comparison to married couple households, single-mother householders and other householders are significantly less likely to live in neighborhoods that are at or above parity.

The last two variables we discuss are military service and recent mover status. The effect of military service for Whites is consistent with expectations; it has statistically significant negative effects on the probability of parity contact. For Latinos, however, effects of military service are generally weak and inconsistent. The inconsistent effects for Latinos do not provide a basis for concluding that Latino convergence with Whites serving in the military will contribute to reducing segregation. Recent mover status also has inconsistent effects. Based on this, we do not see any suggestion that it has meaningful implications.

To summarize, the analyses reported in Table 3 provide a basis for anticipating that spatial assimilation dynamics may play an important role in shaping observed White-Latino segregation. This is based on the pattern of effects observed in the locational attainment models and observed White-Latino differences on resources. In particular, the effects of key resources are consistent with spatial assimilation theory and are likely to combine with White-Latino differences in distributions on these

Table 3. Locational Attainment Micro-models Predicting the Segregation-relevant Score for D.

	Atlanta		Chicago		Houston		Los Angeles		San Diego		Seattle	
Variable	Whites	Latinos	Whites	Latinos	Whites	Latinos	Whites	Latinos	Whites	Latinos	Whites	Latinos
Degree	.0824***	.2001***	.2117***	.2733***	.2650***	.3715***	.2719***	.3570***	.2456***	.2178***	.1446***	.2163***
Income (Ln)	.0482***	.0392	.0896***	.0641***	.1239***	.0806***	.1136***	.0795***	.0929***	.0605***	.0772***	.0760**
Military	−.1582***	.0724	−.2084***	.0805	−.2018***	.0707	−.2715***	−.0177	−.5731***	.1824*	−.3262***	−.2828*
U.S.-born citizen (reference)	—	—	—	—	—	—	—	—	—	—	—	—
Non-U.S. citizen	−.2709*	−.5292***	−.3568***	−.4887***	−.0491	−.5123***	.1953***	−.6209***	.1913	−.6260***	.0407	−.7396***
Naturalized U.S. citizen	−.3425***	−.3406**	−.0996**	−.1399**	−.2500**	−.1501**	.2794***	−.2257***	.3099***	−.5992***	.0250	−.3132**
Recent immigrant	−.5376***	−.4273***	−.1507**	−.0279	−.0355	.1145	−.0746	.0520	−.0076	−.0347	−.3319***	−.1957
English ability	.4374***	.4809***	.2487***	.4429***	.5377***	.4191***	.0054	.4228***	.3663***	.4111***	.3906***	.3077***
Age 30–59 (reference)	—	—	—	—	—	—	—	—	—	—	—	—
Age 15–29	−.3952***	−.5287***	−.1958***	−.1952***	−.1354**	−.3024***	−.1450***	−.4453***	−.3100***	−.1258	−.5320***	−.4349***
Age 60+	.2638***	.4306***	.3495***	.4014***	.1001***	.2182***	.1908***	.3271***	.4611***	.3783***	.5201***	.4182**
Married couple (reference)	—	—	—	—	—	—	—	—	—	—	—	—
Single mother	−.4482***	−.3107*	−.4767***	−.4415***	−.4805***	−.4269***	−.5662***	−.4684***	−.6646***	−.6515***	−.6518***	−.3963**
Other family	−.5920***	−.1944*	−.4926***	−.1626***	−.5340***	−.1527***	−.3444***	.0915***	−.2652***	.0808	−.4989***	−.3329***
Recent mover	−.2772***	−.1594	.0002	.1597**	−.0919*	.0794	.0231	.2570***	−.0041	.1768**	−.2945***	−.2085*
Constant	1.6415***	.3090***	1.3852***	−.5069***	1.3732***	−.4538***	1.3192***	−.8439***	1.1335***	−.4159***	.8322***	.3157***

*$p < .05$. **$p < .01$. ***$p < .001$ (two-tailed test).

Table 4. Standardization Analysis for Dissimilarity Index in Metropolitan Areas.

	Predicted Group Mean on D-specific Scoring					
Comparison	Atlanta	Chicago	Houston	Los Angeles	San Diego	Seattle
Latino resources and Latino rates of return	33.80	27.89	28.05	23.12	31.46	41.22
White resources and Latino rates of return	62.63	48.21	52.73	46.98	52.35	60.65
Latino resources and White rates of return	59.56	67.35	60.66	76.17	68.35	53.42
White resources and White rates of return	80.75	81.29	81.22	83.56	79.61	67.99

Table 5. Components Analysis for Dissimilarity Index in Metropolitan Areas.

	Contribution to Index Score					
Component	Atlanta	Chicago	Houston	Los Angeles	San Diego	Seattle
Resources	28.83	20.32	24.68	23.86	20.89	19.43
Rates of return	25.76	39.46	32.61	53.05	36.89	12.20
Joint impact	–7.64	–6.38	–4.12	–16.47	–9.63	–4.86
Total difference (D)	46.95	53.40	53.17	60.44	48.15	26.77

characteristics to contribute to higher levels of segregation. The effects are also such that all else equal, movement toward White-Latino convergence on these characteristics will lead to even distribution.

We conclude this section by noting that the locational attainment models can provide some insight into place stratification dynamics that shape White-Latino segregation. For example, in all equations, the constant for Latinos is much lower than the constant for Whites, consistent with the place stratification perspective's expectation that under conditions of being equal on other characteristics, Latinos are less likely than Whites to attain residence in neighborhoods that are at parity.[10] We can assess both spatial assimilation and place stratification dynamics more systematically in the analyses to follow, which allow us to move beyond the limitations of locational attainment models and connect these outcomes to overall segregation patterns.

Standardization and Decomposition Analysis

In Table 4, the standardization analysis results based on the dissimilarity index for the six case studies are presented. In all cities, applying the White distributions to the Latino equation raises the proportion of Latinos who live in blocks at or above parity by a large amount, which would imply that segregation would be much lower as a result. This finding confirms that some integration can be achieved through the acquisition of resources that would be relevant for reaching parity. But the largest change happens when the White rates of return are applied to the Latino equations while retaining the Latino distributions on the independent variables, suggesting that it is the disparity in the ability to convert these resources into locational attainments that contributes the most to segregation. In cases such as Seattle, where segregation is relatively lower, the changes are less dramatic as the existing residential disparity is lower in magnitude compared to high segregation cities.

The way in which group differences in resources and rates of return separately and jointly result in changes in predicted levels of segregation can be quantified using decomposition analysis. In Table 4, it was evident that both factors made large contributions to White-Latino differences in residential outcomes: group differences in resources that predict segregation and group differences in rates of return on those resources. In the following, we review the decomposition analysis results based on the dissimilarity index, presented in Table 5.

Table 6. Predicted Dissimilarity Index at Three Levels of Resources.

Group	Low	Observed	High
Atlanta			
Whites	18.18	80.75	85.65
Latinos	3.41	33.80	78.75
Dissimilarity index	14.77	46.95	6.90
Chicago			
Whites	26.83	81.29	90.75
Latinos	2.75	27.89	73.91
Dissimilarity index	24.08	53.40	16.84
Houston			
Whites	17.98	81.22	89.57
Latinos	2.63	28.05	75.83
Dissimilarity index	15.35	53.17	13.74
Los Angeles			
Whites	53.20	83.56	90.39
Latinos	1.29	23.12	71.26
Dissimilarity index	51.91	60.44	19.13
San Diego			
Whites	21.80	79.61	86.89
Latinos	2.81	31.46	74.36
Dissimilarity index	18.99	48.15	12.53
Seattle			
Whites	10.51	67.99	78.02
Latinos	5.50	41.22	72.93
Dissimilarity index	5.01	26.77	5.09

We find a telling pattern in these results, which is that in our highly segregated cities, the group differences in rates of return make a greater contribution to the overall segregation score, whereas in lower segregation cities, it is the existing resources held by householders that tend to matter more. This can be interpreted as the role of race being much greater in high segregation cities such as Los Angeles as compared to lower segregation cities like Seattle. With regards to the joint impact, this term can be interpreted as the portion of either component that is linked to the other component. For example, when Whites and Latinos in Los Angeles are matched on resources, thereby reducing the score by 24 points, the effect of then matching on rates of return is moderated by 16 points because that is the portion of the disparity in rates that is dependent on the disparity in resources, which have already been accounted for.

The finding that the largest contribution to segregation is the White-Latino differences in rates of return in high segregation cities does not downplay the role of White-Latino differences in resources for locational attainments. In every city where segregation is high, the role of disparities in resources is not trivial, often accounting for nearly half of the overall score. With regards to the substantive implications of the findings from this exercise, we argue that there is support for spatial assimilation in that group differences in resources play a non-negligible role in producing segregation, implying that even distribution is more likely when Whites and Latinos are matched on resources. However, we also find evidence of place stratification, or the effect of race-based barriers to integration, in that the White-Latino differential in the ability to convert resources into residential contact with Whites is substantial, especially in high segregation cities.

One final exercise that can be done with standardization is to examine the magnitude of the effects by observing the changes in overall segregation at varying levels of resource "profiles" where Whites and Latinos are set to low and high scores on resources. We demonstrate this in Table 6 with outcomes for three profiles. The low resource profile is based on an individual set of characteristics where they have not attended high school, their

household income is set to $15,000, they have not served in the military, they are noncitizen recent immigrants, they do not speak English, and they are between the ages of 15 and 29. The high resource profile is an individual, aged 60 or older, with a postgraduate degree, a household income of $90,000, who has served in the military, is U.S.-born, and speaks English exclusively or very well.

What we find is that segregation is highest between the groups at their observed distributions. The lowest levels of segregation alternate between when Whites and Latinos are set to the low resources profile and the high resources profile, but what we can assert from this is that lower segregation can be expected when Whites and Latinos are matched on resources as compared to when they are as observed. This is especially the case in low segregation Seattle, while it is less true for highly segregated cities such as Los Angeles. We also find that segregation is consistently lower in the low resources profile in comparison to the high resources profile with the exception of Seattle where, again, segregation is low and the impact of race group membership is notably smaller than the impact of differences in resources.

DISCUSSION

In this study, we investigated and sought to draw a connection between two dominant approaches to studying residential segregation and further investigate the prevailing frameworks for understanding segregation using the case of White-Latino segregation. We have several conclusions from this study. First, we find that in all areas, Latinos have a higher probability of living in neighborhoods that are at or above parity if they hold resources such as education, income, citizenship, and English language ability. This finding is consistent with previous work on spatial assimilation in the context of Latino residential outcomes.

Our second primary conclusion is that using standardization and decomposition, we find that the differences in White and Latino rates of return have a notable impact on segregation. In cities where segregation is high, the group difference in resources is a smaller component of overall segregation as compared to the group difference in the rates of return on those resources. This can be interpreted as the role that race group membership plays in White-Latino segregation in high segregation cities as compared to low segregation cities where group differences in resources matter as much, if not more. There remains the possibility that equalizing on resources may alleviate the impact of race, which is theorized by the spatial assimilation framework, and we account for this by also considering the joint impact of race and resources in our analysis, which we find to be consistently non-negligible.

This study makes two significant substantive contributions to the literature. The first is that we are able to tell a more complex story about White-Latino residential segregation by establishing the direct quantitative link between microlevel locational attainments and overall segregation in the metropolitan area. From this, we are able to explain how these locational attainments give rise to and shift segregation patterns, taking research beyond the previous limitations of not being able to link segregation patterns to the microlevel social processes that produce them. The second substantive contribution is that we are able to assess the role of race even as spatial assimilation dynamics are relevant, making it possible to work toward developing a synergy between the dominant conceptual frameworks of spatial assimilation and place stratification.

We also have provided methodological contributions to the discipline. First, we showcase the usefulness of calculating segregation indices in a difference-of-means format. The difference-of-means formulations are what allow us to directly link segregation scores to individual-level outcomes, making these analyses possible (Fossett 2017). Second, we demonstrate how the complexities of residential segregation can be further explored using standardization and decomposition. These methods allowed us to draw conclusions about the separate and joint impacts of resources and race in driving segregation patterns. We recommend both of these techniques as ways to acquire a more complex understanding of residential segregation. The methods in this paper are easily applicable to the research of segregation between other groups and within other contexts, opening up opportunities to pursue larger questions about the underlying dynamics of residential segregation.

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AUTHORS' NOTE

Any opinions and conclusions expressed herein are those of the author(s) and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed

NOTES

1. "Evenness holds when the proportion of minority members within all residential areas equals the city-wide minority percentage and so 'as areas depart from the ideal of evenness, segregation increases'" (Massey and Denton 1989:373).
2. We argue that blocks are preferable to larger spatial units such as tracts because larger units can mask neighborhood segregation patterns occurring on a smaller scale. In the case of large metropolitan areas, this is less of an issue, but there is nothing to be lost by using blocks as opposed to tracts.
3. Based on summary files from the American Community Survey, we found that all metropolitan areas were comparable with regards to Latino ethnic composition in that they were majority Mexican-origin, although we note that the Latino composition in Atlanta deviates from other areas where Central Americans are a larger percentage of the Latino population at approximately 15 percent.
4. "Pairwise" refers to the proportion calculated using only the counts for the two groups in the segregation comparison. This is not unusual; all measures of uneven distribution draw on this construction.
5. See Fossett (2017) for a discussion of the equivalence.
6. We follow a common practice of setting a "bottom code" of $500 before performing the log transformation to minimize complications associated with very low incomes.
7. Fifteen years since immigration is at some level an arbitrary cut-point, however we found that the results were not notably impacted by other cut-points. Additionally, by identifying immigrants who had arrived within the past 15 years, we are able to some extent capture immigrants who arrived in "new destination" areas such as Atlanta, a phenomenon that characterized migration patterns in the 1990s.
8. To protect the confidentiality of the respondents, the public-use version was used to generate descriptive statistics. We are confident that these statistics accurately represent our analysis sample.
9. When limiting the sample to adult householders, we find that the percent foreign-born is higher for Latinos as compared to the overall Latino population. This is primarily due to the removal of U.S.-born children from the sample.
10. To give the regression constant a meaningful interpretation, degree is centered on the value for those who have a high school education, English ability is centered on the value for those who speak English only or speak English very well, and income is centered on the mean income for Whites with a high school education.

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AUTHOR BIOGRAPHIES

Amber Crowell is Assistant Professor of Sociology at California State University, Fresno. Her research focuses on racial and ethnic residential segregation and social inequality, racial and ethnic relations, and social demography. In addition to investigating the link between individual locational attainments and residential segregation patterns, she is also currently analyzing the relationship between residential segregation, neighborhood inequality, and educational opportunity gaps.

Mark Fossett is Liberal Arts Cornerstone Faculty Fellow and Professor of Sociology at Texas A&M University, College Station, where he currently serves as executive director of the Texas Federal Statistical Research Data Center. His research focuses on the social demography of racial and ethnic groups, urban and spatial demography, and racial-ethnic segregation and socioeconomic inequality. His most recent works include articles reviewing explorations of segregation dynamics using agent-based simulation models and a recent monograph introducing new methods for measuring and analyzing segregation.