OUT OF THE PROJECTS, STILL IN THE HOOD: THE SPATIAL CONSTRAINTS ON PUBLIC-HOUSING RESIDENTS' RELOCATION IN CHICAGO

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ABSTRACT: *Public housing, usually located in predominantly poor, minority neighborhoods, has long been associated with concentrated poverty and spatially constraining opportunities for upward mobility. The federal government created HOPE VI in 1992 to transform the physical and social shape of public housing, demolishing existing projects and replacing them with mixed-income developments. To accomplish this public-housing residents are relocated with housing voucher subsidies to the private market and only a small portion will be able to return to the new mixed income developments. To what extent do these voucher subsidies simply reinforce a stratified housing market by limiting the types of neighborhoods available to former public-housing residents? Using spatial analytic techniques, this study examines the spatial patterns and neighborhood conditions of voucher housing and how these patterns link to public-housing relocatees' destinations. Findings indicate that voucher housing tends to be clustered in poor African-American neighborhoods where the majority of relocated public-housing residents settle. Thus, there appear to be spatial constraints on relocatees' residential options.*

By the late 1980s, issues of concentrated poverty had become the organizing framework for new housing-policy formation at the federal and local levels, primarily because public housing was cited as one of the causes (Goetz, 2000).[1] In housing-policy circles many concluded that public housing was a failure and should be replaced with programs to *deconcentrate* poverty (Popkin, Levy, Harris, Comey, & Cunningham, 2004b). The 1992 HOPE VI (Housing Opportunities for People Everywhere) Program was created by the U.S. Department of Housing and Urban Development (HUD) to demolish large, spatially concentrated high-rise developments and replace them with mixed-income housing, thus deconcentrating poverty (Popkin et al., 2004a; Smith, 2002). In 1993, Congress authorized $300 million, in 1999 $4.2 billion, and by 2006, $6.3 billion for HOPE VI.

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While the HOPE VI initiative aims to transform the physical and social shape of public housing to reduce the alleged negative effects of concentrated poverty, it requires demolishing existing public housing and the relocation—at least temporarily—of residents using private-market housing subsidies (Clampet-Lundquist, 2004a; Kleit & Manzo, 2006). Because there is no one-for-one replacement requirement, only some demolished units are earmarked for low-income replacement units, with the rest defined as either affordable or market-rate housing, both beyond the economic means of former public-housing tenants. Thus, while the program develops replacement housing with a mixed-income design, most relocated residents cannot move back.

Initially, 94,600 public-housing units were earmarked for demolition nationwide; 78,100 of those have since been demolished and 10,400 are slated for redevelopment (Buron, Levy, & Gallagher, 2007; Popkin et al., 2004a). However, of the 95,100 planned replacement units, only 31,080 are completed (Popkin et al., 2004a), and only 48,800 of the planned units will be subsidized for very low-income families; this represents a net loss of half of previously existing low-income project-based units (Buron et al., 2007; Kleit & Manzo, 2006).

The relocation process also has shortcomings. In addition to uprooting public-housing residents from their community and disrupting existing social ties, there are questions concerning the quality of the housing and neighborhoods to which they move (Venkatesh, 2002; Venkatesh & Celimli, 2004a). By 2000, half of all public-housing relocatees had moved to other public-housing facilities with little or no neighborhood improvement (National Housing Law Project, 2002). Another third moved to private rental housing through the Housing Choice Voucher program; neighborhood quality of these destinations is mixed (Comey, 2007). Remaining tenants left public or assisted housing altogether, either voluntarily or through eviction; housing authorities have done little to track this group's residential outcomes (Clampet-Lundquist, 2004b; Holin, Buron, Locke, & Cortes, 2003; Smith, 2002).

The Housing Choice Voucher program, originally Section 8 of the Housing and Community Development Act of 1974, provides demand-side subsidies for HUD-approved private-market rental housing through vouchers (Freeman, 2004). But moving from public housing to private-market housing is a major undertaking for those with vouchers: apartment hunting, dealing with private landlords, passing tenant-screening criteria, and paying utilities can be daunting (Buron et al., 2007); racial and economic discrimination in the housing market persists, leaving many voucher recipients unable to secure apartments outside of high-poverty areas (Marr, 2005; Popkin et al., 2004b). The challenge is greatest in metropolitan areas like Chicago and New York where rents in more desirable areas are typically above the Fair Market Rate, the amount HUD will allocate to landlords; in poor neighborhoods, becoming a voucher landlord might be the most profitable option (Grigsby & Bourassa, 2004).

Researchers have examined neighborhood conditions, geographic patterns of voucher housing (e.g., Newman & Schnare, 1997; Wang, Varady, & Wang, 2008), and characteristics of destination neighborhoods (e.g., Kleit & Manzo, 2006; Popkin & Cunningham, 2000; Venkatesh & Celimli, 2004a). Yet few investigated the degree of spatial clustering of voucher housing as it relates to the actual destinations of relocatees, levels of destination-neighborhood disadvantage, and proximity to existing public housing. Questions remain concerning how successful HOPE VI relocation and redevelopment efforts are at avoiding the geographic concentration of disadvantage.

Using Chicago as our study area we attempt to answer the following questions: (a) What are the spatial patterns and neighborhood conditions of voucher housing in the city? (b) Is there a spatial relationship between the location of voucher housing and that of existing public housing? and (c) Are there related patterns of spatial constraints associated with public-housing tenants' relocation destinations? We used tenant relocation and location of existing public-housing data from the Chicago Housing Authority (CHA), crime data from the Chicago Police Department,

demographic and socioeconomic information from the 2000 census, and location information on existing voucher housing from HUD.

We utilize a spatial analytic approach to examine the extent of geographic clustering of voucher housing, the quality of neighborhoods with clusters, and how the location of voucher housing relates to existing public housing. Thus, we analyze spatial constraints on relocation, examining whether spatial clusters of voucher housing are proximate to existing public housing. We examine neighborhood characteristics of clusters to determine level of disadvantage, and how closely the locational patterns of public-housing relocation follow the spatial clustering of voucher housing.

BACKGROUND

The 1949 Housing Act declared, every American has the right to "a decent home and a suitable living environment" (Lang & Sohmer, 2000). While "decent housing" may refer to the quality of the actual housing structure, "suitable environment" refers to the surrounding neighborhood. Thus, the spatial arrangements of federally sponsored housing programs should provide access to neighborhoods where poverty, crime, and poor public-educational opportunities for children do not constrain opportunities for upward mobility (Freeman, 2004; Newman & Schnare, 1997).

The Act ushered in federal involvement on the local level (Goetz, 2003) and linked the general wealth and overall health of the country to housing quality and called for remedying the "serious housing shortage, [and] the elimination of substandard and inadequate housing" (cf. Lang & Sohmer, 2000, p. 293). Most relevant to urban areas were the Act's Title I, financing slum clearance through urban renewal; Title II, expanding the Federal Housing Administration mortgage insurance program; and Title III, committing federal dollars to building 810,000 new public-housing units (Bratt, 2004; Lang & Sohmer, 2000).

Titles I through III had contradictory effects. White flight from the cities, fueled in part by expanded federal mortgage insurance, caused rapid suburbanization and market disinvestment in the urban core. Discriminatory mortgage practices kept minority households out of the suburbs (Massey & Denton, 1993), while urban renewal initiatives razed inner-city neighborhoods, displacing minority families and shrinking the supply of affordable housing in cities across the country (Teaford, 2000).

City public housing became the only option for the urban poor (Freeman, 2004). Discriminatory siting led to concentrated development on land cleared through urban renewal in or near poor neighborhoods, often blocks from original residences (Bickford & Massey, 1991). For example, during the 1960s, the Chicago City Council built public housing on slum sites to avoid relocating Black tenants to other neighborhoods (Goetz, 2003). The rapid growth of concentrated Black areas led to areas housing eight Blacks for every one housed during the 1920s (Hirsch, 1983, p. 253). The concentration of urban poverty and placement of public housing are interdependent, with housing consistently located in poor Black neighborhoods (Massey & Kanaiaupuni, 1993).

Ongoing research supports the connection between location of public housing and concentrated poverty (Bauman, 1974; Bickford & Massey, 1991; Freeman, 2004; Goering & Coulibably, 1989; Goering, Kamely, & Richardson, 1997; Goetz, 2003; Gray & Tursky, 1986; Hirsch, 1983; Massey & Denton, 1993; Meyerson & Banfield, 1955; Newman & Schnare, 1997; Rossi & Dentler, 1961; Wilson, 1987). Authors focused on indirect effects of public housing and concentrated disadvantage on tenant outcomes: participation in the labor force, failure to complete high school, and civic apathy (Currie & Yelowitz, 1998; Reingold, 1995; Reingold, Van Ryzin, & Ronda, 2001). Findings are mixed due to the difficulty of disentangling the impact of public housing from overall neighborhood disadvantage (Reingold et al., 2001).

Although there are ongoing debates in the literature, high levels of neighborhood poverty have been associated with lower educational attainment, joblessness, a disproportionately high share of

single female-headed households, social isolation, and increased crime (Anderson, 1999; Basolo & Nguyen, 2005; Brooks-Gunn, Duncan, & Aber, 1997; Ellen & Turner, 1997; Hannon, 2005; Jargowsky, 1997; Jenks & Mayer, 1990; Krivo & Peterson, 1996; Leventhal & Brooks-Gunn, 2000; Morenoff, Sampson, & Raudenbush, 2001; Peterson & Krivo, 1999; Quane & Rankin, 1998; Sampson, 1987; Sampson, Raudenbush, & Earls, 1997; Small & Newman, 2001; Strait, 2006; Wilson, 1987). Spatial concentration of poverty can exacerbate its effects: residents face the consequences of their own impoverished state, and contend with the disadvantage of other poor families in the neighborhood.

The Brooke Amendments to the HUD Acts of 1969, 1970, and 1971 (Hartman, 1975) shifted federally sponsored low-income housing construction to rent supplements and capital-cost subsidies to private-market landlords, leading to the Housing and Community Development Act of 1974. Including funding for a new program, Section 8, the Act subsidized private-market initiatives to rehabilitate housing and limited privately sponsored new construction (Freeman, 2004). By the early 1980s all construction of federally subsidized low-income housing ceased; Section 8 was recast as a demand-side subsidy for existing private-market housing through vouchers to qualified tenants (Burchell & Listokin, 1995).

Although existing public housing continued to be widely used for low-income housing along with voucher subsidies to private-market housing, federal devolution, and funding cuts resulted in a rapidly deteriorating public-housing stock and the shift from project-based assistance did little to deconcentrate poverty (Goetz, 2003; Stone, 1993).

The HUD Reform Act of 1989 created the National Commission on Severely Distressed Public Housing, to identify severely distressed public-housing developments nationwide, assess strategies to address their problems, and formulate a plan of action (National Housing Law Project. 2002).[2] The HOPE VI program was initiated in response to the estimate that of the 1.2 million public-housing units in the country, 86,000 were severely distressed (National Commission on Severely Distressed Public Housing, 1992; Turbov & Piper, 2005).

The program's objectives were (a) physically reshaping housing, replacing the worst developments with apartments or townhouses; (b) reducing concentrations of poverty by encouraging a greater income mix among residents; (c) establishing support services to help residents get and keep jobs; (d) establishing and enforcing high standards of personal and community responsibility; and (e) forging broad-based partnerships in planning and improving public housing (Pitcoff, 1999).

Over the first 5 years of HOPE VI laws and regulations evolved, increasingly giving local housing authorities more latitude (Salama, 1999, p. 96). Measures included (a) eliminating federal preferences emphasizing the lowest income household for admissions to public housing; (b) eliminating the one-for-one replacement requirement for demolished public-housing units; and (c) allowing housing authorities to use housing-development funds and operating subsidies for projects owned by private-housing organizations (Salama, 1999). The focus of HOPE VI shifted from *most* severely distressed public-housing sites toward sites that could attract private investment (National Housing Law Project, 2002).

In 1998, the Quality Housing and Work Responsibility Act authorized further deregulation of local housing authorities to deconcentrate poverty and develop mixed-income communities (Hunt, Schulhof, & Holmquist, 1998); nearly any public-housing site could qualify for HOPE VI funds regardless of the condition of the housing stock (National Housing Law Project, 2002). Although touted as one of the most important and innovative inner-city revitalization programs, critics assert that HOPE VI cannot accommodate displaced residents and those at the lowest end of the income scale (Buron et al., 2007).

PREVIOUS RESEARCH

Research consistently shows that public housing is much more likely to be located in high-poverty neighborhoods than other types of assisted housing, including voucher housing (Newman & Schnare, 1997; Oakley, 2008). Indeed, voucher housing tends to be less concentrated than public housing, primarily because of its reliance on the private market (Goetz, 2003). While voucher recipients are much less likely than public-housing residents to be located in areas with extremely high poverty, it is equally unlikely they will reside in low-poverty neighborhoods (Devine, Gray, Rubin, & Taghavi, 2003; Fischer, 2001; Goetz, 2002; Hartung & Henig, 1997; Kingsley, Johnson, & Pettit, 2003; Newman & Schnare, 1997; Pendall 2000; Wang & Varady, 2005; Wang et al., 2008).

Studies describe regional variation in neighborhood conditions of voucher housing, with tight rental markets creating obstacles to obtaining housing outside of poor neighborhoods (Marr, 2005), particularly in large metropolitan areas like Boston, Chicago, and New York (U.S. Department of Housing and Urban Development [HUD], 2001). For example, in a study of Welfare to Work recipients of Section 8 subsidies, Ong (1998) found that recipients in smaller metropolitan areas with less racial segregation, particularly in the west, were more likely to end up in less poor neighborhoods.

Tight rental markets can fail to yield acceptable housing. While failure rates across all metropolitan areas average almost 30%, in large metropolitan areas rates can exceed 50% (Grigsby & Bourassa, 2004). Often failure to obtain housing relates to HUD's limit of Fair Market Rent ceilings, not with actual market rents (Marr, 2005).

Variation in neighborhood quality is often linked to the race or ethnicity of the voucher recipient. Minority voucher recipients relocated by a Southern California housing authority were more likely to end up in higher-poverty neighborhoods than nonminority recipients (Basolo & Ngyuen, 2005). In Chicago, minority voucher holders, particularly Blacks and Hispanics, faced racial discrimination in housing searches (Popkin & Cunningham, 2000).

In contrast, Patterson et al. (2004) found that participants in the Welfare to Work Voucher Program moved to better neighborhoods with voucher subsidies. Likewise, Varady and Walker (2000) found that households relocated from four distressed developments in Baltimore, Newport News, VA, Kansas City, MO, and San Francisco resided in less impoverished neighborhoods.

Some of these successes are at least in part due to housing placement counseling. Several studies found that housing placement services for voucher holders often resulted in relocation to better neighborhoods (Goering et al., 1997; Marr, 2005; Pendall, 2000; HUD, 2001). Without special counseling, voucher households make short-distance moves, remaining in or near original neighborhoods, experiencing little neighborhood or housing improvement (Goering, Stebbins, & Siewert, 1995). However, in their study of such programs in Chicago, Cunningham and Popkin (2002) found 40% of sampled residents could not identify their relocation counseling agency, and 31% stated that they had no counseling agency. They also found overwhelming caseloads for counselors, little follow-up, and lack of targeted, intensive counseling and social services for those facing multiple problems, including little education and/or work experience, and physical and mental health issues. Similarly, Venkatesh & Celimli (2004b) found that tenants received inconsistent relocation information from such agencies resulting in premature moves that in some cases meant loss of the voucher subsidy. One outcome of inadequate relocation counseling was that more than half of program participants moved to high-poverty areas despite assistance from relocation teams (Cunningham & Sawyer, 2005).

Research on public-housing residents relocated through HOPE VI with voucher subsidies is also mixed. Case studies of specific cities demonstrate that those public-housing residents who chose to move with a voucher rather than be moved to another public-housing project live in neighborhoods

that are less poor (Buron, 2004; Clampet-Lundquist, 2004a; Goetz, 2003). National studies reveal a more nuanced picture. While many former residents were relocated to neighborhoods with lower-poverty levels, tight rental markets and racial and economic segregation left 40% living in other highly distressed neighborhoods (Popkin et al., 2004b). More than half were struggling to pay higher rent and utilities costs (Popkin et al., 2004a), and many faced problems with unreliable landlords. Despite relocation counseling, family situations, health issues, and place-dependent considerations such as proximity to kin shaped relocation preferences, possibly resulting in varying quality of destination neighborhoods (Harris & Kaye, 2004; Howell, Harris, & Popkin, 2005; Kleit & Manzo, 2006; Popkin et al., 2004a, 2004b; Smith, 2002).

Studies of residential outcomes of CHA relocatees are inconclusive. In a study of the first 1,000 families to be relocated with voucher subsidies, Fischer (2001, 2002) found destination neighborhoods were no better than neighborhoods of origin. In contrast, a 2002 Urban Institute study (Popkin et al.) found almost half reported improvements in living conditions and safer neighborhoods. Buron (2004) found destination neighborhoods were poor—just not to the extreme level of origin neighborhoods.

OVERVIEW OF CHICAGO'S PLAN FOR TRANSFORMATION

By the early 1990s the CHA, the third largest housing authority in the country, was notorious. The city had twice as many "distressed" units as other cities and the largest concentration of public housing in the United States (Hunt, 2001). Known for mismanagement and deteriorating buildings, the CHA became a symbol of failed urban policies and faced increased pressure from HUD to address this situation (Olivo, 2007a, 2007b; Wright, 2006).

In June 1995, HUD took over the "disproportionately troubled" CHA (Salama, 1999) for 4 years, charged with cleaning up and returning the CHA to local control (Bennett, Smith, & Wright, 2006). Congressional mandates attached to the Omnibus Consolidated Rescissions and Appropriations Act of 1996 obligated the CHA to perform viability assessments of approximately 18,000 public-housing units to determine if repairs were economically feasible (Bennett, Smith, & Wright, 2006). These units, deemed beyond repair, ultimately led to a plan to dramatically overhaul the CHA's housing stock.

By mid-1999 the CHA was back under local control; Mayor Daley called this "the beginning of a new era in public housing in Chicago" (Smith, 2006, p. 101). The city entered into a Memorandum of Understanding with HUD requiring a final plan to address the 18,000 housing units deemed beyond repair (Chicago Housing Authority [CHA], 2000). HOPE VI would fund CHA's Plan for Transformation to rehabilitate or reconstruct 25,000 occupied public-housing units, and to demolish 18,000 units:[3] 31% (7,697 units) of current units rehabilitated and redeveloped as mixed-income family units, 21% as family units, 38% as senior units, and the remaining 10% scattered-site units. As of 2006, 2,244 mixed-income units were redeveloped, and 8,798 senior housing units and 2,543 family-housing units rehabilitated. Once completed, the net loss of units earmarked for very low-income residents is projected to be 14,000 (Cunningham & Popkin, 2002).

Although 6,000 family households or approximately 1,200 annually were slated for voucher-subsidized private-market housing (Fischer, 2001), the actual number this includes is not clear. Ethnographic studies suggest that official data from public-housing authorities like the CHA severely underestimate the true number of public-housing residents (Venkatesh, 2002). Conservatively, based on the CHA figures, these 6,000 families may well represent 16,000 individuals (CHA, 2006).

The 2000 CHA report indicated that 88% of residents were African American. Since then the relative proportion of African-American residents to residents of other racial and ethnic

groups has remained relatively constant, although the total number of public-housing residents has decreased (CHA, 2001, 2002, 2003, 2004, 2005, 2006, 2007).

The original plan addressed public concerns about where the 6,000 families would go: "Because of the extremely high vacancy rate in the targeted properties, the number of households to be relocated is far less than the number of units to be demolished. . .The market can absorb this level of relocation activity" (CHA, 2000, p. 24). The Plan did not mention the socioeconomic characteristics of the destination neighborhoods but did include provisions for the Chicago Housing Choice Voucher Program (CHAC) to contract with community agencies to provide relocation counseling services. Every resident relocated with a voucher would be assigned a counselor to assist with the relocation process: choosing a neighborhood, finding a unit, and locating local child care, education, and employment. However, these services proved less than adequate (Cunningham & Popkin, 2002; Cunningham & Sawyer, 2005; Venkatesh & Celimli, 2004a).

Under threat of litigation from public-interest organizations, in 2001 the CHA mandated smaller caseloads, and offered agencies financial incentives to place residents in less poor neighborhoods (Cunningham & Popkin, 2002). In 2002, the CHA implemented the Gautreaux II Mobility Program to move public-housing residents to "opportunity areas" (census tracts within city limits with a poverty rate of less than 23.5% and an African-American population of less than 30%; CHA, 2003). This program, coordinated with the Leadership Council for Metropolitan Open Communities, includes extensive one-on-one relocation counseling and postmove social services. However, according to Venkatesh and Celimli (2004b), residents relocated from public housing were hesitant to move to such neighborhoods because of concerns about higher housing costs, confusion over limits on security deposit and utility assistances allowable by the CHA, and worries that they could not afford to buy food, clothing and household items at the local stores (p. 15).

As of 2005, 4,000 families were relocated to voucher housing and 15,000 public-housing units were demolished (CHA, 2005). However, Chicago's Coalition to Protect Public Housing (2006) reports that only 1,000 replacement units have been constructed. While the CHA successfully provided a substantial number of displaced public-housing residents with voucher housing, selection excluded families with outstanding utility bills or rent, large families, and those with criminal convictions. Thus, it is unclear how many displaced families left public housing without help of voucher subsidies and how many families remain and will remain in renovated public-housing units.

Return to newly constructed mix income or rehabilitated public housing is not assured for voucher households. Residents "earn" the right to return by being "lease-compliant": timely rent and utilities payment; keeping the property clean and safe; inspections by the CHA or property manager; ensuring that all children attend school; no alcohol abuse; no excessive noise or loud music; and no pets, alterations to the property, or live-in guests without written consent (CHA, 2007). Many families experience difficulty with minor lease-compliance issues; thus many of the 6,000 temporarily relocated families may not be deemed eligible to return (Cunningham & Popkin, 2002).

DATA AND METHODS

Data on public-housing relocation and existing locations were provided by the CHA, including how many public-housing residents were relocated with vouchers between 2000 and 2005, the neighborhoods to which they relocated, and locations of family and senior public-housing facilities as of 2005.[4] Data on voucher housing come from the HUD's *Picture of Subsidized Households* for the year 2000; crime-incident data comes from Chicago Police Department's

publicly available incident reports, including counts of all indexed crimes from 1998 to 2000. Socioeconomic, population, and racial composition data hail from the U.S. Census, extracted from summary files 1 and 3 for the year 2000.

Our analysis consists of two geographic levels: census tracts and community areas (CAs). Within Chicago city limits there are 865 census tracts ranging in population from 114 to 15,000 residents with an average size of 3,369. CAs are much larger, 77 of them range from 3,546 to 117,232 residents with an average size of 37,242.[5] Voucher, public housing, and census data are available at the tract level; relocation and crime data only at the CA level. (This is unfortunate, as relocation data at the census-tract level would provide us with a more robust and finely grained picture of trends concerning destination neighborhoods.) In the early to mid 20th century CAs could capture actual ecological boundaries of neighborhoods, but they have not kept pace with neighborhood changes, including gentrification. Also, their size creates the potential for measurement error.

To overcome these data limitation we begin by analyzing voucher housing at the tract level to assess the degree of spatial clustering, proximity to existing public housing, and neighborhood characteristics. Because we know that all former public-housing families in CA-level data were relocated with vouchers, tract-level analysis will shed light on the spatial constraints and neighborhood characteristics of relocation options.

To link results to the CA level, we use Geographic Information Systems (GIS) to overlay CA boundaries on the tract map of voucher spatial clusters and compute a dummy variable indicating the presence or absence of spatial clusters of voucher housing. Thus, this variable becomes a CA-level indicator of spatially concentrated voucher housing and is included in a regression analysis as one of the predictors of relocation. The dependent variable is the rate of relocation. By conducting these parallel analyses we can uncover the relationship between spatial patterns of voucher housing as it relates to rates of relocation, neighborhood characteristics, and the presence of existing public housing.

Relocation data provided by the CHA comprise the total number of families moved to each CA between 2000 and 2005. (Relocation is unavailable by individual year.) As mentioned earlier, previous studies of public housing suggested that official data from public-housing authorities like the CHA may severely underestimate the true number of public-housing residents (Shroder, 2001; Venkatesh, 2002). For example, Venkatesh's (2002) study of the Robert Taylor homes in Chicago indicated that public-housing households may include leaseholders, nonleaseholders living with leasing families, and squatters. Thus, the true number of residents may not be accurately reflected in administrative records.

We recognize potential biases and limitations inherent in relying on official data; the relocation patterns described herein are only representative of known lease-holding public-housing residents and their family members over the 5-year period. Nonetheless, our analyses are designed to address whether public-housing residents relocate into qualitatively better neighborhoods. By analyzing aggregate information on destinations we glean knowledge about locational patterns and neighborhood quality. We contend that public-housing residents included in the official data may represent the "best case scenario," and disadvantages suffered by them would be that much greater for public-housing residents not captured by official data.

Our tract-level analysis consists of two parts. First, exploratory spatial data analysis (ESDA) determines whether there is spatial clustering of voucher housing. ESDA techniques uncover global and local spatial autocorrelation (or clustering) of place characteristics such as voucher housing over a given area (Baller, Anselin, Messner, Deane, & Hawkins, 2001). Spatial autocorrelation exists when the value of a variable is statistically associated with its values in neighboring areas (Kamber, Mollenkopf, & Ross, 1999). This phenomenon follows Tobler's "First Law of Geography": Everything is related to everything else, but near places are more related than far places (Tobler, 1970).

Anselin (1995) extended this work to a class of "local indicators of spatial association" that consider not only unusually high or low values of a given characteristic in a single place (such as a census tract) but also its values in nearby places. The local indicator of spatial association we use here is the Local Moran's I statistic, related to Moran's I (Moran, 1950), a test for global spatial association. The Local Moran statistic decomposes Moran's I into contributions for each location, I_i. The sum of I_i for all observations is proportional to Moran's I (Anselin & Rey, 1991). Thus, there can be two interpretations of the Local Moran statistic, as an indicator of spatial clustering or as a diagnostic for outliers in global spatial patterns. We use this statistic to identify local spatial clusters of voucher housing.

Statistically significant Local Moran values indicate unusually high or low clusters of voucher housing. Measured this way, a *cluster* is made up of a single focal census tract along with all tracts that surround and share a boundary with it (Logan, Alba, & Zhang, 2002). In fact, most clusters are not isolated, but extend continuously over areas containing many tracts. There are four categories of statistically significant Local Moran's I values: (a) high–high indicating a concentration of voucher housing in contiguous census tracts compared to other areas in the city; (b) low–low indicating clusters of very low concentration of voucher housing; (c) low–high indicating that a tract with low concentration is surrounded by high concentration tracts; and (d) high–low indicating that adjoining tracts with high voucher-housing concentration surround a tract with a low concentration.

This analysis will focus on clusters of tracts with high–high values, which indicate spatial clustering, as well as tracts with low–low values, where tracts with little voucher housing tend to be surrounded by tracts with similar housing characteristics. To assess neighborhood quality of clusters, we look at a series of socioeconomic and population characteristics and presence of existing public-housing projects. If high–high clusters have more disadvantaged characteristics than low–low clusters, this suggests that voucher housing tends to be located in poorer places. If no spatial clusters are revealed, locations of voucher housing do not follow any type of nonrandom spatial pattern and therefore are not spatially associated with one another.

The second part of the tract-level analysis consists of two ordinary least square (OLS) regression models. The first model predicts the presence of voucher housing units with a series of neighborhood and housing characteristics. The second model includes the same predictors and a spatial lag term of the dependent variable to assess whether the presence of voucher housing units in a tract is a predictor of voucher housing units in nearby tracts. The dependent variable is again the percentage of voucher housing units among all private rental units in the census tract.

The spatial lag term is constructed as the averages of the neighboring values of a given variable—in this case the percentage of voucher housing. The value of each neighboring location is multiplied by a spatial weight, with nonzero values for neighboring observations and zero for others; the products are summed (Messner et al., 1999). A spatial-weights matrix can be constructed based on contiguity from polygon boundary files, or calculated from the distance between points. In this case, a matrix based on contiguity is used because the focus is on investigating the possible diffusion of voucher housing to adjacent areas causing spatial clustering. If the spatial lag term is statistically significant and positive it is suggestive of spatial dependence— voucher housing units in one place predict an increased likelihood of voucher housing units in neighboring places. The implication of such a finding would be that there are spatial constraints on where relocated families can move.

Following prior urban neighborhood research and theory, our independent variables include three neighborhood structural characteristics, calculated as scales using data from the 2000 Census: (a) concentrated disadvantage; (b) residential instability; and (c) immigrant concentration (Morenoff et al., 2001; Sampson, Raudenbush, & Earls, 1997). These scales were constructed as the average of their standardized scores.[6]

Concentrated disadvantage includes the percentages of families in poverty, families receiving public assistance, unemployed individuals, female-headed families with children, and residents who are Black, with higher values indicating more disadvantage. This scale derives from William J. Wilson's *The Truly Disadvantaged* (1987), representing urban neighborhoods facing multiple disadvantages beyond poverty, including racial and economic segregation, unemployment, and family disruption (Ricketts & Sawhill, 1988; Sampson & Wilson, 1995). Though including a variable representing racial composition in this disadvantage scale potentially confounds the effects of disadvantage and race on the dependent variable, theoretically and methodologically this decision makes sense, both to capture the concentration of African Americans in poor neighborhoods in Chicago, and to avoid potential problems with multicollinearity in our model.

We include two other commonly used scales to represent neighborhood structural characteristics (Sampson et al., 1997). *Residential instability* includes the percentage of residents 5 years or older who did not live in the same house 5 years earlier, and the percentage of homes that are renter-occupied. *Immigrant concentration* includes the percentage of Latino and foreign-born residents. Prior research indicated that high levels of residential instability and the presence of immigrant groups reflecting ethnic and linguistic diversity can disrupt valuable local social ties.

Last, we include two dummy variables representing the presence of senior and family public housing. We distinguish between senior and family public housing because historically it is the family projects that have been associated with severe disadvantage, crime, and general distress (Massey & Kanaiaupuni, 1993). In addition, the primary focus of the CHA's *Plan for Transformation* has been family public housing (CHA, 2005). If the presence of family public housing is a positive and significant predictor of voucher housing, this could indicate that the Plan for Transformation has not been very effective at deconcentrating poverty.

Our CA-level analysis utilizes negative binomial regression modeling. The outcome of interest is the *rate* of relocation for each CA. Since our relocation variable is relatively small, representing a total of 3,838 public-housing families successfully relocated with vouchers between 2000 and 2005, we compute a rate per thousand. Although this pooled variable does not allow for an exploration of changes in relocation patterns over time, it does allow us to explore potential predictors of relocation, and whether specific CAs received a disproportionate share of relocatees.

The standard approach for analyzing per capita rates of events is to compute the rate for each aggregate unit, in this case CA, and to use these rates as the dependent variable in an OLS regression analysis. This strategy is problematic because, for many of the CAs, the number of relocated public-housing tenants is very low relative to population size, resulting in a highly skewed and discrete distribution. An acceptable solution is to use a Poisson-based regression model instead of OLS.

Although Poisson regression models typically predict counts of events rather than rates, we follow Osgood's (2000) recommendation to add the natural logarithm of population size of each CA to our model as an offset variable, giving that variable a fixed coefficient of one. Accordingly, our analysis now becomes "an analysis of rates of events per capita, rather than an analysis of counts of events" (Osgood, 2000, p. 27).

Because basic Poisson regression models assume that all of the meaningful variation in the dependent variable is accounted for by the set of explanatory variables in the model, we use the negative binomial variant of the Poisson regression. This model allows for overdispersion, a situation in which the variance of the dependent variable exceeds the mean, by including a residual (i.e., unexplained) variance parameter. We compared a basic Poisson model with the negative binomial variant and achieved a likelihood-ratio test value of 329.89 ($p < 0.001$). This test statistic is treated conservatively with an approximate chi-squared distribution with 1 degree of freedom. Thus, it is highly significant at the $p < 0.001$ level, and the null hypothesis of alpha = 0 is rejected, indicating statistically significant evidence of overdispersion. Thus, the data are

more consistent with the negative binomial model than the basic Poisson model because, on average, differences between fitted and observed relocation rates are larger than those specified by the Poisson distribution.

We estimate two negative binomial models: one including a dummy variable for the presence of high–high voucher housing clusters; the other a dummy variable for the presence of low–low voucher housing clusters. If the coefficient for the high–high dummy is positive and significant this would suggest that relocation options are spatially constrained. Similarly, if the coefficient for the low–low dummy is negative and significant, we can conclude that families are not typically ending up in areas with low amounts of voucher housing, which could indicate that counseling provided by the CHA is not directing families to these areas.[7] Other socioeconomic and population variables included in these models are the same as the tract-level analysis, but aggregated or recomputed at the CA-level. The variables for existing senior and family public housing are dummy computations indicating presence or absence (1, 0) at the CA level.

FINDINGS

Tract-Level Analysis

We examine spatial patterns of voucher housing at the tract level. Figure 1 shows the percentage of rental units receiving voucher subsidies. Higher percentages appear to concentrate on the far west and south sides of the city. According to 2000 census data both areas have high poverty
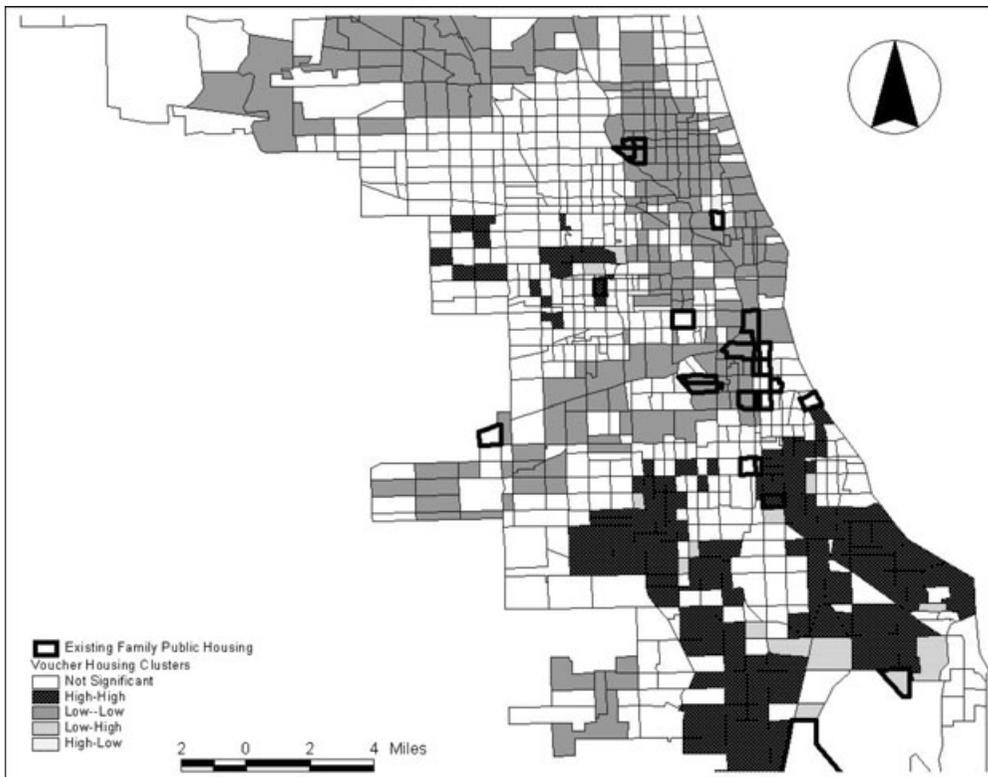

FIGURE 1

Percent Housing Choice Voucher Units—2000

FIGURE 2

Spatial Patterns of Housing Choice Voucher Units—2000

rates and are largely Black or Hispanic. Figure 2 shows the Local Moran's I statistic for percent voucher housing. Census tracts outlined in black indicate the presence of existing family public housing. High–high clusters are evident in the far south and to a lesser extent in the far west, while low–low clusters are visible in the near south and west sides; as well as the near and far north sides of the city. These spatial-clustering patterns indicate that higher percentages of voucher housing tend to be in close proximity to other areas with higher percentages. Similarly, lower percentages of voucher housing are in close proximity to areas with lower percentages. Thus, voucher housing is not evenly distributed throughout the city. In addition, the low–low clusters appear to overlap with the presence of family public housing, not the high–high ones, suggesting that spatial clustering of voucher housing is not related to the location of existing public housing.

Table 1 shows the average neighborhood characteristics of high–high voucher housing clusters. On average over half the units are rental and of these 12% are voucher housing. Comparatively, many census tracts have no voucher housing, with the average per tract is 4.2%. The results also show relatively high levels of disadvantage represented by an average poverty rate of 35%, unemployment at 19%, and public assistance at 27%. Similarly, female-headed households are overrepresented at 61%. Blacks are also disproportionate at 93%. At the same time the representation of Hispanics (3.9%) and foreign born (2.9%) is low. These findings suggest that areas with high spatial clustering of voucher housing represent urban neighborhoods facing multiple disadvantages including racial and economic segregation.

TABLE 1

Average Neighborhood Characteristics of High–High Voucher Housing Clusters—2000

Variable	Mean	SD
Total population	3730.00	2,488.00
% Poverty	35.10	12.46
% Unemployment	19.00	7.48
% Public assistance	27.15	12.07
% Female headed	60.80	12.51
% Black	93.31	12.77
% Hispanic	3.91	10.32
% Foreign born	2.86	4.90
% Residential mobility	36.10	11.00
% Renter	56.11	23.71
% Voucher units	12.00	5.51

$N = 132$.

TABLE 2

Average Neighborhood Characteristics of Low–Low Voucher Housing Clusters—2000

Variable	Mean	SD
Total population	3,059.00	2,268.00
% Poverty	14.00	14.28
% Unemployment	7.51	8.94
% Public assistance	9.36	13.54
% Female headed	23.01	19.81
% Black	11.55	23.80
% Hispanic	20.82	23.36
% Foreign born	21.10	15.43
% Residential mobility	52.69	17.71
% Renter	55.28	23.41
% Voucher units	0.38	0.67

$N = 224$.

Table 2 shows the average neighborhood characteristics of low–low voucher housing clusters. The average presence of voucher units is only 0.38% even though 55% of the total housing stock is rental. Although residential mobility is almost 20% greater than in the high–high cluster neighborhoods, average neighborhood characteristics indicate relatively low levels of disadvantage with poverty at 14%; unemployment at 7.5% and public assistance at 9.4%. On average female-headed households represent 23% of all households—almost three times smaller than the high–high clusters. Blacks are underrepresented at 11.5% while Hispanics and foreign-born residents show a substantial presence (at 20.8% and 21.10%, respectively). In contrast to the high–high cluster neighborhoods, characteristics of the low–low cluster neighborhoods are not representative of multiple levels of disadvantage. Taken together, this suggests that voucher housing tends to be clustered in poor Black neighborhoods.

Table 3 shows the results of the tract-level regression models. The dependent variable is the percentage of voucher housing. Correlations, means, and standard deviations can be found in Appendix A. The first OLS model has no spatial term. The adjusted R^2 value of 0.361 indicates an adequate fit. Increased levels of disadvantage are significantly associated with increased levels of voucher housing. Concurrently, presence of family public housing is negatively associated with

TABLE 3

Tract-Level Spatial Regression Results

	OLS Model Coefficient (Std. Error)	Spatial Lag Model Coefficient (Std. Error)
Disadvantage	2.94***	1.57***
	(0.209)	(0.931)
Residential instability	0.04**	0.018*
	(0.011)	(0.008)
Immigrant concentration	−1.02***	−0.52***
	(0.181)	(0.156)
Population size	0.697***	0.440***
	(0.137)	(0.115)
Presence of senior public housing	−1.04	−0.552
	(0.756)	(0.637)
Presence of family public housing	−7.16***	−5.01***
	(1.09)	(0.929)
Spatial lag		0.532***
		(0.034)
Intercept	−3.21**	−2.39**
	(1.10)	(0.931)
Adjusted R^2	0.361	0.547
N	865	865

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

voucher housing, suggesting that an increased percentage of voucher housing is not associated with the location of existing public housing. Immigrant concentration is negatively associated with voucher housing. Last, residential instability is positively associated with increased levels of voucher housing, but the coefficient is very small (0.04).

The second model includes a spatial lag of the dependent variable to examine whether the presence of voucher housing is a predictor of voucher housing nearby. Interestingly, the adjusted R^2 value of 0.547 indicates a better model fit than the first model. However, overall the findings are similar: disadvantage continues to be a very strong predictor, while the presence of family public housing is strongly but negatively associated with voucher housing. Immigrant concentration is negatively associated with voucher housing and residential instability is positively associated, but as with the first model, that coefficient is very small. Most telling is the spatially lagged term, which is significantly and positively associated with increases in voucher housing, indicating that voucher housing is a strong predictor of nearby voucher housing.

In summary these findings suggest three important trends: (a) disadvantage is a strong and positive predictor of voucher housing; (b) the presence of voucher housing in one census tract substantially increases the likelihood that voucher housing will be located nearby; and (c) the presence of existing family public housing is negatively associated with voucher housing, suggesting that these two forms of assisted housing tend not to be located in close geographic proximity. Taken together these trends have implications for public-housing relocation options, particularly concerning the socioeconomic status of destination neighborhoods.

Community Area-Level Analysis

We turn now to the CA-level analysis to assess whether spatial patterns of voucher housing revealed in the tract-level analysis influence where public-housing relocatees live. Our CA models
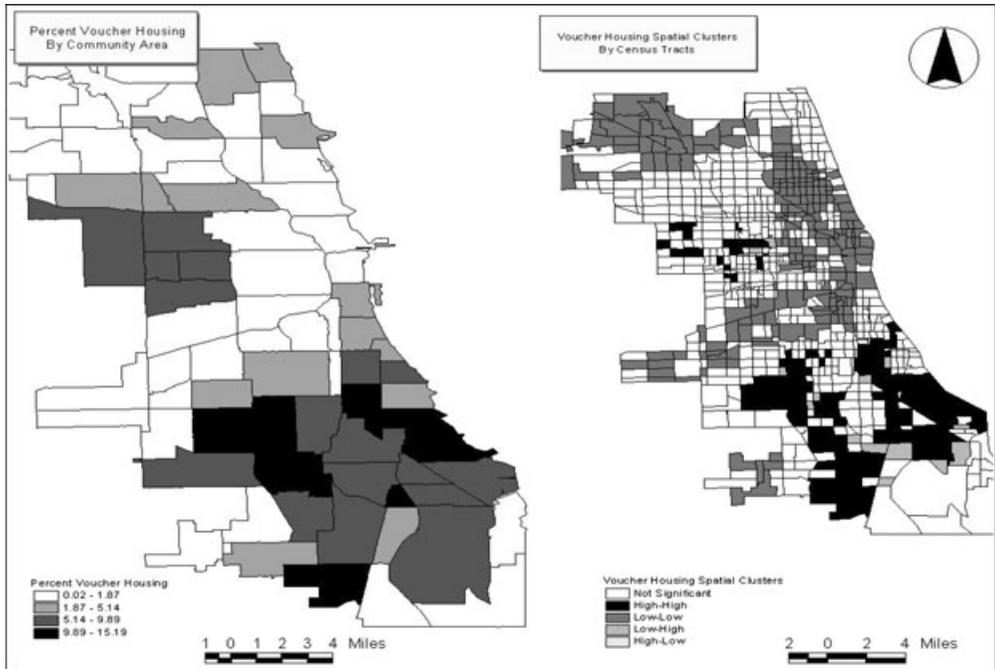
FIGURE 3

Percent Voucher Housing at the Community Area Level Compared to Tract-Level Spatial Clusters

predict the rate (per 1,000) of former residents' relocation. We include the same explanatory variables as our tract-level models, and the 3-year averages (1998–2000) of violent and property crimes by CA. In addition, we include a variable representing the natural log of CA population, with a fixed coefficient of one; the coefficients produced by each model reflect changes in the *rate* of relocation associated with changes in the levels of the explanatory variables.

To link the CA-level analysis to the tract-level analysis we include explanatory variables indicating the presence or absence of voucher housing spatial clusters. Each CA in which a spatial cluster is located is coded as 1, others as 0. We computed dummy variables for the high–high and low–low spatial clusters and estimate two models: one with the high–high and one with the low–low dummy variable. Appendix B includes a map illustrating the overlay of the CA boundaries on the tract-level clusters.

Figure 3 shows the percentage of voucher housing by CA compared to the location of the tract-level voucher clusters. The locational patterns of voucher housing at both levels show the same general patterns, with voucher housing more likely to be located in the far south and west sides of the city.

Table 4 shows the results of the first negative binomial-regression model. Correlations, means, and standard deviations are in Appendix A. The model chi-square test of 120.48, $p < 0.001$, indicates that the set of predictor variables is statistically significant. Results indicate that disadvantage is associated with higher rates of former public-housing residents' relocation. Specifically, a one standard deviation increase in the level of concentrated disadvantage in a given CA corresponds with more than 200% increase in the rate of relocation into that CA.[8] Thus, former public-housing residents are very likely to relocate into highly disadvantaged CAs. Results also show that the presence of high–high voucher spatial clusters is strongly associated with higher relocation rates,

TABLE 4

Negative Binomial Regression Model Predicting Relocation with High–High Voucher Clusters by Community Area[a]

	Coefficient (Std. Error)
Disadvantage	1.23***
	(0.204)
Residential instability	0.429
	(0.345)
Immigrant concentration	0.114
	(0.126)
Violent crime average 1998–2000	−0.000
	(0.000)
Property crime average 1998–2000	0.000
	(0.000)
Presence of high–high voucher clusters	1.02***
	(0.238)
Presence of senior public housing	−0.230
	(0.183)
Presence of family public housing	0.047
	(0.208)
Intercept	−7.47***
	(0.188)
Natural log of population	1.00
Model χ^2	120.48***
Likelihood ratio test of alpha = 0[b]	329.89***

[a]Entries are unstandardized coefficients.
[b]Overdispersion parameter. Significant value indicates data overdispersed and negative binomial model is appropriate.
$N = 76$.
***$p < 0.001$.

suggesting that relocated public-housing residents are more likely to move where voucher housing is spatially concentrated.

Interestingly, there is no significant relationship between either violent crime or property crime in a CA and its relocation rate. While results suggest that the immigrant concentration of a CA is associated with an increase in the rate of relocation, the effect is not significant. The relationship between residential instability and relocation rate was also not significant. Unlike the tract-level analysis, the effect of the presence of family public housing on relocation rate was not significant, although the coefficient is in the positive direction. The presence of senior public housing shows a negative effect, but this coefficient is also not significant.

Table 5 show the negative binomial-regression model results, including low–low spatial clusters of voucher housing as one of the explanatory variables. The model chi-square test of 120.64, $p < 0.001$ indicates a statistically significant set of predictor variables. Though the values of the coefficients vary somewhat, the results are very similar to the first model with the exception of the low–low spatial-cluster dummy variable. While results indicate that increased levels of disadvantage are associated with higher rates of former public-housing residents' relocation, the presence of low–low voucher clusters indicates the opposite effect. In other words, the spatial clustering of low percentages of voucher housing predicts lower levels of relocation. This finding reinforces the trends shown in the first model: relocated public-housing residents are far more likely to end up in highly disadvantaged neighborhoods where voucher housing is spatially concentrated.

TABLE 5

Negative Binomial Regression Model Predicting Relocation with Low–Low Voucher Clusters by Community Area[a]

	Coefficient (Std. Error)
Disadvantage index	1.31***
	(0.213)
Residential instability	0.587
	(0.377)
Immigrant concentration	−0.002
	(0.121)
Violent crime average 1998–2000	−0.001
	(0.000)
Property crime average 1998–2000	0.000
	(0.000)
Presence of low–low voucher clusters	−0.831***
	(0.196)
Presence of senior public housing	−0.161
	(0.199)
Presence of family public housing	−0.161
	(0.208)
Intercept	−6.71***
	(0.168)
Natural log of population	1.00
Model χ^2	120.64***
Likelihood ratio test of alpha = 0[b]	691.18***

[a]Entries are unstandardized coefficients.
[b]Overdispersion parameter. Significant value indicates data overdispersed and negative binomial model is appropriate.
$N = 76$.
***$p < 0.001$.

DISCUSSION

Results show that voucher housing tends to be spatially clustered in disadvantaged neighborhoods; there is a clear link between these spatial trends and where relocated public-housing families are likely to move. Indeed, relocated families are not distributed throughout the City of Chicago, but instead are concentrated in poor Black neighborhoods on the south and west sides of the city. Whether these destination neighborhoods are better or worse than the neighborhoods of origin cannot be determined with the present analysis because many of the buildings in which these families resided have since been demolished. However, given previous research on the neighborhood conditions of public-housing projects, it is likely that these families are making a "lateral" move—going from one highly disadvantaged neighborhood to another. Interestingly, no significant relationship was found between either violent or property crime and higher relocation. This could suggest that former public-housing residents are moving to areas with less crime or areas with no more or less crime than their origin neighborhoods. But, because we do not have information on the crime levels of the origin neighborhoods we cannot confirm either scenario—only that relocation is not associated with property or violent crime rates.

In addition, our descriptive analysis indicates that the racial composition of the destination neighborhoods is predominately Black, which could suggest mechanisms of structural spatial constraints at least indirectly linked to Chicago's long legacy of racial and economic segregation.

Another possible interpretation is that relocated public-housing residents, who are majority Black, are moving to Black neighborhoods because they feel more comfortable there. While there is some evidence to support this latter interpretation (Venkatesh & Celimli, 2004a), one cannot ignore the fact that these neighborhoods also have the largest share of voucher housing.

Our analysis also found a significant but negative relationship between the location of existing family public-housing projects and that of voucher housing at the tract level, and no significant relationship between existing public housing and relocation rates at the CA level. Although our data do not include any information on the original neighborhoods of relocated families, the fact that existing family public housing is not positively associated with relocatees' destination neighborhoods is suggestive of two trends: (a) relocated families do not necessarily remain in or near their original neighborhoods; and (b) these two types of assisted housing are not necessarily located in the same neighborhoods, perhaps because one depends primarily on government decisions and the other on the private rental market.

CONCLUSION

While the HOPE VI initiative aims to transform the physical and social shape of public housing to reduce the negative effects of concentrated poverty, it requires the demolition of existing public housing and the relocation—at least temporarily—of many current public-housing residents with private-market subsidies for rental housing (Clampet-Lundquist, 2004a; Kleit & Manzo, 2006).

However, because there is no one-for-one replacement requirement, only a portion of demolished units are earmarked for low-income replacement units with the rest defined as either affordable or market-rate housing, both beyond the economic means of former public-housing tenants. While the HOPE VI programs refer to replacement developments as mixed-income housing that seeks to avoid reconcentrating poverty, the reality is that *because* of the mixed-income design, most relocated residents cannot move back. Therefore, neighborhood characteristics where relocated residents live become an important indicator of the overall success or failure of this policy initiative.

This study ultimately sought to examine socioeconomic characteristics of the destination neighborhoods of public-housing families relocated through the HOPE VI initiative in Chicago. We first examined the spatial patterns of voucher housing at the census-tract level and found significant spatial clustering, particularly in disadvantaged, predominately Black neighborhoods. We then assessed how relocation patterns related to the locational patterns of voucher housing and found that former public-housing families relocated with vouchers are most likely to settle in highly disadvantaged neighborhoods where spatial clustering of voucher housing is present.

In fact our findings suggest that the prospects of escaping high-poverty neighborhoods through relocation are very slim. Even if conditions are improved through demolition of public housing and its replacement with mixed-income housing in the original neighborhoods, these benefits are not attainable for the majority of former public-housing families relocated with housing vouchers. Our findings suggest that the primary consequence is that many relocated families will remain in highly disadvantaged neighborhoods, just not in public-housing facilities. Thus, policy and advocacy concerns about the quality of the housing and neighborhoods in which relocated families settle have merit.

Overall, policy implications of our findings shed a dim light on the HOPE VI initiatives in terms of relocation in the City of Chicago. Obviously additional studies of this nature would help

ascertain whether the trends are as evident in other cities with HOPE VI programs. Nevertheless, our findings do raise questions about the intent of housing revitalization programs like HOPE VI: Does this policy actually depend at least partly on simply moving out most of the very poor residents to achieve successful revitalization in origin neighborhoods while implicitly knowing that only a small portion of the original public-housing residents will decide and/or qualify to move back? Is the entire objective to create "less poor" original neighborhoods without systematically taking into account the neighborhood quality of *where* relocated public-housing families live?

In other words, questions linger as to whether relocation is an integral part of the HOPE VI program's objective of providing safe, affordable housing for former public-housing residents. Our findings suggest that the ultimate consequences of *where* the relocated residents move is not; which means that this policy, like previous federally sponsored low-income housing policies, has *not* succeeded in the goal of providing decent housing in a suitable living environment for all U.S. citizens, as the 1949 Housing Act specified (Newman & Schnare, 1997, p. 1). Clearly as more public-housing residents continue to be moved out, and more HOPE VI developments continue to be completed, further research can verify whether the conclusions of our research are borne out.

APPENDIX A
Correlations and Descriptive Statistics

TABLE A1

Tract-Level Correlations and Descriptive Statistics

Variable	1	2	3	4	5	6	Mean	SD
1. Percent voucher housing	1						4.183	5.387
2. Disadvantage	0.523	1					0.000	0.865
3. Residential instability	−0.167	0.118	1				−0.021	0.807
4. Immigrant concentration	−0.379	−0.473	0.063	1			0.000	0.938
5. Population size	−0.009	−0.206	−0.113	0.258	1		3,369.831	2,607.151
6. Presence of senior public housing	−0.010	0.056	0.092	−0.043	0.036	1	0.055	0.285
7. Presence of family public housing	−0.055	0.216	0.042	−0.077	−0.021	0.125	0.023	0.157

$N = 865$.

TABLE A2

Community Area-Level Correlations and Descriptive Statistics

Variable	1	2	3	4	5	6	7	8	9	Mean	SD
1. Disadvantage	1									0.000	0.929
2. Residential instability	0.758	1								0.000	0.379
3. Immigrant concentration	−0.474	−0.449	1							0.000	0.937
4. Violent crime average 1998–2000	0.587	0.409	−0.231	1						674.724	639.964
5. Property crime average 1998–2000	0.130	−0.105	−0.069	0.724	1					1,816.811	1,419.056
6. Presence of high–high voucher clusters	0.616	0.559	−0.503	0.476	0.109	1				0.395	0.492
7. Presence of low–low voucher clusters	−0.493	−0.372	0.252	−0.329	−0.047	−0.599	1			0.434	0.499
8. Presence of senior public housing	0.360	0.227	−0.101	0.392	0.407	0.020	0.113	1		0.421	0.497
9. Presence of family public housing	0.395	0.237	−0.280	0.119	0.116	−0.027	0.033	0.453	1	0.316	0.468
10. Population size (log)	−0.172	−0.195	0.314	0.541	0.675	−0.014	0.072	0.170	−0.214	4.466	0.331

N = 76.

APPENDIX B
Overlay of Community Area Boundaries on Voucher Clusters

CA Boundaries
Clustering of Voucher Housing
Non-significant
High-High
Low-Low
Low-High
High-Low

3   0   3   6 Miles
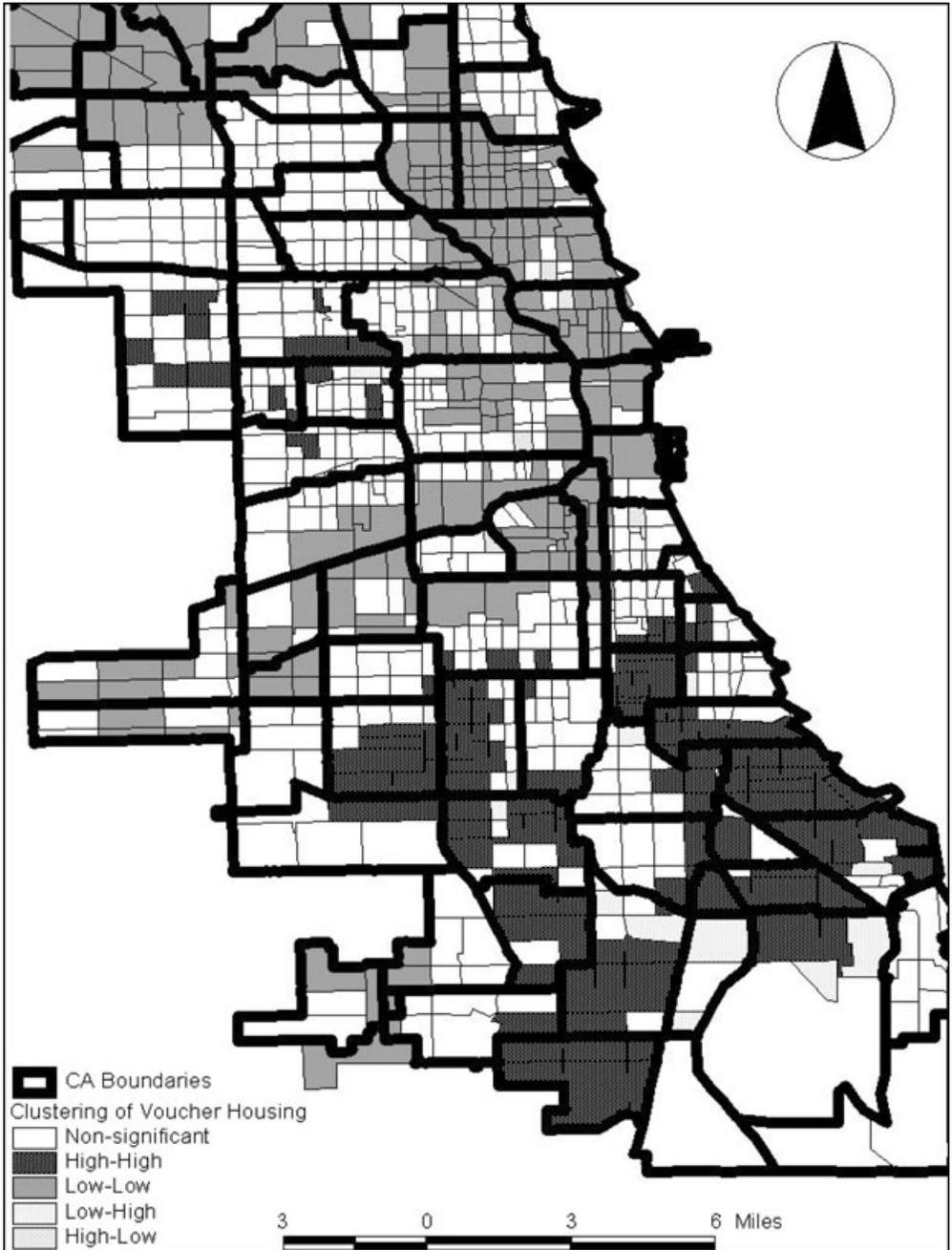
ENDNOTES

1 Concentrated poverty areas are neighborhoods where more than 40% of residents live below federally established poverty levels (Danziger & Gottschalk, 1987). Galster (2005) and Kingsley and Petit (2003) argued that even 20% of the population living in poverty yields similar negative consequences.

2 Severely distressed refers to dilapidated, often largely vacant buildings that show the effects of poor construction, managerial neglect, inadequate maintenance, and rampant vandalism (Turner, Popkin, Kingsley, & Kaye, 2005). These developments typically have huge backlogs of repairs that create a poor and unsafe living environment for residents: nonworking elevators, leaky pipes, old electric wiring, unstable walls, and pest infestations (Turner et al., 2005). HOPE VI legislation did not codify this definition as a program requirement (National Housing Law Project, 2002).

3 The total number of existing units at the time was 38,776.

4 We were unable to obtain reliable information on those public housing projects that have been demolished since 2000.

5 In the late 1920s, sociologists at the University of Chicago delineated 75 CAs, which roughly corresponded to city neighborhoods at the time (Chicago Historical Society, 2005). Another CA was added in the 1950s with the annexation of the O'Hare airport location and in the 1980s Edgewater/Uptown was split into two CAs. The Chicago Police Department and the CHA continue to use the CA to report and analyze various trends in crime and housing. We exclude the O'Hare CA because public-housing relocation data are not available for that CA.

6 Factor-weighted scores yielded the same results.

7 The CHA has approximately 26,000 voucher subsidies available each year (Cunningham & Popkin, 2002). Thus, the total number of relocated families represents just over 15% of annual vouchers, and if we divide our data set by the years it includes, the percentage of annual vouchers is less than 3%. Therefore, relocation counseling services would not be overwhelmed by the public-housing families needing relocation.

8 Parameters in these models estimate the impact of a variable on the log rate of relocation. To obtain the estimated percentage change in the relocation rate associated with a one unit change in a given independent variable, we exponentiate the coefficients, subtract one and multiply the result by 100 (i.e., $(100 \times [e^{\beta} - 1])$. Because the disadvantage scale is a standardized variable, its coefficient of 1.23 was multiplied by its standard deviation of 0.92, resulting in 1.13. This number was then exponentiated to 3.093, and $(100 \times (3.093 - 1)$ equals 209%, thus the 200% increase figure.

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