Nativity Differences in Neighborhood Quality Among New York City Households

Emily Rosenbaum
Fordham University

Samantha Friedman
The George Washington University

Michael H. Schill
New York University School of Law

Hielke Buddelmeyer
New York University

Abstract

This article adds to the literature on locational attainment of immigrants by evaluating how immigrant households in New York City compare with native-born households with respect to neighborhood characteristics. It also examines whether the relationship between immigrant status and neighborhood quality varies by race/ethnicity and place of birth.

Overall, foreign-born households are more likely than native-born households to live in neighborhoods with less access to medical care, higher rates of tuberculosis, and higher concentrations of poverty. Multivariate analyses reveal that all but one of these disadvantages disappear for foreign-born households as a group. However, island-born Puerto Ricans and immigrants—especially Dominicans, Caribbeans and Africans, and Latin Americans—are more likely to reside in lower-quality neighborhoods than native-born white households. Equally important, native-born blacks and Hispanics are also disproportionately disadvantaged relative to native-born whites, suggesting that a racial hierarchy exists in the locational attainment of households in New York City.

Keywords: Immigration; Neighborhood; Populations

Introduction

Urban neighborhoods differ from one another on many dimensions. Some neighborhoods offer their residents broad access to such important resources as high-quality schools, medical care, and safety, while others are not as replete with these and other assets that can positively affect residents' quality of life and their life chances (see, for example, Ellen and Turner 1998 for a recent review of the

neighborhood effects literature). If the opportunity to reside in neighborhoods possessing high-quality resources is differentially distributed across such characteristics as race and immigrant status, then the potential for upward mobility may be substantially diminished for the adversely affected group(s). Nowhere is this argument more clearly expressed than in Massey's research on the interconnection between racial residential segregation and geographically concentrated poverty (Massey 1990; Massey and Denton 1993) and Wilson's work on the limited opportunities for advancement available to the mostly minority residents of extremely poor and segregated inner-city neighborhoods (Wilson 1986, 1996). Indeed, evaluations of the Gautreaux program (e.g., J. Rosenbaum 1995) have demonstrated that the "geography of opportunity" (Galster and Killen 1995) varies. This observation forms the basis for mobility programs such as Moving to Opportunity (U.S. Department of Housing and Urban Development 1996).

A large and growing literature focusing on the locational attainment process[1] among individuals and households has demonstrated that members of different racial/ethnic groups experience varying levels of access to high-quality neighborhoods (Alba and Logan 1991, 1993; Alba, Logan, and Bellair 1994; Alba, Logan, and Leung 1994; Logan, Alba, and Leung 1996; Logan et al. 1996; Rosenbaum 1996a; White, Biddlecom, and Guo, 1993). These studies have contributed greatly to our knowledge concerning the extent and nature of racial/ethnic inequality by consistently demonstrating a general pattern of access to advantaged areas whereby whites enjoy the highest levels of access, followed by Asians, Hispanics, and finally blacks. These studies, however, are limited in two important ways. First, they use a fairly narrow range of neighborhood quality indicators; the vast majority of studies focus on access to such census-derived tract characteristics as the proportion of whites and median household income, while far fewer consider other quality-of-life indicators such as the risk of crime (but see Alba, Logan, and Bellair 1994). This limitation is likely related to the difficulty in amassing non–census derived indicators of neighborhood quality for areas larger than, for example, a single city (Massey, Condran, and Denton 1987).

The second limitation affecting the existing literature on locational attainment studies relates to the relative omission of immigrant

[1] Alba and Logan (1992), among others, argue that the concept of "locational attainment" is related to the more traditional sociological concept of "status attainment." Within the tradition of status attainment research, individuals' background characteristics are predicted to explain their status-related outcomes.

groups as distinct entities. That is, while immigration-related variables are frequently used to help explain the locational attainment process of *ethnic* groups, rarely, if ever, is the foreign-born contingent of a given ethnic group analyzed separately from the native-born contingent of that group.[2]

Immigration is increasing in importance as a component of population and household growth in the United States generally (Pitkin et al. 1997) and in specific urban areas, notably New York City (Farley 1997; James, Romine, and Zwanzig 1998; Kasarda et al. 1997). For example, between 1980 and 1995, the number of immigrant households in the United States grew by 3.1 million, accounting for 18 percent of the nation's total household growth (Pitkin et al. 1997), while in the five years preceding the 1990 census, the 122,000 immigrant households that moved to New York City accounted for fully 44 percent of all in-migrant households during that period (Kasarda et al. 1997). Thus, there is an increasing need to learn how foreign-born members of different racial and ethnic groups fare relative to their native-born coethnics, because such information will help us to understand how immigrant status and race/ethnicity interact to determine access to key resources.

In this article, we add to the literature on locational attainment by addressing the above limitations in a comparison of the quality of neighborhoods in which native- and foreign-born households live in New York City. By combining 1996 survey data for New York City with two unique databases consisting of a wide variety of administrative and other publicly available data, we evaluate whether immigrant households are more or less likely than native-born households to acquire residence in neighborhoods characterized by low crime rates and concentrations of poverty, positive health outcomes, and physically safe housing. In addition, we evaluate whether the relationship between immigrant status and neighborhood quality varies by race/ethnicity and place of birth.

While focusing on a single city inevitably limits our ability to generalize our findings to other locations, there are many reasons why New York City is an ideal case study for this type of analysis. First and foremost is New York's high degree of racial and ethnic diversity, as well as its historic role as one of the premier destinations

[2] However, in a tract-level examination of group differences in exposure to various geographic characteristics, Galster, Metzger, and Waite (1999) use specific place-of-birth groups.

for immigrants to the United States (Salvo and Lobo 1997). New York currently receives a disproportionate share of all immigrants to the United States and, when compared with the nation as a whole, receives far larger shares of immigrants from the Caribbean and Latin America, and lower shares—but still sizable numbers—of immigrants from Asia (Salvo and Lobo 1997). Recent data from the U.S. Immigration and Naturalization Service, moreover, show that Ghana and Nigeria have made it onto the list of the "top-20" sending countries to New York City (Salvo 1998), joining such diverse countries as the Dominican Republic, China, the former Soviet Union, Poland, Jamaica, and Guyana. The large numbers of non-Hispanic white and black immigrants, along with immigrants of Hispanic and Asian origin, thus offer an unparalleled opportunity to evaluate the question of whether nativity differences in neighborhood quality are contingent on race.

While the racial/ethnic diversity of New York's native- and foreign-born households allows us to conduct a meaningful investigation into the extent and nature of nativity differences in neighborhood quality, several features of New York's housing market underscore the uniqueness of this case study. Specifically, immigrants to New York City move to one of the tightest housing markets in the nation, characterized by consistently low rental vacancy rates and low rates of new housing construction (Schill and Scafidi 1999). In addition to these constraints, New York City is characterized by a high degree of residential segregation, particularly among blacks and, to a lesser extent, Hispanics (Rosenbaum 1994), which limits the housing choices of minority householders throughout the city (Rosenbaum 1994, 1996a, 1996b). New York's high level of segregation, moreover, exceeds that of other major immigrant-receiving cities (Massey and Denton 1993). Thus, as a group, immigrants in New York may face more serious obstacles to acquiring residence in high-quality neighborhoods than immigrants elsewhere, yet certain immigrants—especially those of African ancestry—may be disproportionately disadvantaged (when compared with native-born whites). Finally, by not including the suburban communities surrounding New York City—locations to which immigrants with the means to ameliorate their living situations may move (see, for example, Alba et al. 1999)—our results may overstate the differences between immigrant households and native-born white households.

This article is organized as follows. In the next section, we describe the theoretical frameworks that guide our analysis of immigrant-status differences in neighborhood quality and outline our hypotheses. We then discuss our sources of data and describe the bivariate and multivariate approaches we use in our analysis. Finally, we describe and discuss our results.

Theoretical frameworks

Locational attainment in a multiethnic city

Two theoretical models provide insight into how specific immigrant groups may fare, relative to the native born, in their quest for residence in high-quality neighborhoods. The first is the *spatial assimilation model*, which identifies residential assimilation as one outcome of the social attainment process (Massey and Denton 1985). Formulations of this model suggest that as members of minority groups acquire higher levels of education, enter the mainstream economy, and earn higher incomes, they seek to move to neighborhoods that are more in line with their improved social and economic status (Massey 1985). Because this process may involve leaving the ethnic neighborhood for an area inhabited mainly by majority group members, one potential outcome is increasing similarity between the residential characteristics of minority and majority group members (Alba and Logan 1991; Logan and Alba 1993). In short, the spatial assimilation model predicts that once individual-level characteristics—such as human capital, life-cycle stage, and acculturation-related variables—are controlled for, any observed racial/ethnic differences in residential characteristics should disappear (Alba and Nee 1997).

Although the general assimilation framework has come under question of late (e.g., Rumbaut 1997), the findings from numerous studies of various residential outcomes among racial and ethnic groups have largely supported the main tenets of the spatial assimilation model (Alba and Nee 1997). For example, residential outcomes, such as suburban location and the tract-level median income and proportion of whites, are found to be positively related to socioeconomic status for all groups and to acculturation-related variables such as years in the United States, generational status, and English-language proficiency for Hispanics and, to a lesser extent, Asians (Alba and Nee 1997).

There is, however, widespread agreement that the spatial assimilation model is less successful at describing the locational attainment process for certain groups, notably blacks, Puerto Ricans, and nonwhite Hispanics, suggesting that opportunities for converting social and economic achievement into improved residential outcomes are constrained by being black.

The significance of structural constraints in maintaining racial/ethnic inequality in residential outcomes has given rise to the second theoretical model, the *place stratification model* (Alba and Logan 1992). This model derives from the hierarchical ordering of places and social groups and the mechanisms that more advantaged groups use to maintain social and spatial distance from their less

advantaged counterparts (Logan and Molotch 1987). Prominent among these mechanisms are discriminatory acts[3] that create and maintain racially segregated neighborhoods (Massey and Denton 1993) and thus constrain minority residential choices to areas that are more ethnically diverse, less prosperous, and of lower quality than those available to whites (Turner 1993; Yinger 1995). In short, the place stratification model extends the individual-level explanation of racial/ethnic differences in locational outcomes proposed by the spatial assimilation model to emphasize the role played by structural constraints that limit the housing choices of blacks and other nonwhite minorities.

Studies of the locational attainment process among racial and ethnic groups demonstrate a general pattern of access to advantaged areas whereby whites experience the highest levels of access, followed by Asians, Hispanics, and finally blacks. Such patterns also are found to hold in the New York region, where Asians are relatively successful at acquiring residence in fairly advantaged suburbs (Alba, Logan, and Bellair 1994; Alba, Logan, and Leung 1994; Logan and Alba 1993), and where socioeconomic status is strongly and positively related to decentralization away from the enclave in lower Manhattan (Zhou and Logan 1991). Although controlling for individual-level characteristics increases Hispanic proximity to whites, Hispanics in the New York area do not fare as well as Asians but do not suffer the same degree of housing disadvantage as do blacks (Logan and Alba 1993). As noted above, however, such studies generally do not identify foreign-born members of racial/ethnic groups separately from their native-born counterparts, and thus cannot offer much insight into their relative status in the locational attainment process.

In a similar vein, previous work does not clearly indicate where foreign-born whites and blacks fit into this general pattern of housing opportunities. Recent evidence suggests that foreign-born blacks are better able than native-born blacks to live in suburban neighborhoods with higher proportions of whites (Logan, Alba, and Leung 1996), a result that is consistent with the former group's generally superior socioeconomic profile (Butcher 1994; Dodoo 1997; Kalmijn 1996). However, given the continuing significance of black race in influencing housing opportunities, when compared with native-born whites, foreign-born blacks likely will be at a competi-

[3] Among the discriminatory acts referred to here are unequal treatment of minority homeseekers by landlords and realtors (Yinger 1995), as well as the actions of local governments (Schill and Wachter 1995; Shlay and Rossi 1981), mortgage lenders (Leahy 1985; Munnell et al. 1992), and neighbors (Massey and Denton 1993). Spatial stratification also may be caused by different preferences among whites and nonwhites for different neighborhood racial/ethnic compositions (Farley 1993; Farley, Fielding, and Krysan 1998).

tive disadvantage in their quest for residence in high-quality neighborhoods. In contrast, foreign-born whites should experience few, if any, barriers in the housing market, given the generally limited influence that immigration-related variables have on locational outcomes for this group (Logan, Alba, and Leung 1996).

Hypotheses

The preceding discussion suggests the following hypotheses. Consistent with the spatial assimilation model, we expect that education, income, age of the householder, presence of children, and headship by married couples will be positively related to residence in high-quality neighborhoods. While we expect, at the bivariate level, to see immigrant households living in lower-quality neighborhoods than those in which native-born households live, the spatial assimilation model predicts that once individual-level factors are controlled, such differences should disappear or at least be moderated. The tenets of the place stratification model suggest, however, that group differences in neighborhood quality will remain even in the face of controls for individual-level factors. The pattern of residual group differences predicted by the place stratification model is one of "racial hierarchy," with foreign- and native-born blacks and Hispanics being more likely than native-born whites to live in low-quality neighborhoods, and with foreign-born whites and Asians exhibiting few, if any, neighborhood quality disadvantages.

Data

The analysis is based on three sources of data. The first is the 1996 panel of the New York City Housing and Vacancy Survey (HVS), which provides us with individual-level data on New York City households. The other two sources of data—*Infoshare* and the Early Warning Information System (EWIS) database on buildings in New York City—provide us with aggregate-level data to operationalize our dependent variables.

The HVS is a multistage probability sample of approximately 18,000 housing units located throughout the five boroughs of New York City that is surveyed every two or three years. The HVS is conducted by the U.S. Bureau of the Census under contract to New York City in compliance with city and state laws regarding rent regulation. Although the HVS's main focus is housing conditions, it also collects a variety of socioeconomic and demographic indicators for household members, making it the most current source of information on the city's population and its housing stock. Sampling weights (scaled down to maintain unweighted cell sizes) are used in all bivariate and multivariate analyses to correct for sampling design effects and potential undercoverage.

Although the HVS provides timely data on New York's population and housing stock, it does not collect the full complement of immigration-related variables that would be ideal for an analysis such as ours. For example, while the HVS ascertains the place of birth for the householder as well as his/her parents, it does not collect information on either year of arrival in the United States or English language proficiency. Because these indicators capture differences in acculturation, which in turn are conceptually linked to individuals' abilities to acquire residence in resource-rich neighborhoods (especially for Hispanics), our results likely will reveal larger intergroup differences than we might find if we were able to control for English language proficiency and time in the United States.

One advantage of using the HVS is that it identifies the "subborough areas," or subareas, in which the sampled units are located. New York has a total of 55 subareas, each of which is composed of an aggregation of census tracts and has a minimum population of 100,000. Although a smaller geographic unit may be more appealing conceptually as a proxy for a "neighborhood," the Census Bureau's confidentiality requirements prohibit the release of microdata for geographic units consisting of fewer than 100,000 persons. Moreover, because the 55 subareas are based on the 59 community districts that serve as the city's main administrative units for services and other amenities, results based on this level of geography are more meaningful for policy makers than would be results based on smaller geographic units, such as census tracts.

Our dependent variables, measuring a wide range of neighborhood conditions, are derived from *Infoshare* and EWIS. *Infoshare* is a unique New York City database that combines information from a variety of public and private sources, and enables users to aggregate indicators to different geographic levels, including the HVS subareas. Indicators from *Infoshare* include rates of disease prevalence and other health-related conditions, rates of vital events, crime rates, and other information relevant to the quality of life experienced by neighborhood residents. The EWIS database was created by researchers at New York University and the University of Pennsylvania to assist city officials in identifying buildings at risk of abandonment (Scafidi et al. 1999). The EWIS, which covers all residential buildings in New York City, combines building-specific information on ownership and tax status with data on the number and type of housing code violations.

Analytical methods

The central variable in our analysis is nativity status, which is determined by the householder's place of birth and the place of birth

of his/her parents. Householders born in the United States are considered native born, while those born outside of the 50 states to parents who also were born outside of the 50 states are considered foreign born. Although Puerto Rico is part of the United States, for the purposes of this analysis we treat island-born Puerto Rican households as "foreign born."[4] In addition to this dichotomous measure of nativity status, we also use several dummy variables indicating the place of birth of foreign-born householders[5] to examine whether an immigrant's place of birth has a unique effect on neighborhood conditions above and beyond the effect of nativity status. We also use place of birth as a proxy for the race and ethnicity of immigrant households.[6]

The remaining individual-level variables relevant to the spatial assimilation model include households' life-cycle and socioeconomic characteristics, as well as their race and ethnicity. Life-cycle factors are represented by the householder's age, a dichotomous variable indicating whether the household is headed by a married couple (versus a single individual), and a dichotomy indicating whether there are any children under the age of 18 present in the household. In line with the fundamental assumptions of the spatial assimilation model, we expect that households headed by older householders and married couples, and those with children present, will be less likely to live in disadvantaged neighborhoods. We also use a dichotomous variable to indicate whether there are any adults present in the household beyond those in the nuclear family. Although we do not specify whether these other adults are related to the householder, this measure will allow us to control for the use of a multiple-earner strategy that could theoretically enable immigrant and native-born minorities to improve their living conditions (see,

[4] We differentiate between island- and mainland-born Puerto Rican households because island-born Puerto Rican households that migrate to the mainland may have experiences similar to those of immigrant households.

[5] We create ten dummy variables based on the householder's place of birth: (1) Puerto Rico; (2) the Dominican Republic; (3) the Caribbean (other than Puerto Rico and Dominican Republic) and Africa; (4) Mexico, Central America, and South America; (5) Europe (other than Russia and successor states to the Soviet Union); (6) Russia and successor states to the Soviet Union; (7) China, Hong Kong, and Taiwan; (8) India, Pakistan, and Bangladesh; (9) Korea, the Philippines, Burma, Cambodia, Laos, Malaysia, Singapore, Thailand, Vietnam, and other Asian countries (other than Russia and successor states to the Soviet Union); and (10) all other countries. A value of 1 indicates the householder was born in the country (or one of the countries in the group). A value of 0 indicates the householder was born in the United States. Category (9) is referred to as "other Asia" in all tables and throughout the text.

[6] Of course, place of birth is not a perfect proxy for race. For example, many immigrants from Guyana—who are counted as foreign-born Caribbeans and Africans—are of Asian Indian descent.

for example, Rosenbaum 1996a). In this context, we would expect to see a negative relationship between the presence of other adults and poor neighborhood quality.[7]

Socioeconomic status is measured by the householder's educational attainment (entered as two dummy variables indicating whether the householder has less than a high school education and whether he or she has a high school diploma, with the reference category being some college or more), household income (logged)[8] and a dummy variable indicating whether any members of the household receive public assistance. We expect that households with greater educational attainment or income will live in higher-quality neighborhoods, but that households receiving public assistance might be constrained in their locational options.

We use six categories of race and ethnicity, based on the reported race and ethnicity of the householder: (1) white, non-Hispanic; (2) black, non-Hispanic; (3) Puerto Rican; (4) non–Puerto Rican Hispanic (which includes individuals who identify themselves as Dominican, Cuban, South/Central American, Mexican, Mexican-American, Chicano, or other Hispanic); (5) Asian or Pacific Islander; and (6) other (which includes American Indian, Aleut, Eskimo, and other races).

We use six dependent variables to tap into four basic dimensions of neighborhood quality. The first dimension is the risk of violent crime, which we operationalize as the rate, per 1,000 population, of violent crimes against persons (i.e., murder, rape, robbery, assault). While the risk of victimization has undeniable merit on its own as a quality-of-life indicator, the violent crime rate also is inversely related to the degree of social organization in the area, and thus can have direct and indirect effects on family functioning (Elliott et al. 1996; Furstenberg 1993; Leventhal and Brooks-Gunn 1997).

We measure the second dimension, health-related outcomes, in two ways. The first, access to medical care, is operationalized by the number of full-time-equivalent patient-care physicians per 10,000

[7] More generally, the fact that immigrant and minority households are more likely to be extended than are native-born white households (Angel and Tienda 1982; Tienda and Angel 1982) argues that we control for this difference. It is possible that, should the reason for household extension be more one of "getting by" than "getting ahead" (see, for example, Edin and Lein 1997), then we might expect a positive relationship between the presence of other adults in the household and the chance of residing in a disadvantaged neighborhood.

[8] Household income includes all income received by any household member, including cash assistance from the government. The distribution of income was badly skewed to the right; taking its log helped to make the distribution more normal.

population in the subarea. The second is the overall level of health in the area, which we measure as the rate (per 100,000 population) of reported tuberculosis cases. Although people may not be fully cognizant of these neighborhood features when they search for housing, most would agree that a low risk of contracting a communicable disease and easy access to medical help can only enhance one's quality of life.

The third dimension of neighborhood quality is the concentration of poverty, which we operationalize with two separate measures: the percent of the population receiving public assistance and the percent of housing units that are public housing or are subsidized through the Section 8 program. While the geography of poverty typically is operationalized with a population-related indicator (similar to our first indicator), a number of studies have demonstrated the significant role that public housing plays in "anchoring" poverty in place (e.g., Rosenbaum 1995; Schill 1993; Schill and Wachter 1995). Moreover, as a population-based indicator of the area's economic status, the proportion of the population that receives public assistance is the most similar (of all our dependent variables) to the typical census-based indicators of neighborhood resources, and thus offers us a chance to observe how our results compare with those reported by other researchers.

The final dependent variable is the percent of all residential buildings (with at least two units) that were issued an "unsafe building" code violation between 1992 and 1996.[9] This variable, by measuring the physical quality of housing in an area as well as the level of (dis)investment in the area's infrastructure, taps into the extent of physical and social disorder in city neighborhoods (Skogan 1991). While the first five of our dependent variables all derive from *Infoshare*, the sixth dependent variable derives from the EWIS.[10]

[9] Buildings that were issued a "B" or "C" code violation by inspectors from the New York City Department of Buildings are classified as unsafe for human habitation.

[10] The tuberculosis data derive originally from the New York City (NYC) Department of Health and refer to cases reported for 1996. The data on full-time-equivalent patient-care physicians are for 1995 and originate from the New York State Department of Education. The data on violent crime (originating from the NYC Police Department) refer to cases reported for 1995, while the building code violation data cover the 1992–96 period and originate from the NYC Department of Buildings. The public assistance caseload data originate from the NYC Department of Human Resources and refer to the 1996 caseload. The data on public housing and Section 8 housing originate from the U.S. Department of Housing and Urban Development's and Maptitude's *Community 2020* database and also refer to 1996. The population estimates for the denominators of measures operationalized as rates are areal projections for 1994, originating from National Planning Data Corporation, Inc. The denominator for the percent of subsidized housing units consists of the sum of subsidized and nonsubsidized housing units (1996) from the *Community 2020* database.

We employ bivariate analysis to compare the life-cycle, socioeconomic, and neighborhood characteristics of foreign- and native-born households and perform significance tests as appropriate. To examine the relationship between nativity status and neighborhood quality more fully—that is, while controlling for the range of theoretically relevant independent variables—we specify two types of descriptive multivariate models. The first uses the simple dichotomous measure of nativity status and thus evaluates the relative ability of all immigrant households (versus all native-born households) to gain residence in high-quality neighborhoods. Included in this model are dichotomous variables measuring the race/ethnicity of householders, regardless of nativity status. The second model uses the place-of-birth categories along with dichotomies representing the race/ethnicity of *native-born* householders, and thus evaluates the relative abilities of immigrant households and native-born minority households, relative to native-born white households, to gain access to high-quality neighborhood resources.

One problem inherent to models that predict an aggregate-level outcome as a function of individual-level characteristics is spatial autocorrelation, since multiple cases share the same value on the dependent variable (Alba and Logan 1991). This problem has the potential to produce correlated error terms and thus to underestimate the standard errors of regression coefficients. To address this problem, we use feasible generalized least squares to estimate our multiple regression models. This technique produces regression coefficients and standard errors that take into account the fact that the error variances across subareas are different.[11] A second prob-

[11] To correct for spatial autocorrelation, we need to superimpose a structure on the covariance matrix. Traditionally, this is done using "time" in time series analysis data and "distance" in geographic data. In our case, although we can identify the subareas in which respondents live, we cannot identify how respondents within subareas are geographically related to one another. Therefore, we cannot use the traditional technique.

One alternative could be to specify a random effects model with an individual-specific error and a subarea-specific error. However, in our case, since individuals within the same subarea have identical values for each dependent variable, we cannot specify a within-subarea individual-specific error.

To address this problem, we use feasible generalized least squares (FGLS) to estimate our multiple regression models. This method allows us to estimate unique error variances for each of the K subareas. This was the best of the limited options available to us to take into account the spatial autocorrelation that exists in our data. FGLS takes the general form

$$y = X\beta + \varepsilon,$$

where y is the dependent variable and X is the matrix with explanatory variables. The vector β contains the regression coefficients.

lem common to this type of analysis is that although we are seeking to explain why some households are located in neighborhoods exhibiting certain characteristics, these characteristics, themselves, are influenced by the characteristics of neighborhood residents (and thus by our independent variables) (see, for example, Tienda 1991).

Results

Bivariate analyses

Our analysis begins with an overview of differences in the neighborhood conditions of native- and foreign-born households. Do immigrant households live in inferior neighborhoods relative to those in which native-born households live? To what degree does the quality of immigrants' neighborhoods depend on their place of birth? Tables 1 and 2 provide initial descriptive statistics to answer these questions, with comparisons that parallel those in the multivariate models to come (i.e., in table 1 we compare all foreign- and native-born households, while in table 2 foreign-born households are stratified by place of birth and compared with native-born white households). It should be noted that while higher scores on the physicians-per-population ratio indicate *higher* levels of neighborhood quality (i.e., greater access to medical services), for the remaining outcomes, higher scores indicate *lower* levels of neighborhood quality.

The data in table 1 indicate that on four of our six measures, immigrants' neighborhoods tend to be of lower quality, although the magnitude of the disparity tends to be relatively modest. Specifically, immigrants are significantly more likely than native-born house-

---

To estimate the vector β, we use the feasible generalized least squares (FGLS) estimator, denoted as

$$\hat{\beta}_{fgls} = (X' \hat{\Omega}^{-1} X)^{-1} X' \hat{\Omega}^{-1} y,$$

where $\hat{\Omega}$ is a consistent estimate of the variance-covariance matrix w. To get this consistent estimate, we first do ordinary least squares (OLS) regression on the pooled data and then use the residuals from the OLS regressions to compute the mean squared residual for each of the K subareas separately. The consistent estimate of w then has the following shape

$$\hat{\Omega} = \begin{bmatrix} \hat{\sigma}_1^2 I_{n_1} & 0 & \cdots & 0 \\ 0 & \hat{\sigma}_2^2 I_{n_2} & \cdots & \cdots \\ \cdots & \cdots & \cdots & 0 \\ 0 & \cdots & 0 & \hat{\sigma}_K^2 I_{n_K} \end{bmatrix}$$

where the $\hat{\sigma}_i^2$ are mean squared residuals for each of the K subareas and the n_i are the number of observations in each of the K subareas.

Table 1. **Neighborhood Characteristics of Foreign- and Native-Born Households in New York City (Weighted)**

	Foreign Born	Native Born
1995 crime rate[a] (per 1,000 residents)	12.99	12.80
1995 physician availability rate[b] (per 10,000 residents)	24.32***	31.61
1996 tuberculosis rate (per 100,000 residents)	26.33***	23.88
Mean percentage:		
Receiving public assistance[c] (1996)	13.23***	11.39
Subsidized housing units (1996)	7.77***	7.31
Neighborhood buildings with unsafe building violations (1996)	0.44***	0.55
N	5,835	7,155

[a] Crime refers specifically to crimes against persons (i.e., murder, rape, robbery, assault).
[b] Availability of full-time-equivalent patient-care physicians.
Public assistance receipt includes individuals receiving Aid to Families with Dependent Children (AFDC), Aid to Dependent Children (ADC), or Home Relief, and ADC unemployed fathers.
*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$. Indicates difference between foreign and native born is significant.

holders to live in areas with less access to medical care (i.e., fewer physicians per 10,000 population) and higher rates of tuberculosis. They are also significantly more likely to reside in poorer areas, that is, those containing relatively more persons receiving public assistance and more subsidized housing units. However, the crime rates to which foreign- and native-born households are exposed in their neighborhoods are statistically indistinguishable, and, contrary to our expectations, immigrants tend to live in areas with proportionately fewer residential buildings with unsafe building code violations (0.44 versus 0.55 percent).[12]

When we turn to the data in table 2, we see that the neighborhood conditions of foreign-born households vary greatly depending on place of birth. For example, while all foreign-born households (except Russians) live in areas with significantly higher rates of tuberculosis than do native-born white households, island-born Puerto

[12] The lower prevalence of unsafe building violations in immigrant neighborhoods may be attributable to the fact that the city's identification process is complaint driven. Immigrants may have less information about where to lodge housing complaints or they may be distrustful of government and thus less likely to lodge complaints. Furthermore, the low average prevalence of unsafe building code violations at the subarea level (less than 1 percent) suggests that analyses of this outcome should be treated with caution.

Table 2. **Neighborhood Characteristics of Foreign- and Native-Born Households in New York City by Place of Birth (Weighted)**

Characteristic	U.S.-Born White Non-Hispanic	Foreign Born								
		Puerto Rico	Dominican Republic	Caribbean[d] and Africa	Latin America[e]	Europe[f]	Russia[g]	China, Hong Kong, and Taiwan	India, Pakistan, and Bangladesh	Other Asia[h]
1995 crime rate[a] (per 1,000 residents)	9.39	17.58***	13.99***	15.57***	13.02***	9.55	8.69***	9.72	10.03*	10.32**
1995 physician availability rate[b] (per 10,000 residents)	37.61	23.90***	23.87***	20.80***	21.45***	29.02***	20.79***	26.21***	20.64***	32.99**
1996 tuberculosis rate (per 100,000 residents)	18.31	31.66***	34.99***	26.29***	29.48***	19.95***	17.52*	26.81***	21.65***	23.33***
Mean percentage: Receiving public assistance[c] (1996)	7.02	20.91***	18.92***	13.88***	13.11***	8.40***	9.62***	7.77***	9.33	7.03
Subsidized housing units (1996)	4.18	13.60***	8.84***	7.67***	7.51***	5.26***	5.06***	6.12***	6.11***	4.39
Neighborhood buildings with unsafe building violations (1996)	0.24	0.78***	0.71***	0.45***	0.45***	0.24	0.14***	0.36***	0.23	0.24
N	4,200	909	615	1,139	776	891	418	301	206	327

[a] Crime refers specifically to crimes against persons (i.e., murder, rape, robbery, assault).
[b] Availability of full-time-equivalent patient-care physicians.
[c] Public assistance receipt includes individuals receiving AFDC, ADC, or Home Relief, and ADC unemployed fathers.
[d] Caribbean (other than Puerto Rico and Dominican Republic).
[e] Mexico, Central America, and South America.
[f] Excludes Russia and successor states to the Soviet Union.
[g] Russia and successor states to Soviet Union.
[h] Korea, the Philippines, Southeast Asia (Burma, Cambodia, Laos, Malaysia, Singapore, Thailand, and Vietnam), and other Asia. Excludes Russia and successor states to the Soviet Union.
*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$. Indicates significant difference between the group marked and native-born non-Hispanic whites.

Ricans and foreign-born Dominicans and Latin Americans live in the least healthy areas, with close to 32, 35, and 30 cases, respectively, of tuberculosis per 100,000 population (compared with just over 18 per 100,000 in native-born whites' neighborhoods). Similarly, relative to native-born white households, all foreign-born households live in areas with significantly higher crime rates (except those from Europe; Russia; and China, Hong Kong, and Taiwan), higher concentrations of persons receiving public assistance (except other Asians and Indians, Bangladeshis, and Pakistanis), and more subsidized housing (except other Asians). Island-born Puerto Ricans and foreign-born Dominicans, Caribbeans and Africans, and Latin Americans tend to have particularly high rates of living in the lowest-quality neighborhoods on these measures. Furthermore, it is these same four foreign-born groups (plus the Chinese) who live in areas with proportionately more residential buildings with unsafe building code violations. The sole indicator on which the Hispanic-origin foreign-born households are not the most disadvantaged is the physician-per-population ratio; on this indicator, foreign-born households from the Caribbean and Africa; Russia; and India, Bangladesh, and Pakistan live in areas with the least access to medical care, with slightly fewer than 21 physicians available per 10,000 population (compared with just under 38 per 10,000 population among native-born whites). These initial patterns, therefore, lend some preliminary support to expectations that foreign-born blacks and Hispanics would experience the least desirable neighborhood conditions, but this finding is not uniform across all neighborhood conditions.

As discussed above, nativity status differences in locational attainments may stem from group differences in key individual-level predictors. Insofar as these microlevel differences work to the disadvantage of immigrant households, they may be at the root of the nativity-status differences that we observe in neighborhood conditions. Table 3 presents descriptive statistics on the household characteristics of native- and foreign-born households, while table 4 replicates the analysis stratifying foreign-born households according to their place of birth and comparing them with native-born white households.

The data in table 3 indicate some initial support for these expectations. Indeed, foreign-born householders are significantly more likely to receive public assistance and to have lower educational attainment than their native-born counterparts. However, foreign-born households are more likely to be headed by a married couple, to have children under age 18 present, and to have other adults present beyond those in the nuclear family, factors which theoretically should help to alleviate locational disadvantages.

Table 3. **Household Characteristics of Foreign- and Native-Born Households in New York City (Weighted)**

Characteristic	Percent	
	Foreign Born	Native Born
Race/Ethnicity of Householder		
White, non-Hispanic	26.28***	59.34
Black, non-Hispanic	19.43***	29.29
Puerto Rican	15.66***	7.62
Non–Puerto Rican Hispanic	23.73***	2.42
Asian	14.47***	0.88
Other	0.42	0.45
Household Characteristics		
Age (mean)	47.61***	48.72
Couple-headed household	45.80***	35.39
Presence of:		
Children under 18	25.79***	21.01
Others in the household beyond the nuclear family	17.29***	8.65
Education		
Less than high school	35.33***	17.90
High school diploma	27.01***	29.47
College and more	37.66***	52.62
Total household income (median)[a]	$25,300	$31,500
Receiving public assistance	22.96***	15.67
N	5,835	7,155

[a]Significance test not conducted for this variable.
*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$. Indicates difference between foreign- and native-born households is significant.

When foreign-born households are stratified by place of birth, we see that their characteristics vary greatly. The most notable differences involve the measures of household socioeconomic status. Compared with native-born white householders, all foreign-born householders (except for those from other Asia and India, Bangladesh, and Pakistan) are significantly less likely to have completed at least some college and significantly more likely to receive some form of public assistance. Some of these differences, moreover, are quite

Table 4. **Household Characteristics of Foreign- and Native-Born Households in New York City by Place of Birth (Weighted)**

Characteristic	U.S.-Born White Non-Hispanic	Foreign Born								
		Puerto Rico	Dominican Republic	Caribbean[b] and Africa	Latin America[c]	Europe[d]	Russia[e]	China, Hong Kong, and Taiwan	India, Pakistan, and Bangladesh	Other Asia[f]
Age of householder (mean)	51.44	50.63	42.42***	44.54***	42.55***	57.67***	51.40	48.29***	40.11***	42.44***
Couple-headed household (percent)	41.89	28.75***	32.04***	42.72	49.34***	50.02***	58.22***	67.39***	69.47***	56.94***
Presence of:										
Children under 18 (percent)	15.12	24.15***	35.18***	28.64***	27.14***	16.47	26.60***	20.58**	36.99***	25.83***
Others in the household beyond the nuclear family (percent)	4.58	15.90***	28.10***	19.28***	24.55***	6.82**	11.92***	17.00***	21.24***	13.37***
Education										
Less than high school (percent)	11.54	57.34***	56.67***	26.28***	37.33***	31.84***	22.97***	32.08***	13.58	12.54
High school diploma (percent)	28.08	25.43*	23.44**	30.40	31.61*	29.56	21.77***	25.27	25.34	16.63***
College and more (percent)	60.38	17.24***	19.89***	43.31***	31.06***	38.60***	55.26***	42.65***	61.08	70.84***
Total household income (median)[a]	$40,500	$13,200	$15,450	$29,978	$29,600	$30,000	$15,480	$35,000	$37,000	$42,000
Receiving public assistance (percent)	5.16	45.43***	48.11***	13.99***	17.30***	7.71***	41.58***	8.31*	4.87	7.26
N	4,200	909	615	1,139	776	891	418	301	206	327

[a] Significance tests between groups not conducted for this variable.
[b] Caribbean (other than Puerto Rico and Dominican Republic).
[c] Mexico, Central America, and South America.
[d] Excludes Russia and successor states to the Soviet Union.
[e] Russia and successor States to the Soviet Union.
[f] Korea, the Philippines, Southeast Asia (Burma, Cambodia, Laos, Malaysia, Singapore, Thailand, and Vietnam), and other Asia. Excludes Russia and successor states to the Soviet Union.
*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$. Indicates significant difference between the group marked and native-born non-Hispanic whites.

large. For example, while slightly more than 60 percent of native-born white householders have completed at least some college, less than 20 percent each of island-born Puerto Rican and foreign-born Dominican householders report this level of educational attainment. Similarly, while approximately 5 percent of native-born white households receive some form of public assistance, the respective percentages among island-born Puerto Rican and foreign-born Dominican households are about nine times higher (45 and 48 percent).

Multivariate analyses

The results of the bivariate analyses demonstrate that, on most dimensions, immigrants as a group tend to live in areas that are lower in quality than those in which the native born live. The results further reveal that among immigrant households, those of Hispanic and African and Caribbean ancestry tend to live in areas exhibiting the worst scores on the majority of indicators, lending initial support to the "racial hierarchy" of access to spatially determined resources predicted by the place stratification framework. As hypothesized, a portion of these group disparities in locational attainments are likely due to corresponding group differences in socioeconomic status, because island-born Puerto Ricans and foreign-born Dominicans consistently exhibit the lowest levels of socioeconomic status. However, because foreign-born Caribbean and African and Latin American households are not as disadvantaged on these key predictors as are island-born Puerto Ricans and foreign-born Dominicans, it remains to be seen if the differences in neighborhood attributes that we see at the bivariate level can be explained by controlling for these predictors.

Tables 5 and 6 present the results of our multivariate regression models predicting location in less advantaged areas according to each of our six neighborhood quality indicators. The models in table 5 use the dummy variable for nativity status (and control for the race/ethnicity of all households) and thus correspond to the bivariate analyses presented in table 1. The models in table 6 use the place-of-birth dummy variables (and control for the race/ethnicity of native-born households only), and so parallel the bivariate analyses presented in table 2. All coefficients are unstandardized, and standard errors are shown in parentheses.

In our analysis of the multivariate results, our main focus will be on variables concerning nativity status and race/ethnicity, so we briefly summarize the other results. In general, the indicators of

Table 5. **Results of Feasible Generalized Least Squares Models Predicting Location in Low-Quality New York City Subareas, 1996 (Using Dummy Variable for Nativity Status)**

	Indicator of Neighborhood Quality					
Independent Variables	Violent Crime Rate (1)	Physicians-per-Population Ratio (2)	Tuberculosis Rate (3)	Proportion of the Population Receiving Public Assistance (4)	Proportion of Subsidized Housing Units (5)	Proportion of Residential Buildings with Unsafe Building Code Violations (6)
Foreign born	0.0311	−0.06430**	0.2891	−0.0836	−0.3598****	−0.0398****
	(0.0892)	(0.2614)	(0.1769)	(0.1180)	(0.0919)	(0.0079)
Household characteristics						
Age of householder	−0.0028	−0.0225***	−0.0176****	0.0038	0.0096****	−0.0003
	(0.0026)	(0.0076)	(0.0052)	(0.0034)	(0.0026)	(0.0002)
Couple-headed household	−0.4596****	−1.1362****	−1.5068****	−0.2820**	−0.1059	−0.0267****
	(0.0872)	(0.2533)	(0.1751)	(0.1154)	(0.0888)	(0.0073)
Children under 18 in household	0.0450	−1.5005****	−0.1718	0.6534****	0.3785****	0.0200**
	(0.1083)	(0.3054)	(0.2116)	(0.1454)	(0.1106)	(0.0091)
Other adults in household	0.2381*	−1.6556****	−0.4676*	0.5710****	0.2840**	0.0147
	(0.1233)	(0.3518)	(0.2464)	(0.1725)	(0.1318)	(0.0111)
Less than high school diploma	0.8181****	−2.2699****	0.8592****	1.7042****	1.0779****	0.0746****
	(0.1088)	(0.3060)	(0.2156)	(0.1445)	(0.1110)	(0.0095)
High school diploma	0.2598***	−2.4765****	−0.3784**	0.7266****	0.6229****	0.0198**
	(0.0954)	(0.2771)	(0.1903)	(0.1251)	(0.0969)	(0.0079)
Logged household income	−0.0967****	0.2028****	−0.1188***	−0.2334****	−0.1836****	−0.0097****
	(0.0220)	(0.0599)	(0.0438)	(0.0284)	(0.0213)	(0.0019)
Receives public assistance	0.8164****	−0.4808	2.1475****	1.8518****	1.2516****	0.1158****
	(0.1108)	(0.2958)	(0.2107)	(0.1522)	(0.1136)	(0.0100)

Table 5. **Results of Feasible Generalized Least Squares Models Predicting Location in Low-Quality New York City Subareas, 1996 (Using Dummy Variable for Nativity Status)** *(continued)*

	Indicator of Neighborhood Quality					
Independent Variables	Violent Crime Rate (1)	Physicians-per-Population Ratio (2)	Tuberculosis Rate (3)	Proportion of the Population Receiving Public Assistance (4)	Proportion of Subsidized Housing Units (5)	Proportion of Residential Buildings with Unsafe Building Code Violations (6)
Race/ethnicity (vs. white)[a]						
Black	6.3403****	−6.3178***	9.3187***	5.8549****	3.7594****	0.3806****
	(0.1294)	(0.2884)	(0.2017)	(0.1406)	(0.1057)	(0.0096)
Puerto Rican	4.6926****	−4.9509***	8.4720***	5.3481****	4.1716****	0.3262****
	(0.1459)	(0.3995)	(0.2766)	(0.2052)	(0.1470)	(0.0128)
Non–Puerto Rican Hispanic	2.6566****	−2.5128***	8.1371***	3.3832****	2.0841****	0.2145****
	(0.1421)	(0.4152)	(0.2871)	(0.1939)	(0.1489)	(0.0122)
Asian	0.9278****	−1.1757**	1.6737****	0.2540	0.5642***	0.0410***
	(0.1685)	(0.4956)	(0.3334)	(0.2087)	(0.1721)	(0.0135)
Other	6.4433****	−5.9291***	8.9270***	6.1448****	4.3869****	0.2321****
	(0.5436)	(1.5156)	(1.0816)	(0.8351)	(0.5734)	(0.0550)
Intercept	10.3595	27.0731	21.8700	3.1932	5.1650	0.3036
Adjusted R^2	0.2615	0.0839	0.1712	0.3441	0.1773	0.1094

Notes: All coefficients are unstandardized. Standard errors are shown in parentheses. With the exception of the physicians-per-population ratio, higher values on all dependent variables indicate less advantaged neighborhood conditions.

[a]These categories refer to the race/ethnicity of *all* households, regardless of nativity status.

*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$. ****$p < 0.001$.

Table 6. **Results of Feasible Generalized Least Squares Models Predicting Location in Low-Quality New York City Subareas, 1996 (Using Place-of-Birth Dummy Variables)**

Independent Variables	Indicator of Neighborhood Quality: Violent Crime Rate (1)	Physicians-per-Population Ratio (2)	Tuberculosis Rate (3)	Proportion of the Population Receiving Public Assistance (4)	Proportion of Subsidized Housing Units (5)	Proportion of Residential Buildings with Unsafe Building Code Violations (6)
Household characteristics						
Age of householder	−0.0036	−0.0232***	−0.0223****	0.0030	0.0080***	−0.0004*
	(0.0027)	(0.0078)	(0.0054)	(0.0034)	(0.0026)	(0.0002)
Couple-headed household	−0.5340****	−1.1196****	−1.4779****	−0.2923**	−0.1388	−0.0224***
	(0.0698)	(0.2597)	(0.1816)	(0.1131)	(0.0887)	(0.0072)
Children under 18 in household	0.0862	−1.4974****	−0.3200	0.5983****	0.3569***	0.0175*
	(0.1119)	(0.3120)	(0.2213)	(0.1492)	(0.1107)	(0.0090)
Other adults in household	0.3105**	−1.6431****	−0.5960**	0.5702****	0.2909**	0.0129
	(0.1287)	(0.3587)	(0.2605)	(0.1690)	(0.1316)	(0.0111)
Less than high school diploma	0.6883****	−2.2154****	0.6580***	1.4970****	0.9984****	0.0571****
	(0.1130)	(0.3128)	(0.2255)	(0.1427)	(0.1112)	(0.0095)
High school diploma	0.2205*	−2.5115****	−0.5668***	0.7094****	0.5994****	0.0127
	(0.0983)	(0.2844)	(0.1971)	(0.1226)	(0.0966)	(0.0077)
Logged household income	−0.0982****	0.2072****	−0.1285***	−0.2134****	−0.1722****	−0.0079****
	(0.0227)	(0.0610)	(0.0454)	(0.0278)	(0.0212)	(0.0018)
Receives public assistance	0.9572****	−0.5606*	2.2500****	1.5205****	1.0765****	0.1037****
	(0.1175)	(0.3058)	(0.2277)	(0.1543)	(0.1164)	(0.0104)
Race/ethnicity of native-born (versus native-born white)						
Black	6.3403****	−6.1158****	8.9962****	6.6538****	4.6247****	0.3664****
	(0.1294)	(0.3462)	(0.2649)	(0.1742)	(0.1269)	(0.0122)
Puerto Rican	4.0218****	−4.5910****	6.2490***	4.4754****	3.8434****	0.2029****
	(0.2186)	(0.5939)	(0.4274)	(0.2958)	(0.2151)	(0.0193)
Non-Puerto Rican Hispanic	2.3064****	−1.7829*	4.3573***	2.2236****	1.8863****	0.0873***
	(0.3577)	(0.9996)	(0.7472)	(0.4624)	(0.3456)	(0.0281)
Asian	1.2063**	0.1282	0.6899	0.9518	0.9559*	0.0148
	(0.5616)	(1.7099)	(1.2420)	(0.6657)	(0.5517)	(0.0436)
Other	6.1770****	−5.5533***	8.0738****	7.9753****	5.7380****	0.2233***
	(0.7850)	(1.7493)	(1.7573)	(1.1641)	(0.7181)	(0.0739)

Table 6. **Results of Feasible Generalized Least Squares Models Predicting Location in Low-Quality New York City Subareas, 1996 (Using Place-of-Birth Dummy Variables)** *(continued)*

	Indicator of Neighborhood Quality					
Independent Variables	Violent Crime Rate (1)	Physicians-per-Population Ratio (2)	Tuberculosis Rate (3)	Proportion of the Population Receiving Public Assistance (4)	Proportion of Subsidized Housing Units (5)	Proportion of Residential Buildings with Unsafe Building Code Violations (6)
Place of birth (versus native-born white)						
Puerto Rico	5.0116****	−5.5098****	9.4085****	6.3971****	4.4861****	0.3379****
	(0.1829)	(0.4779)	(0.3443)	(0.2643)	(0.1865)	(0.0158)
Dominican Republic	2.9023****	−1.9695****	10.5271****	6.2350****	2.6061****	0.2861****
	(0.2104)	(0.5763)	(0.4112)	(0.3007)	(0.2045)	(0.0175)
Caribbean and Africa	5.5483****	−5.6812****	7.3047****	4.0329****	2.1011****	0.1546****
	(0.1476)	(0.4490)	(0.3053)	(0.2012)	(0.1627)	(0.0151)
Latin America	2.6043****	−4.7088****	6.2733****	2.3268****	1.3513****	0.1059****
	(0.1729)	(0.5218)	(0.3714)	(0.2367)	(0.1978)	(0.0150)
Europe	0.2798*	−1.6573***	0.4199	0.4213**	0.2585*	−0.0137
	(0.1680)	(0.5384)	(0.3326)	(0.1916)	(0.1567)	(0.0119)
Russia	−0.8879****	−0.8393	−2.2873****	0.6507***	0.5209***	−0.1141****
	(0.2312)	(0.7065)	(0.4364)	(0.2294)	(0.2015)	(0.0183)
China, Taiwan, Hong Kong	0.6460**	0.0040	1.7347****	0.0865	0.1758	0.0073
	(0.2753)	(0.7490)	(0.5116)	(0.3105)	(0.2681)	(0.0194)
India, Bangladesh, Pakistan	1.2948****	−4.0496****	1.9977****	1.1085***	1.3948****	0.0049
	(0.3065)	(0.9677)	(0.5996)	(0.3837)	(0.3195)	(0.0252)
Other Asia	0.2033	−2.6364***	1.3362***	−0.3628	−0.3572	−0.0037
	(0.2588)	(0.8269)	(0.4876)	(0.3144)	(0.2598)	(0.0176)
All other	1.6947****	−1.2892	1.9449***	0.9033**	0.7498***	0.0016
	(0.2935)	(0.8896)	(0.5947)	(0.3590)	(0.2807)	(0.0236)
Intercept	10.4623	26.8295	22.3836	8.9806	5.0200	0.2844
Adjusted R^2	0.2623	0.0854	0.1835	0.3597	0.1837	0.1220

Notes: All coefficients are unstandardized. Standard errors are shown in parentheses. With the exception of the physicians-per-population ratio, higher values on all dependent variables indicate less advantaged neighborhood conditions.
*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$. ****$p < 0.001$.

socioeconomic status show predictable results: lower income, less education, and public assistance receipt are positively associated with low-quality neighborhood characteristics. The effects of the indicators of household life cycle are a bit more mixed in terms of direction and significance but generally conform to expectations.[13]

The effect of nativity status. For three of our dependent variables (the violent crime rate, the physicians-per-population ratio, and the proportion of residential buildings with unsafe building code violations), the multivariate models produce results that are similar, with respect to the effect of nativity status, to those from the bivariate analyses. For example, while in the bivariate analyses we found that the crime rates prevailing in immigrant and native-born households' neighborhoods were statistically indistinguishable, we find the same results even after controlling for household life cycle, socioeconomic status, and race/ethnicity (column 1 of table 5). Similarly, controlling for the full range of household characteristics does not alter the findings that immigrants, as a group, live in neighborhoods with lower physicians-per-population ratios than do native-born households (column 2) and in neighborhoods with significantly lower concentrations of unsafe building code violations (column 6).

In contrast, while the bivariate analyses demonstrated that immigrant households, as a group, tend to live in areas with higher tuberculosis rates, higher rates of public assistance use, and higher proportions of subsidized housing units, controlling for household characteristics either eliminates the observed nativity status differential or reverses it (columns 3, 4, and 5 of table 5). Hierarchical models that enter the race/ethnicity dummy variables subsequently to the indicators of household life cycle and socioeconomic status (not shown but available, upon request, from the authors) reveal that controlling for race/ethnicity is the key to eliminating or reversing the observed nativity status differential. Moreover, with respect to the effect of race/ethnicity, all black, Hispanic, Asian, and other race households tend to live in lower-quality neighborhoods than do whites. The sole exception to this generalization is the find-

[13] The results pertaining to the presence of other adults in the household in four of the six models suggest that extended households tend to live in areas that are more disadvantaged. These findings are consistent with the notion that household extension may be a mechanism to cope with economic distress. In other words, household extension may reflect a dimension of economic need that is independent of household income and receipt of public assistance.

ing that Asian households do not live in neighborhoods with significantly higher levels of public assistance use.

The effect of place of birth. Turning to the results using the place-of-birth dummy variables (table 6), we see, as we did in the bivariate analyses, that the neighborhood conditions of foreign-born households vary depending on place of birth. For example, when compared with native-born white households, island-born Puerto Rican households and foreign-born households from the Dominican Republic, the Caribbean and Africa, and Latin America tend to live in lower-quality neighborhoods on all six indicators, even after controlling for household life cycle and socioeconomic status. Households from India, Bangladesh, and Pakistan exhibit significantly lower-quality neighborhood conditions on all indicators except the proportion of buildings with unsafe building code violations. When compared with native-born white households, foreign-born households from Europe tend to live in areas with higher crime rates, more public assistance use and subsidized housing, and lower physicians-per-population ratios. Foreign-born households from China, Taiwan, and Hong Kong; other Asia; and Russia, however, exhibit disadvantaged neighborhood conditions (relative to native-born whites) on only two indicators (crime and tuberculosis rates for the Chinese; physician availability and tuberculosis rates for other Asians; and the rate of public assistance use and the proportion of subsidized housing for Russians). Russian immigrants, moreover, are the only foreign-born group to exhibit *advantaged* neighborhood conditions relative to native-born whites. That is, after controlling for household life cycle and socioeconomic status, foreign-born Russian households tend to live in neighborhoods with lower violent crime rates, lower tuberculosis rates, and safer buildings than do native-born white households.

The pattern of effects just described provides evidence supporting our expectations of a "racial hierarchy" in access to neighborhood resources in that foreign-born black and Hispanic households tend to live in lower-quality neighborhoods on *all* six indicators, while other place-of-birth groups exhibit relative disadvantages in neighborhood conditions on fewer indicators. As hypothesized, these findings suggest that it is race and ethnicity, rather than nativity status per se, that largely determine locational outcomes in New York City. This conclusion is strengthened by the results pertaining to native-born minority households: in each model, black, Puerto Rican, non–Puerto Rican Hispanic, and other race households tend to live in neighborhoods that are significantly more disadvantaged than those in which native-born white households live. Moreover, when the coefficients for the native-born minority and place-of-birth groups are

compared,[14] black and Hispanic households, regardless of nativity status, tend to live in neighborhoods that are of significantly lower quality on all indicators than do foreign- and native-born Asian households and foreign-born white households as well. (Comparisons are not shown but are available, upon request, from the authors.)

Discussion

This article adds to the literature on locational attainment by evaluating whether immigrant households are more or less likely than native-born households to live in neighborhoods characterized by a broad range of (non–census derived) indicators of neighborhood quality. It also evaluates whether the relationship between immigrant status and neighborhood quality varies by race/ethnicity and place of birth. Drawing on the two main theoretical frameworks used thus far in studies of locational attainment, we expected that controlling for group differences in socioeconomic status and life cycle would at least moderate differences in neighborhood quality between foreign- and native-born households. We also expected that race/ethnicity would be a potent predictor of a group's ability to acquire residence in high-quality neighborhoods. That is, we expected that, regardless of nativity status, blacks and Hispanics would be exposed to the least desirable neighborhoods, while Asians and (foreign-born) whites would experience fewer neighborhood disadvantages. Our findings strongly support both of these expectations.

Specifically, our bivariate analyses showed that foreign-born households, as a group, lived in areas with less access to physicians, higher rates of tuberculosis, and proportionately more persons on public assistance and more housing units receiving government subsidies relative to native-born households. Our multivariate models, however, revealed that these disadvantages disappeared when we controlled for life-cycle, socioeconomic, and racial/ethnic characteristics, except in the case of the physicians-per-population ratio.

The greater exposure of foreign-born households—again, as a group—to higher areal rates of tuberculosis and concentrated poverty becomes statistically insignificant when we enter controls for

[14] The significance of these pairwise comparisons is assessed with a standard t-test of the form

$$t = \frac{b_1 - b_2}{\sqrt{se_1^2 + se_2^2}}$$

where b_1 and se_1, and b_2 and se_2, are the unstandardized regression coefficients and standard errors for the first and second group, respectively.

race/ethnicity. This finding suggests that differential location in areas with lower levels of health as well as higher concentrations of poverty is less a function of group differences in socioeconomic status than it is a function of the greater representation of nonwhites among foreign-born than native-born households (table 2). This finding lends support to the tenets of the spatial stratification model, which emphasizes the role of race in sorting households among areas of varying quality.

Indeed, the importance of race/ethnicity in influencing households' ability to acquire residence in areas replete with high-quality resources is clearly demonstrated in both the effects of the race/ethnicity variables and in the effects of the place-of-birth indicators. In the nativity status model, while we find very little evidence that immigrant households are disproportionately disadvantaged relative to native-born households, the same cannot be said for nonwhites (relative to whites). In five of the six models, *all* nonwhites (regardless of nativity status) exhibit greater tendencies to live in lower-quality areas than do whites. Greater exposure (relative to whites) to higher proportions of persons receiving public assistance describes the situation of blacks, Puerto Ricans, non–Puerto Rican Hispanics, and those of "other" races, but not of Asians.

The juxtaposition of the minimal effect of immigrant status versus the profound effect of minority status, however, is not the entire story. The place-of-birth model clearly reveals the dominant role of race/ethnicity in determining access to higher quality neighborhoods. Certain minority groups—notably island-born Puerto Ricans and foreign-born Dominicans; Caribbeans and Africans; and Latin Americans—are relegated largely to areas with far fewer of the neighborhood amenities that improve one's current standard of living and, perhaps more significantly, one's future life chances. While these four groups consistently exhibit neighborhood-quality disadvantages relative to native-born whites, foreign-born households from Russia tend to live in areas of *at least equal* quality to those of native-born whites on four of the six outcomes.[15] Equally important, native-born blacks and Hispanics are also disproportionately disadvantaged (relative to native-born whites) on all six indicators of neighborhood quality, and all foreign- and native-born blacks and Hispanics live in areas of lower quality than do all foreign- and native-born Asians and foreign-born whites.

Thus far our predictions concerning the "racial hierarchy" of access to more advantaged neighborhoods have been strongly supported by

[15] Households from the former Soviet Union might live in relatively advantaged neighborhoods because of financial and housing assistance received from American fraternal and religious organizations (Herszenhorn 1996).

our empirical results for blacks and Hispanics, regardless of nativity status. Our results pertaining to the experiences of Asians, however, are more mixed. We predicted that Asians should experience few, if any, neighborhood-quality disadvantages. However, in the nativity status models we find that Asians (regardless of nativity status) tend to live in worse areas than do whites on five of the six indicators. In the place-of-birth models we find that, relative to native-born whites, foreign-born households from India, Pakistan, and Bangladesh tend to live in lower-quality areas on five of the six outcomes. Foreign-born households from China, Hong Kong, Taiwan, and other Asia as well as native-born Asians tend to live in relatively disadvantaged areas on two of the six outcomes. Thus, while our findings for native-born Asians largely conform to our expectations, our findings of serious neighborhood-quality disadvantages for specific groups of foreign-born Asians contrast with findings in the larger literature on locational attainment.

The fact that our findings for specific foreign-born Asian groups stand in contrast to those of studies of the locational attainment process among racial/ethnic groups may be related to our focus on a single city. Foreign-born Asians who live in New York City may disproportionately represent the newest arrivals relative to all foreign-born Asians in the metropolitan area (see, for example, Alba et al. 1999; Zhou and Logan 1991) or the nation. The case of Bangladeshis is particularly salient in this regard because the volume of Bangladeshi immigration to New York City has risen greatly since the 1970s (Lobo 1998). Data from the U.S. Immigration and Naturalization Service indicate that the average number of Bangladeshis arriving per year in the 1970s was 123, a number that rose to an annual average of 416 in the 1980s and 1,911 in the first four years of this decade (Lobo 1998). Moreover, the most recent data (for 1995 to 1996) show an average of 3,700 Bangladeshis arriving in New York city per year, making this group the sixth largest of all immigrant groups to arrive in the city during this period (Lobo 1998). It seems likely that if we had access to measures of years since arrival and English language fluency, some, if not all, of the disadvantages we find for foreign-born Asian households would be eliminated.

Thus, our findings of racial/ethnic stratification in the process of locational attainment largely support those reported by other researchers. The significance of this similarity lies in the fact that our measures of neighborhood quality, despite being limited to a single city, go beyond the neighborhood characteristics available in census data, and therefore significantly add to our cumulative knowledge concerning the types of neighborhood resources that are apparently out of reach of both native- and foreign-born blacks and Hispanics. Insofar as our indicators of neighborhood quality are important inputs in the process of social and economic mobility, our findings cast

a pessimistic shadow on the potential for reductions in racial/ethnic inequality. Equally significant, however, our results here complement those from an earlier work (Schill, Friedman, and Rosenbaum 1998) that demonstrate almost identical patterns of inequality in housing conditions. Thus, it is clear that certain groups in New York experience multiple layers of disadvantageous living conditions, while others are barely affected by any, and that the risk of being in these groups is determined largely by race/ethnicity.

Although our analysis consistently points to the higher probability of black and Hispanic households in New York City (immigrant and nonimmigrant alike), to live in lower-quality neighborhoods than white households, the data that we use do not permit us to isolate the precise causal mechanism that generates these patterns. It is very possible that racial discrimination in New York City's housing market constrains the locational choices of racial/ethnic minorities to less desirable neighborhoods (Schill and Scafidi 1999) and/or that neighborhoods with high proportions of these households receive proportionately fewer of the resources and investment, both public and private, that foster neighborhood amenities and safety.

It is also possible that historical discrimination, and the segregation that it fostered, interact with current preferences for neighborhood racial/ethnic composition to generate the patterns we uncover. Patterns of racial/ethnic segregation in New York today are the legacy of years of illegal discrimination by actors in the housing market and government, as well as the flight of white households to the suburbs (Massey and Denton 1993). To the extent that racial/ethnic minority immigrants to New York prefer to live in neighborhoods composed of people from similar backgrounds and/or of similar race/ethnicity, they may seek housing in these neighborhoods despite the fact that they are less "desirable" on the range of indicators we employ.

Our findings suggest that policies targeting racial/ethnic minorities will improve the neighborhood conditions of immigrants who are most in need of assistance. Among these initiatives are increased efforts by the government to enforce federal, state, and local laws that prohibit discrimination in the housing market on the basis of race or national origin. Furthermore, government efforts to promote positive investment in minority communities, whether through community-based redevelopment initiatives or the Community Reinvestment Act, likely would have a positive impact.

It also should be noted that our analysis, by necessity, is static, measuring the neighborhood characteristics of immigrants at one point in time. Immigrants do not merely experience neighborhood quality; they also may affect the conditions of the neighborhoods in

which they live. As black and Hispanic immigrants move into neighborhoods that are relatively disadvantaged in terms of the types of resources and amenities we measure in this article, they may bring with them the seeds of renewal. Throughout New York City, anecdotal accounts abound of neighborhoods that have been positively affected by both the financial and institutional contributions of householders born in foreign countries (Salvo and Lobo 1997; Winnick 1990). Clearly, more work needs to be done, using a longitudinal framework, to evaluate whether these effects are widespread and, if so, to quantify their impact.

Authors

Emily Rosenbaum is Associate Professor of Sociology in the Department of Sociology and Anthropology at Fordham University. Samantha Friedman is Assistant Professor of Sociology at The George Washington University. Michael H. Schill is Professor of Law and Urban Planning at the New York University School of Law and Director of its Center for Real Estate and Urban Policy. Hielke Buddelmeyer is a Research Assistant at the New York University Center for Real Estate and Urban Policy.

References

Alba, Richard D., and John R. Logan. 1991. Variation on Two Themes: Racial and Ethnic Patterns in Attainment of Suburban Residence. *Demography* 28:431–53.

Alba, Richard D., and John R. Logan. 1992. Analyzing Locational Attainments. *Sociological Research and Methods* 20(3):367–97.

Alba, Richard D., and John R. Logan. 1993. Minority Proximity to Whites in Suburbs: An Individual-Level Analysis of Segregation. *American Journal of Sociology* 98:1388–427.

Alba, Richard, John Logan, and Paul Bellair. 1994. Living with Crime: The Implications of Racial/Ethnic Differences in Suburban Location. *Social Forces* 73(2):395–434.

Alba, Richard, John Logan, and Shu-yin Leung. 1994. Asian Immigrants in American Suburbs: A Study of the Greater New York Metropolitan Region. *Research in Community Sociology* 4:43–67.

Alba, Richard, John Logan, Brian Stults, Gilbert Marzan, and Wenquan Zhang. 1999. Immigrant Groups and Suburbs: A Reexamination of Suburbanization and Spatial Assimilation. *American Sociological Review* 64(3):446–60.

Alba, Richard, and Victor Nee. 1997. Rethinking Assimilation Theory for a New Era of Immigration. *International Migration Review* 31(4):826–74.

Angel, Ronald, and Marta Tienda. 1982. Determinants of Extended Household Structure: Cultural Pattern or Economic Need? *American Journal of Sociology* 87:1360–83.

Butcher, Kristin. 1994. Black Immigrants to the United States: A Comparison with Native Blacks and Other Immigrants. *Industrial and Labor Relations Review* 47:265–84.

Dodoo, F. Nii-Amoo. 1997. Assimilation Differences Among Africans in America. *Social Forces* 76(2):527–46.

Edin, Kathryn, and Laura Lein. 1997. *Making Ends Meet.* New York: Russell Sage Foundation.

Ellen, Ingrid Gould, and Margery Austin Turner. 1998. Does Neighborhood Matter? Assessing Recent Evidence. *Housing Policy Debate* 8(4):833–66.

Elliott, Delbert, William Julius Wilson, David Huizinga, Robert Sampson, Amanda Elliott, and Bruce Rankin. 1996. The Effects of Neighborhood Disadvantage on Adolescent Development. *Journal of Research in Crime and Delinquency* 33(4):389–426.

Farley, Reynolds. 1993. Neighborhood Preferences and Aspirations among Blacks and Whites. In *Housing Markets and Residential Mobility*, ed. G. Thomas Kingsley and Margery Austin Turner, 161–91. Washington, DC: Urban Institute Press.

Farley, Reynolds. 1997. *The New American Reality*. New York: Russell Sage Foundation.

Farley, Reynolds, Elaine Fielding, and Maria Krysan. 1998. The Residential Preferences of Blacks and Whites: A Four-Metropolis Analysis. *Housing Policy Debate* 8(4):763–800.

Furstenberg, Frank. 1993. How Families Manage Risk and Opportunity in Dangerous Neighborhoods. In *Sociology and the Public Agenda*, ed. William Julius Wilson, 231–58. Newbury Park, CA: Sage.

Galster, George, and Sean Killen. 1995. The Geography of Metropolitan Opportunity: A Reconnaissance and Conceptual Framework. *Housing Policy Debate* 6(1):7–43.

Galster, George, Kurt Metzger, and Ruth Waite. 1999. Neighborhood Opportunity Structures of Immigrant Populations, 1980 and 1990. *Housing Policy Debate* 10(2):395–442.

Herszenhorn, David M. 1996. The Neediest Cases: From Ukraine, with Cab Fare and Hope but Not Much Else. *New York Times*, December 15, p. 65.

James, Franklin, Jeff Romine, and Peter Zwanzig. 1998. The Effects of Immigration on Urban Communities. *Cityscape* 3(3):171–92.

Kalmijn, Matthijs. 1996. The Socioeconomic Assimilation of Caribbean American Blacks. *Social Forces* 74(3):911–30.

Kasarda, John D., Stephen J. Appold, Stuart H. Sweeney, and Elaine Seiff. 1997. Central-City and Suburban Migration Patterns: Is a Turnaround on the Horizon? *Housing Policy Debate* 8(2):307–58.

Leahy, Peter J. 1985. Are Racial Factors Important for the Allocation of Mortgage Money? *American Journal of Economics and Sociology* 44:185–96.

Leventhal, Tama, and Jeanne Brooks-Gunn. 1997. What Are the Important Questions to Ask about Neighborhood Effects on Children and Youth? Implications for Moving to Opportunity. Paper presented at HUD's first conference on Moving to Opportunity, Washington, DC, November 20–21.

Lobo, A. Peter. 1998. Personal communication.

Logan, John, and Richard Alba. 1993. Locational Returns to Human Capital: Minority Access to Suburban Community Resources. *Demography* 30(2):243–68.

Logan, John, Richard Alba, and Shu-yin Leung. 1996. Minority Access to White Suburbs: A Multiregional Comparison. *Social Forces* 74(3):851–82.

Logan, John, Richard Alba, Tom McNulty, and Brian Fisher. 1996. Making a Place in the Metropolis: Locational Attainment in Cities and Suburbs. *Demography* 33(4):443–53.

Logan, John, and Harvey Molotch. 1987. *Urban Fortunes: The Political Economy of Place.* Berkeley: University of California Press.

Massey, Douglas S. 1985. Ethnic Residential Segregation: A Theoretical Synthesis and Empirical Review. *Sociology and Social Research* 69:315–50.

Massey, Douglas S. 1990. American Apartheid: Segregation and the Making of the Underclass. *American Journal of Sociology* 96(2):329–57.

Massey, Douglas S., Gretchen A. Condran, and Nancy A. Denton. 1987. The Effect of Residential Segregation on Black Social and Economic Well-Being. *Social Forces* 66:29–56.

Massey, Douglas S., and Nancy A. Denton. 1985. Spatial Assimilation as a Socioeconomic Outcome. *American Sociological Review* 50:94–106.

Massey, Douglas S., and Nancy A. Denton. 1993. *American Apartheid: Segregation and the Making of the Underclass*. Cambridge, MA: Harvard University Press.

Munnell, Alicia H., Lynn E. Browne, James McEneaney, and Geoffrey M. B. Tootell. 1992. Mortgage Lending in Boston: Interpreting HMDA Data. Working Paper No. 92-7. Boston: Federal Reserve Bank of Boston. October.

Pitkin, John R., Dowell Myers, Patrick A. Simmons, and Isaac F. Megbolugbe. 1997. Immigration and Housing in the United States: Trends and Prospects. *Report of the Early Findings from the Fannie Mae Foundation Immigration Research Project*. Washington, DC: Fannie Mae Foundation.

Rosenbaum, Emily. 1994. The Structural Constraints on Minority Housing Choices. *Social Forces* 72(3):725–47.

Rosenbaum, Emily. 1995. The Making of a Ghetto: Spatially Concentrated Poverty in the 1980s. *Population Research and Policy Review* 14:1–27.

Rosenbaum, Emily. 1996a. Racial/Ethnic Differences in Home Ownership and Housing Quality, 1991. *Social Problems* 43(4):403–26.

Rosenbaum, Emily. 1996b. The Influence of Race on Hispanic Housing Choices: New York City, 1978–1987. *Urban Affairs Review* 32(2):217–43.

Rosenbaum, James. 1995. Changing the Geography of Opportunity by Expanding Residential Choice: Lessons from the Gautreaux Program. *Housing Policy Debate* 6(1):231–69.

Rumbaut, Ruben. 1997. Assimilation and Its Discontents: Between Rhetoric and Reality. *International Migration Review* 31(4):923–60.

Salvo, Joseph. 1998. Personal communication.

Salvo, Joseph, and A. Peter Lobo. 1997. Immigration and the Changing Demographic Profile of New York. In *The City and the World: New York's Global Future*. New York: Council on Foreign Relations.

Scafidi, Benjamin, Michael H. Schill, Susan M. Wachter, and Dennis Culhane. 1999. An Economic Theory of Abandonment. *Journal of Housing Economics*, forthcoming.

Schill, Michael H. 1993. Distressed Public Housing: Where Do We Go from Here? *University of Chicago Law Review* 60(2):497–554.

Schill, Michael H., Samantha Friedman, and Emily Rosenbaum. 1998. The Housing Conditions of Immigrants in New York City. *Journal of Housing Research* 9(2):201–36.

Schill, Michael H., and Benjamin P. Scafidi. 1999. Housing Conditions and Problems in New York City. In *Housing and Community Development in New York City: Facing the Future*, ed. Michael H. Schill, 11–52. Albany: State University of New York Press.

Schill, Michael H., and Susan M. Wachter. 1995. The Spatial Bias of Federal Housing Law and Policy: Concentrated Poverty in Urban America. *University of Pennsylvania Law Review* 143(5):1285–342.

Shlay, Anne, and Peter Rossi. 1981. Keeping Up the Neighborhood: Estimating Net Effects of Zoning. *American Sociological Review* 46(6):703–19.

Skogan, Wesley. 1991. *Disorder and Decline.* Berkeley, CA: University of California Press.

Tienda, Marta. 1991. Poor People and Poor Places: Deciphering Neighborhood Effects on Poverty Outcomes. In *Macro-Micro Linkages in Sociology*, ed. Joan Huber, 244–62. Newbury Park, CA: Sage.

Tienda, Marta, and Ronald Angel. 1982. Headship and Household Composition Among Blacks, Hispanics, and Other Whites. *Social Forces* 61:509–31.

Turner, Margery Austin. 1993. Limits on Neighborhood Choice: Evidence of Racial and Ethnic Steering in Urban Housing Markets. In *Clear and Convincing Evidence: Measurement of Discrimination in America*, ed. Michael Fix and Raymond Struyck, 118–47. Washington, DC: Urban Institute Press.

U.S. Department of Housing and Urban Development. 1996. *Expanding Housing Choices for HUD-Assisted Families: First Biennial Report to Congress*. Washington DC.

White, Michael, Ann Biddlecom, and Shenyang Guo. 1993. Immigration, Naturalization, and Residential Assimilation among Asian Americans in 1980. *Social Forces* 72(1):93–117.

Wilson, William Julius. 1986. *The Truly Disadvantaged.* Chicago: University of Chicago Press.

Wilson, William Julius. 1996. *When Work Disappears: The World of the New Urban Poor.* New York: Knopf.

Winnick, Louis. 1990. *New People in Old Neighborhoods.* New York: Russell Sage Foundation.

Yinger, John. 1995. *Closed Doors, Opportunities Lost: The Continuing Costs of Housing Discrimination*. New York: Russell Sage Foundation.

Zhou, Min, and John Logan. 1991. In and Out of Chinatown: Residential Mobility and Segregation of New York City's Chinese. *Social Forces* 70:387–407.