SPATIAL AND TEMPORAL CONTEXTS OF NEIGHBORHOOD ENVIRONMENTS IN METROPOLITAN CHICAGO

by

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To Erica, with much love

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

In recent decades, there has been an expansion of interest in the effect of neighborhoods on individual well-being (Leventhal and Brooks-Gunn 2000; Sampson, Morenoff, and Gannon-Rowley 2002; Entwisle 2007). Although the tradition of studying individuals in their neighborhoods to understand the relationship between individuals and their social worlds dates back to the "human ecological" studies of the Chicago School, renewed interest in the area was sparked by Wilson's (Wilson 1980, 1987, 1996) work investigating the plight of the "urban underclass." The unemployment created by the decentralization of American manufacturing in post-war America and the expansion of suburban opportunities for the middle-class—particularly the black middle-class—spatially concentrated poverty in urban neighborhoods. As the metropolitan social landscape was changing, Wilson argued, the declining neighborhoods in which the poor were caught were inhibiting their ability to escape poverty and its consequences even beyond a resident's own personal capacity to do so.

In the decades following Wilson's original formulation of this theory, numerous theoretical advancements have supported and extended this work. For example, neighborhood conditions have been shown to affect the size of residents' social networks (Rankin and Quane 2000; Small 2007), their ability to exert social control to limit crime and other neighborhood threats (Sampson, Raudenbush, and Earls 1997), and have, more recently, been shown to affect resident's health (Morenoff 2003; Diez Roux 2002; Robert 1999). Methodological advances such as the expansion and adaptation of multilevel modeling techniques (Raudenbush and Sampson 1999; Raudenbush and Bryk 2002), the use of geographic information systems to collect and analyze spatially indexed data (Downey 2006; Cummins et al. 2005; Powell et al. 2007), and the improvement of systematic social observation techniques to collect independent data on neighborhood physical and social context (Sampson and Raudenbush 1999; Reiss 1971; Perkins and Ralph Taylor 1996) have facilitated the development of these theories.

One of the structural underpinnings of the process of neighborhood change is the continued racial segregation of American metropolitan areas. Massey and Denton (1993; Massey 1990) criticized Wilson for failing to really account for the continued role of racial segregation in shaping metropolitan opportunities. They showed that the continued patterns of racial segregation helped exacerbate the problems of structural disinvestment and deindustrialization for the poorest urban blacks while limiting the mobility and gains that blacks – including the black middle-class – could make through the housing market (Oliver and Shapiro 1995; Flippen 2001). Through this criticism, Massey and Denton highlighted the fact that Wilson seemed to take racial segregation for granted in much of his work; instead, they argued, that absent racial segregation, there would still be poverty, but it would not have been as debilitating or concentrated to such a degree in a single segment in the population.

With respect to the structural barriers of race, the two sides of the debate reflected two different lines of thought that stemmed from the Civil Rights Movement. On the one hand, Wilson (1980) saw the promise of new opportunities and the possibility for blacks to overcome the discrimination and subjugation that they had faced *solely* for the color of their skin. He acknowledged that even the black middle-class faced discrimination and started out with fewer opportunities than their white counter-parts; but he saw that many blacks were well-positioned to take advantage of the Civil Rights legacy and that race would become less significant in defining their life chances. On the other hand, Massey and Denton (1993) saw the durable legacy of historical subjugation and, given its enduring form, particularly through the segregation of blacks from the opportunities whites are privileged to receive, race at all levels was going to continue to matter into the foreseeable future.

It is in this debate that the studies included in this dissertation are situated and on which I hope that they build. Since they first articulated this debate, more changes have been reshaping the social landscape of American metropolitan areas including the increasing diversity of many cities through the immigration of especially (but not solely) Latinos and Asians, the substantial rise of gentrification, and the thawing of racial attitudes and beliefs among whites. Studying how these changes influence the lives of individuals as well as what implications they hold for the theories about the structural conditions in American metropolitan areas requires that research focuses on these changes at the neighborhood level.

Yet, even despite Wilson's focus on *changes* in the neighborhood conditions of the urban poor, with few exceptions (Morenoff and Sampson 1997; Morenoff and Tienda 1997; Anderson 1990), studies have focused on existing neighborhood conditions rather than the effect that changes in neighborhood conditions have on residents. Moreover, even Wilson tended to focus on a single form of neighborhood change—the spatial concentration of urban poverty—even though other major social changes have been changing the social landscape of American cities. Meanwhile, it is difficult to discern what the increasingly diverse and multiethnic populations of American metropolitan areas would have on Massey and Denton's theories regarding the importance of racial segregation. Furthermore, emergent types of neighborhood change – immigration and gentrification in particular – offer the possibility that some of the stability of racial segregation might be undermined.

The chapters included here take their cue from the Chicago School of the past and use the Chicago metropolitan area as a laboratory to study a few of these processes and to discern what they could mean for our future understanding of the influence of neighborhood conditions and residential change on metropolitan populations. Chapter 2 examines patterns of change in the racial and ethnic composition of metropolitan Chicago neighborhoods from 1970 to 2000. The changing patterns of neighborhood racial and ethnic composition present an interesting complexity of relationships among and between the neighborhoods where whites, blacks, and

Latinos live. More than focusing on the overall distributions of people across the three racial categories, I also trace the patterns of neighborhood change across each decennial in order to decompose the overall trajectories to develop a more complete picture of how the changing distributions come about.

While Chapter 2 focuses on the past patterns of change, Chapter 3 investigates the potential for future change in redeveloping Chicago neighborhoods. As gentrification and redevelopment continue to dramatically change many American cities, little is known about the residential preferences for living in redeveloped neighborhoods beyond those if residents who already live in one. Chapter 3 begins to fill this void by investigating who would consider moving to a redeveloped neighborhood based on a sample of residents who live in Chicago and its surrounding suburbs. Results show different patterns for homeowners compared to renters. Chicago homeowners are more likely to consider moving to a redeveloped neighborhood than suburban owners; however, the reasons for doing so are different for whites, blacks, and Latinos. Among renters, racial differences are more pronounced than city/suburban residence. I find some support for theories of gentrification that argue that residential preferences for redeveloping neighborhoods are a cultural field of distinction but that focusing exclusively on cultural distinction can hide other important dimensions of preferences, in particular individual race and homeownership status. While some argue that redevelopment could reduce economic and racial segregation of rustbelt cities, I find this to be unlikely.

In Chapter 4, I shift the context in which neighborhoods are understood from a temporal to a spatial framework. In this chapter, I discuss the possibility that many aspects of the neighborhood environment are best characterized by thinking of residential environments as a smooth surface over which the attribute varies rather than a patchwork of discrete independent units defined as neighborhoods, usually based on administrative boundaries such as census tracts. I demonstrate how the geostatistical method of kriging can be adapted from environmental science be used with data from a systematic social observation of Chicago neighborhoods to develop accurate small-scale measures of physical disorder. I then explore the spatial scales at which a residents' fear to walk alone at night in their neighborhood is influenced by physical disorder, using the measures I develop.

CHAPTER 2

TRAJECTORIES OF CHANGE FOR NEIGHBORHOOD RACIAL AND ETHNIC COMPOSITION IN METROPOLITAN CHICAGO, 1970-2000

The persistent racial residential segregation that remains prevalent in most American metropolitan areas continues to have negative consequences on minorities' opportunities and recalls a legacy of overt racism that was deeply damaging to American ideals of justice and equality (Massey and Denton 1993). The segregation of American metropolitan neighborhoods by race is one of the institutional mechanisms through which racial disparities are perpetuated (Massey and Mullan 1984). Segregation has, for example, been linked to poorer health outcomes (Grady 2006; Acevedo-Garcia et al. 2003; Collins and Williams 1999), less financial security (Massey 1990; Flippen 2004), and a greater exposure to crime and disorder among minority residents (Pattillo-McCoy 1999; Adelman 2004), although the negative effects of segregation differ by race and ethnicity (Klinenberg 2003; Flippen 2001).

In this context evidence that blacks are becoming less segregated from whites has been met with some optimism while the increases in Latino-white segregation have been cause for some concern (Logan, Stults, and Farley 2004). Systematic variations in the rates of change across metropolitan areas also suggest that the neighborhood-level processes underlying these changing rates of segregation differ across – and potentially within – metropolitan areas (Logan et al. 2004; Timberlake and Iceland 2007; Frey and Farley 1996). However, because they study patterns at the metropolitan-level, these studies cannot reveal the types of changes that, in aggregate, create metropolitan-level shifts in racial and ethnic segregation.

Studies examining neighborhood-level changes in racial and ethnic composition have provided evidence regarding how neighborhood-level changes are creating "shifting geographies"

(Fischer 2008) of metropolitan racial and ethnic residential patterns. Most studies have defined neighborhoods into categories based on their racial and ethnic composition and examined the transition of neighborhoods among these categories over time and have shown and increasing number of diverse metropolitan neighborhoods. The definitions are generally broad because the categorical methods used to explore transitions are difficult to examine with more than a limited number of categories.

Some studies have moved beyond the categorical framework and have examined the levels of racial and ethnic change in diverse tracts; however, they have tended to limit their studies to examining change in particular types of neighborhoods. Ellen (2000) examined the correlates of white loss in integrated black-white neighborhoods and Swaroop (2005) extended this strategy to examine the trends of white loss in multiple types of integrated neighborhoods (e.g. Latino-white, black-white-Latino). Denton and Massey (1991) also analyzed what tract level characteristics predicted growth in proportion black, Latino, and Asian. These studies conclude that racial succession or "tipping" models do not describe the process of neighborhood change as accurately as they have in the past, particularly for blacks, but that tracts are likely to continue to grow in minority population and slowly transition to being predominantly non-white ((Lee 1985; Ellen 2000; Taub, Taylor, and Dunham 1984; Denton and Massey 1991).

While these studies have provided valuable insights regarding the changing patterns of racial and ethnic composition, it is possible that these studies do not capture the full extenent of the increasing diversity of metropolitan neighborhoods. The use of broad racial and ethnic categories, although necessary for categorical analysis, also masks a substantial amount of information about the distribution of racial and ethnic groups within these categories. Although multiple racial or ethnic groups might be present in a neighborhood, they could be present at very different levels that would imply different experiences of residential integration.

For those studies that look at change in racial and ethnic composition of groups over time could also mask a substantial amount of diversity in the trends that neighborhoods follow. By modeling the changes in the proportions of a racial or ethnic group using a single trend, researchers overlook the potential heterogeneity in the types of changes that racial and ethnic compositions follow; some tracts might regress towards more segregation while others remain stable. Models using only a single trend to convey this change will smooth over the two trends that have distinct implications for racial and ethnic segregation to some average level of change. Furthermore, as metropolitan areas become more diverse, models predicting the changing composition of a single racial or ethnic group do not provide any information about the changing composition of other racial or ethnic groups. For example, a decreasing proportion of white residents in a mixed Latino-white tract might mean that the tract is becoming increasingly Latino or that blacks might be replacing whites.

To more fully understand the changing nature of diversity in a multiethnic context, I describe and analyze the patterns of racial and ethnic change in metropolitan Chicago neighborhoods from 1970-2000. To do so I employ tools – ternary plots and growth mixture models – that have not been previously used to explore patterns of racial and ethnic change and that permit comparisons across tracts using continuous measures of racial and ethnic change. Using these tools and a dataset specially designed to track neighborhood-level changes across the 1970, 1980, 1990, and 2000 decennial censuses, I find that much of the diversity that is found in many metropolitan neighborhoods comes from within the broadly defined categories typically used to describe neighborhood racial and ethnic composition. I also show that neighborhoods sometimes follow very different trajectories of racial and ethnic change that belie a single path of neighborhood change.

HISTORICAL DEVELOPMENT OF THE RACIAL SUCCESSION MODEL

One of the dominant ways that the neighborhood has been conceived to change with respect to its racial and ethnic composition is the invasion/succession model that is based on Park's (1936) human ecological model of urban development (Schwirian 1983). In this model, racial and ethnic groups compete for urban space and separate into functionally specialized units such as neighborhoods to form the urban environment in much the same way that species compete to form ecosystems. As urban environments developed, racial and ethnic groups could also be described as being sorted through a similar process. In large part, the competition for space and dominance in areas by particular ethnic groups was seen as a function of their length of duration in the city and degree of social mobility among members of the group.

Studies following the Second World War noted that the process of racial transition for blacks did not seem to follow the general trend of improved neighborhood conditions and assimilation concomitant with increases in socioeconomic status (Duncan and Duncan 1957; Taeuber and Taeuber 1965; Farley et al. 1978). Instead, they found that African Americans were uniquely segregated from whites. Neighborhoods, once “invaded” by a small number of African American residents, were likely to completely transition from being majority white to almost exclusively black within a short time as whites fled these neighborhoods and blacks entered. This model was formalized and researchers explored the point at which neighborhoods could be expected to “tip” towards rapid increases in black population (Schelling 1971). The conclusions from these studies were clear: the entrance of blacks into a neighborhood would inevitably lead to a predominantly black neighborhood and implied that blacks would, despite the legal and political victories that reduced formal barriers to integration, largely remain segregated from whites.

Despite the fact that the neighborhood racial succession or tipping-point model has become the predominant way that social scientists have conceptualized neighborhood racial and ethnic change, the continued efficacy of this model to describe contemporary patterns of neighborhood racial change has been questioned. Some have highlighted the fact that the prevalence of this model could have been the product of the unique conditions that existed in the post-war era. The combination of the discrimination faced by blacks in the housing market that was already tight because of the Depression and then World War II contributed substantially to the racial turnover that was caused by the crowding of traditional black areas (Taeuber and Taeuber 1965; Massey and Denton 1993). Housing supply problems were exacerbated by local and federal local policies that tended to further artificially limit housing supply and destabilize prices in predominantly African American communities (Hirsch 1983; Sugrue 1996). With the passage of the Fair Housing Act in 1968, decreasing evidence of housing discrimination (Ross and Turner 2005), and the increasing access of blacks to the growing suburban rings that encircle metropolitan areas, the racial succession model could be less applicable. Indeed, metropolitan-level studies find that rates of black suburbanization are inversely associated with black-white segregation (Fischer 2008; Timberlake and Iceland 2007). However, it is unclear whether the tipping model no longer applies or simply that the tipping point is higher and neighborhoods take longer to transition.

Patterns of neighborhood ethnic change involving Latinos are less understood. While traditionally being less segregated than blacks, rates of segregation have been increasing in recent decades (Logan et al. 2004; Timberlake and Iceland 2007). Some have suggested that this might be the result of increased Latino immigration to U.S. metro areas. The rapid increase of Latino residents from large-scale migration patterns might create the structural conditions that lead to residential invasion and succession in that housing supply diminishes in already established Latino communities. The expansion out of established Latino communities can lead residents of other races, especially whites, to fear becoming a minority and leave neighborhoods adjacent to Latino enclaves or barrios. Indeed, both Denton and Massey (1991) and Clark (1993) find evidence that this is occurring. In Los Angeles, however, Clark (1993) finds that this process slows considerably, though not completely, after the 1970s. Los Angeles' sprawling form might provide an avenue through which immigrants can be absorbed in a way that might not be possible in Chicago given its denser urban form.

CHANGING RACIAL ATTITUDES AND RESIDENTIAL PREFERENCES

Another important point to consider is the changing racial attitudes of the American population and especially those of whites. The negative attitudes towards blacks have declined considerably in the past half century (Schuman et al. 1997) and this is also true with respect to white

American's views towards racially integrated housing. A series of studies of Detroit metropolitan residents show that the number of whites willing to consider moving to a neighborhood with 20 percent black residents increased from 58 percent in 1976 to 70 percent in 1992 to 78 percent in 2004 (Farley et al. 1978, 1994; Krysan and Bader 2007). Perhaps more importantly, the number of residents who would try to move out of a neighborhood that became increasingly black also declined, though only for low levels of racial integration (Farley et al. 1994). Although these gains have been substantial, it is still true that almost one in four whites would not consider a neighborhood that is reasonably integrated and the number falls precipitously as the percentage of minority residents increases and limits the possibilities for maintaining stably integrated neighborhoods (Krysan and Bader 2007).

There is some debate, however, about how well these measures capture pure racial bias that is likely to influence patterns of racial and ethnic change. Since black neighborhoods tend to have fewer amenities and more problems such as crime or poor schools, the racial composition of a neighborhood could serve as a proxy for these non-racial, but racially correlated, neighborhood conditions (Harris 1999, 2001). Home-seekers might use these racially-based proxies or stereotypes to project the types of neighborhood change they believe are likely to occur; but, these stereotypes are likely overcome if other institutions or neighborhood conditions imply that the neighborhood is socioeconomically stable (Ellen 2000; Taub et al. 1984).

Furthermore, some have argued that white avoidance of minorities has been blamed disproportionately for the racial succession of neighborhoods since minority preferences for mixed neighborhoods theoretically help to propel the process of racial turnover (Fossett 2006; Clark 1992). Studies using alternative methods of assessing racial bias in residential preferences net of other community characteristics have still found strong racial effects on white residential preferences and much more muted racial effects on black preferences (Emerson, Chai, and Yancey 2001; Krysan and Bader 2007). In aggregate, the research regarding residential preferences implies that the mere entrance of blacks to a neighborhood is no longer likely to precipitate an immediate racial transition; but, they do suggest that long-term racial transition is likely in the long run due to the large proportion of whites would not consider a neighborhood beyond a small proportion of minorities.

RACIAL AND ETHNIC PATTERNS OF CHANGE IN A MULTIETHNIC CONTEXT

As the previous discussion of the literature suggests, the majority of studies exploring changes in the racial and ethnic composition of neighborhoods have done so using solely a black and white framework. Yet, as the nation's population becomes more diverse, this diversity must be reflected in the studies of neighborhood racial and ethnic change. Although less numerous than studies of racial transitions between whites and blacks, a number of studies have begun to explore and reveal the complexity of neighborhood racial and ethnic change in multiethnic metropolitan areas.

These studies have generally examined transitions among various neighborhood types defined as having particular combinations of present in the tract. Typically, transition matrices are created by defining some arbitrary cut-point that determines a neighborhood type by which racial and ethnic groups are "present" in the tract. Tracts are then placed in rows according to their typology and charted against columns using the same typology at some later point in time. Patterns of stability or change can be examined by determining the relative frequency of cells that either remain stable (on the main diagonal) or transition from particular types of racial and ethnic combinations to other types between time points. Overall, these studies reveal an increasing diversity of neighborhood types experienced by metropolitan residents, particularly whites (Alba et al. 1995; Swaroop 2005; Denton and Massey 1991); however, there is also evidence that the increases in diversity were mostly experienced in tracts sharing whites and Asians as the number of all-minority tracts for both blacks and Latinos increased (Clark 1993; Alba et al. 1995).

Measuring only the presence of various groups does not provide any evidence about the levels of exposure to different groups within tracts that are just as important for understanding the nature of racial and ethnic contact in multiethnic metropolitan areas. Denton and Massey (1991) model levels of loss in white racial composition as well as gains in proportion black, Latino, and Asian; however, by examining each group independently they do not examine the multiple patterns of relationships that could be causing white loss or minority gain. Ironically, the series of studies that best examine this phenomenon were nominally only interested in the stability or succession of black and white integration. In their studies, Lee and Wood (Lee and Wood 1990, 1991) find that tracts with stable black populations, which are more likely to be found in multiethnic and western metropolitan areas, do not maintain integration with whites. Rather, tracts with a relatively stable black population tend to gain other minority (i.e., non-white) residents.

In whole, these results suggest that whites in multiethnic metropolitan areas tend to have an increasing amount of exposure to other races and ethnicities but that this trend is most pronounced for Asians and least so for blacks, with Latinos in between. Minorities tend to have increasing contact with each other, particularly for blacks and Latinos. These patterns conform well to residential preferences expressed in multiethnic metropolitan areas that show a hierarchy of preferences with whites as the most desirable neighborhoods, then Asians, then Latinos, and blacks being the least desirable (Zubrinsky and Bobo 1996). But, without comparing the levels of changes across multiple racial and ethnic groups over time, it is difficult to discern whether these patterns represent temporary shifts toward resegregation among multiple racial and ethnic groups or whether these analyses represent the prospect of stable integration.

In the present study, I examine patterns of neighborhood racial and ethnic composition changes across non-Latino whites, non-Latino blacks, and Latinos in the increasingly diverse Chicago metropolitan area from 1970 to 2000 (hereafter, whites, blacks, and Latinos). In particular, I am interested in exploring the multiple dimensions of neighborhood change that can occur when looking across these three racial and ethnic groups and the levels at which racial and ethnic groups live with each other. I begin by descriptively exploring the levels at which whites, blacks, and Latinos share the same neighborhoods and how these levels are related to characteristics of the neighborhood. Finally, I formally model the dominant patterns of change among tracts in the Chicago metropolitan area and the neighborhood characteristics that predict those particular patterns.

DATA AND METHODS

Data Source and Study Region

Data for this study come from the Neighborhood Change Database (NCDB) created by the Urban Institute and published by Geolytics, Inc. (Tatian 2003). The NCDB takes data from the United States Census long form for the 1970, 1980, 1990, and 2000 decennial censuses and normalizes the data from each decade to the 2000 census tract boundaries using geographical apportionment (for details, see Tatian 2003). This process yields data across three decades and four censuses for tracts defined with geographically constant boundaries. Using these data and accepting tract boundaries as reasonable approximations of neighborhoods makes the NCDB well-suited to investigate changes in neighborhood racial and ethnic composition over this span of time.

I use all tracts from the Chicago metropolitan area, which I define as any tract in the Chicago-Gary-Kenosha, IL-IN-WI Consolidated Metropolitan Statistical Area (CMSA). I choose to use the more expansive definition of consolidated metropolitan area (as opposed to the Chicago, IL Primary Metropolitan Statistical Area) because tight housing supply has been hypothesized as a major contributor to racial succession (Taeuber and Taeuber 1965; Taub et al. 1984). Since a substantial portion of the Chicago housing market has expanded into the "Chicagoland" area to the city's south and past the state line in Wisconsin to the north, the CMSA capturing this area was used. Therefore, a tract was included in the sample if it was in any of the counties included in the 1999 definition of the Chicago-Gary-Kenosha, IL-IN-WI CMSA.[1]

Although the results from an analysis of a single metropolitan area cannot be generalized

[1] The counties include: Cook Co., IL; DeKalb Co., IL, DuPage Co., IL; Grundy Co, IL; Kane Co., IL; Kendall Co., IL; Lake Co., IL; McHenry Co., IL; Will Co., IL; Lake Co., IN; Porter Co., IN; Kenosha Co., WI.

beyond the neighborhoods in that metropolitan area, there are strong theoretical justifications for investigating the patterns of neighborhood racial and ethnic change the greater Chicago area. First, from Park's (1936) original formulation of the ecological model, Chicago has been the site of some of the most influential studies on the causes, patterns, and consequences of neighborhood racial change (Duncan and Duncan 1957; Suttles 1972; Taub et al. 1984; Wilson 1987). The present study provides an opportunity to build on this previous work to examine how the increasingly multiethnic population influences these well-established patterns.

Second, although the Chicago School and its contemporary descendents have been accused of improperly applying models of urban development developed based on Chicago to other metropolitan areas (Dear 2001; Dear and Flusty 1998), the same criticism could be made of research exploring the effect of multiculturalism based solely on the experience of Los Angeles (Lee and Wood 1991; Clark 1993; Zubrinsky and Bobo 1996). While there is good reason to study the development of multicultural forms in Los Angeles, the fact that Chicago's multiethnic population is growing based on urban forms of "modern" development might suggest that the experience of multiculturalism and neighborhood racial and ethnic transition could be very different than that experienced in Los Angeles or other newer, western metropolises (Betancur 1996).

Description of Measures

Racial and Ethnic Composition. Racial and ethnic composition was measured as the proportion of residents that identify as non-Latino whites, non-Latino blacks, and Latinos of any race. Together, these three racial and ethnic groups comprised 98.4, 97.9, 96.7, and 95.0 percent of all residents in 1970, 1980, 1990, and 2000, respectively. Because of the overwhelming proportion of residents these three categories represent in the Chicago metropolitan area and the large increase in complexity required to include a fourth "other" category, analyses were only conducted with these three groups. Therefore, the proportion of each group is defined as the number of the group divded by the sum of whites, blacks, and Latinos.

Creating these categories was somewhat problematic because the Census Bureau did not start tabulating Latinos by race until 1980, meaning that Latinos are included in the counts of whites and blacks in 1970. I used the same strategy as that used by Timberlake and Iceland (2007) and allocated Latinos to racial categories in 1970 based on the proportion of Latinos identifying by each race in the same tract in 1980. This will have the potential effect of understating the level of change between proportions Latinos and whites and blacks in the 1970s and potentially overstate the level of stability. All tracts were included that had at least 100 residents that identified as any of the three racial groups.

Socioeconomic and ecological characteristics. I also examine how changes in the socioeconomic and ecological characteristics change along with the various racial and ethnic composition change trajectories. The first of these characteristics is the average home value of owner-occupied units of the tract in 1999 dollars, adjusting values from the 1970, 1980, and 1990 Censuses using the consumer price index. This provides a measure of potential wealth accumulation for home owners and potential financial hardship for renters since higher housing values are typically associated with higher rents. While home values can provide a measure of wealth for homeowners, changes in the neighborhood mean household income (also measured in constant 1999 dollars) can provide information about the immediate financial situations of neighborhood residents. I also include the percentage of residents who are least 25 years old that have a bachelor's or advanced degree as a measure of socioeconomic status as well as the percentage of neighborhood residents who are in poverty. To assess the ecological characteristics of the neighborhood, I include measures of the vacancy rate as a measure of housing supply, the percentage of housing units that are owner occupied to measure investment in the neighborhood, and whether the tract is in one of the two central cities in the Chicago metropolitan area (Chicago, Illinois and Gary, Indiana).

Analytic Methods

To explore the levels of integration and change in neighborhood racial and ethnic composition, I begin by examining basic descriptive statistics and the transition matrix among categories of racial and ethnic composition. I start with these analyses for two reasons. First, although categorizing race solely by typologies defined by some arbitrary level of racial composition that is deemed integrated can mask important differences in the level of integration within these broadly defined categories, they are useful tools for observing gross changes in the distribution of racial and ethnic composition over time. Second, since most studies exploring neighborhood racial and ethnic change have used transitions matrices, first exploring changes with the transition matrix should prove to be helpful when examining patterns of changes in the level of racial and ethnic integration (or segregation) over time.

Tables are ill-suited, however, to discern the level of heterogeneity that exists in racial and ethnic composition within neighborhood categories. The number of categories could be expanded to provide a finer break-down of racial and ethnic composition, but as the number of cells increases to add more categories, tables become increasingly unwieldy and less helpful in summarizing important results. As an alternative, I use ternary plots such as those shown in Figure 2.2. Ternary plots of non-Latino white, non-Latino black, and Latino racial and ethnic composition in 1970, 1980, 1990, and 2000 for tracts in the Chicago-Gary-Kenosha, IL-IN-WI CMSA to summarize and explore the distributions of racial and ethnic composition within neighborhoods.

Ternary plots can be read by locating where a point falls relative to the three axes. The plots in Figure 2.2. Ternary plots of non-Latino white, non-Latino black, and Latino racial and ethnic composition in 1970, 1980, 1990, and 2000 for tracts in the Chicago-Gary-Kenosha, IL-IN-WI CMSA display Latinos on the left axis, whites on the right, and blacks along the bottom. Labels are shown along the axis marking the proportion of each group present in a tract. To obtain the proportion of residents identifying as one of the three racial or ethnic groups, one would draw a line from the point that extends parallel to the side counter-clockwise of the side measuring the race of interest. Where this line crosses the side measuring the race of interest indicates the percentage of residents of the race in the tract. For example, in the plots presented in this chapter, the percentage of Latinos in tracts is always listed on the left axis; therefore, the percentage of Latinos in a particular tract can be found by tracing a line parallel to the bottom of the page (since the bottom of the triangle is counter-clockwise to the Latino axis) to the left side of the graph.

After looking at changes in the overall distribution of whites, blacks, and Latinos from 1970 to 2000, I turn my focus to attempting to understand how the racial and ethnic composition patterns change in individual neighborhoods over time. Just as I did looking at the change in overall distribution of tracts, I begin this analysis by examining tract-level changes in racial and ethnic composition using the racial and ethnic categories described above by calculating the mean percentage of residents of the three racial and ethnic groups in each category of the racial/ethnic break-down. To discover the degree to which these summary statistics might mask the diversity of ways that neighborhood racial and ethnic composition changes over time, I again use ternary plots to visually describe the change present in tracts. In this second set of ternary plots, I follow the trajectory of racial and ethnic change in individual tracts by tracing the same tracts over time and connecting where a tract fell in the plot in 1970, 1980, 1990, and 2000.

Finally, I turn my attention to formally modeling the multiple trajectories of neighborhood racial and ethnic change. I use growth mixture models (Kreuter and Muthén 2008) to determine the typical trajectories of neighborhood racial and ethnic change from 1970 to 2000 are in the Chicago metropolitan area. In addition to providing information about what types of neighborhood racial and ethnic composition patterns are typical, I can also assess the proportion of tracts that are best characterized by each of the trajectories to examine what patterns of neighborhood change are more common than others. Finally, based on the predicted posterior probabilities of class membership, I classify each tract into the trajectory that it most likely belongs. Using this classification, I plot the racial and ethnic composition of all tracts by the different trajectories as well as examine the socioeconomic and ecological characteristics of tracts by their various racial and ethnic change trajectories.

Growth mixture models extend the framework of latent growth modeling. In latent growth models, the components of a growth trajectory (e.g. an intercept and slope in a linear model) are modeled from available data over multiple time points. Because observations are made at multiple time points, latent growth models can account for measurement error or random variation that occurs at any one time of observation (Raudenbush and Bryk 2002; Singer and Willett 2003). However, traditional latent growth models assume that the population being modeled follows a single underlying growth pattern. Often, this is an untenable assumption, as is the case here. We would not, for example, think that a tract that starts off 90 percent black in 1970 will have the same underlying growth trajectory as one that is 90 percent white. Growth mixture models empirically detect and model the multiple underlying populations evident from the data.

Thus, while previous findings have found that tracts tend to stay integrated (Ellen 2000), these findings overlook the potential heterogeneity in types of neighborhood racial composition that exist. While a substantial proportion of integrated tracts might retain long-term, stably integrated populations, it is possible that, for another significant number of tracts, the level of integration does simply mark a period at the midpoint of racial turnover. This becomes even more of a problem in a multiethnic context like the one presently under investigation since the multiple racial and ethnic compositions that could result from a single starting point vary in two dimensions rather than one.

A schematic depiction of the growth mixture model used in this study can be found in Figure 2.1 In the schematic, straight lines indicate the regression of one variable on another variable, curved lines indicate that the two variables were allowed to randomly co-vary in the model, and small arrows pointing to a single variable mean that the variable was allowed to have residual variation unaccounted for by the model. For each decennial census, there are two outcomes measured: the tract proportion black and the tract proportion Latino, labeled as blkYR and latYR in the diagram (respectively) where "YR" is replaced by the year of observation. From these eight outcomes, four each for the two racial and ethnic groups, six growth factors are estimated: an intercept factor for proportion black (iblk), a linear slope factor for proportion black (sblk), a quadratic slope factor for the proportion black (qblk), an intercept factor for proportion Latino (ilat), a linear slope factor for proportion Latino (slat), and a quadratic slope factor for proportion Latino (qlat). A latent categorical variable, labeled "c" on the diagram, is a categorical variable indicating the predicted latent trajectory class of the neighborhood.

There are two things worth noting about this model. First, one can see that the quadriatic slope growth factor for proportion black (qblk) is fixed, meaning that it has no residual variance and does not co-vary with any of the other growth factors. This growth factor had very little residual variation in the model once tracts were assigned to classes and was estimated to have negative covariance estimates with other factors in the model. Since the variances was very low and was not significantly different than zero, I fixed this factor in the model. Similarly, the covariance between proportion non-Latino black in 2000 (pnhb0) and proportion Latino in 2000 (plat0) was difficult to estimate within classes – meaning assignment to classes controlled for the residual covariance between these two terms – and, since the covariance term was not significantly different than zero, I fixed this covariance to be zero as well.. The second notable element of the model is the fact that I model proportions as a continuous function. Because all three proportion variables sum to one and are not, therefore, continuous and normally distributed measures since each depends on the distribution of the others, modeling the outcomes using a multinomial distribution would be the most appropriate strategy; however, because the computational demands of these models are exceedingly high, I modeled the two outcomes as continuous measures and using a transformation of the dependent variable to break the reliance between the mean and the variance.[2]

Mplus version 5.2 was used to model the growth mixture models. The remaining analyses were conducted in Stata version 10.2.[3]

RESULTS

Changes in the Distribution of Tract-Level Racial and Ethnic Composition

I begin by examining changes in the distribution of tracts in broad racial and ethnic categories. I define categories for tracts labeled as having "all" one race if there is fewer than ten percent of each of the other two groups in the tract. Tracts are classified as being integrated across two groups if both groups represent 10 percent or more of the tract population. Finally, a tract is considered integrated across all three races if each represents more than 10 percent of the population. Table 2.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000 reports, by decade, the number of tracts falling in each of these categories.

The figures in Table 2.1 echo the findings from other studies that metropolitan neighborhoods are becoming more racially and ethnically diverse. While there were 1,366 all-white tracts in 1970, that number had diminished to 747 by 2000. Meanwhile, the number of all-black tracts expanded in both absolute and relative terms during the three decades: from 231 tracts (12 percent of all tracts) in 1970 to 353 tracts in 2000 (17 percent of all tracts), with the largest jump occurring in the 1970s (231 tracts to 315 tracts, a gain in four percentage points). Interestingly, there were no all-Latino tracts in 1970 still and relatively few in 2000 (N=42). The most marked rise, however, is among tracts that are shared between whites and Latinos. These tracts represented just fewer than ten percent of all tracts in 1970 and more than doubled over the

[2] Specifically, I used the transformation arcsin($p_r^{1/2}$), where p_r is the proportion of people that identify as race r in the tract.
[3] Ternary plots were constructed using Nicholas J. Cox's TRIPLOT program created for Stata, which is available at http://ideas.repec.org/c/boc/bocode/s342401.html. The program was modified slightly for plotting lines on the ternary plot; the downloaded version was used for all point plots and the modified version for line plots.

course of the next 30 years.[4]

The transition matrix in Table 2.2 helps us investigate what types of changes are occurring that, in aggregate, make the overall trends we saw in Table 2.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000

The rows of Table 2.2 represent the initial category of the neighborhood racial and ethnic category in 1970 and the columns represent the destination. Therefore, a neighborhood represented on the diagonal of the matrix indicates a tract with the same initial and destination racial and ethnic category. The row marginals (the column labeled "Total") report the number of tracts in each row category in 1970 and the column marginals (the row labeled "Total") report the number of tracts in each column category in 2000.[5]

The first row of the table demonstrates again the remarkable decline in all-white tracts over the thirty-year period. Of the 1,364 tracts that start out as all-white in 1970, only 666 (49 percent) remained all-white by 2000. Also, one can note the trend towards all-black neighborhoods in the transition matrix as well. In part, this is due to the racial stability of all-black neighborhoods: of 227 all-black tracts in 1970, 219 – or 96 percent – remained all-black in 2000. There was also an increase in the number of all-black neighborhoods. Most of the neighborhoods that became all-black were originally in the white-black mixed tracts in 1970 (N=62); however, this number was only slightly larger than the number of tracts that became all-black from 1970 to 2000 came from the all-white category (N=56). This, combined with the fact that only 61 percent of neighborhoods that were mixed black-white in 1970 retained both blacks and whites, seems to suggest that a fair amount of racial succession could still be observed and the number of all-white tracts that became all-black by the end of three decades provides

4 Since the proportion non-Latino white and Latino were estimated using 1980 proportions applied to the values, these results might *understate* the magnitude of this change.

5 The values for the marginals in this table to not exactly correspond to the number of tracts reported in Table 2.1. This is due to the fact that tracts with a population of white, black, and Latino residents fewer than 100 people were removed from all analyses involving the decade that they fell below this threshold. In Table 2.2, there are 77 tracts that were not included in 1970 and ten in 2000 with one overlapping tract that was missing in both decades.

evidence that some of these transitions likely happened relatively quickly.

The final trend that is apparent in Table 2.2 is the growth of neighborhoods that are mixed with Latinos. By 2000, 715 of the tracts measured in 1970 had enough Latinos to be considered mixed while only 42 had enough Latinos to be considered all-Latino. The growth largely comes from an expansion in the number of tracts considered to be mixed between Latinos and whites from those that were all-white in 1970. 387 tracts, about 20 percent of all of the tracts measured in both 1970 and 2000, were in this category having. These findings stand in contrast to the previous literature which has highlighted the growth of mixed black-Latino neighborhoods, not white-Latino neighborhoods (Lee and Wood 1991; Alba et al. 1995).

Levels of Diversity Within Racial and Ethnic Categories

As I discussed previously, transition matrices are helpful to understand the gross patterns of neighborhood racial and ethnic change over time. They cannot be used to describe or evaluate the levels of exposure residents have to different racial and ethnic groups within the broadly defined racial and ethnic categories. It is impossible to tell, for example, whether the growth of white-Latino mixed neighborhoods has resulted in neighborhoods with a relatively even balance of whites and Latinos, a clustering of tracts that are predominantly Latino, or tracts that have just enough Latinos to make them mixed but are still predominantly white. This requires knowing not only into which racial and ethnic category a neighborhood falls, but also where in the distribution among whites, Latinos, and blacks that it falls.

Figure 2.2 displays ternary plots of the distribution of whites, blacks, and Latinos for each decade from 1970 to 2000. Again, each point maps to the proportions of Latinos, whites, and blacks in tracts for each decade. The primary purpose for this plot is to summarize the overall distribution of racial and ethnic compositions of neighborhoods over time, and so it would be helpful to describe the intuition behind these plots in some detail. First, the closer to a vertex that a point falls, the more the tract is dominated by a single race or ethnicity. Points near the left vertex represent tracts that are predominantly black, those near the top represent predominantly Latino tracts, and those near the right represent predominantly white tracts. Second, points falling on a side of the triangle are composed solely of two groups: tracts represented by points falling on the left side are mixed black-Latino (i.e. no whites), points falling on the right side are mixed Latino-white (i.e. no blacks), and those falling on the bottom side are mixed white-black (i.e. no Latinos). The closer a point is plotted to one of the sides, the greater the proportion of residents in the tract that come from those two groups and, consequently, the fewer that come from the third. Finally, the closer a point falls to the middle of the plot, marked by the intersection of the dashed lines, the more equally blacks, Latinos, and whites are represented.

The broad patterns that were described using the transition matrix can be seen in the series of four ternary plots displayed in Figure 2.2. Perhaps most notably, one can see the predominance of all-white and all-black tracts in 1970 by the clustering of points near the lower-right and lower-left vertices in the plot and the gradual dissipation of points away from the all-white tracts in the decades following. The increasing frequency of points in the center of the plots for later decades is evidence of the increasingly diverse setting of most metropolitan Chicago neighborhoods. The growth of white-Latino tracts can also be seen by the greater number of points that fall along the right side of the plots in later decades. It appears that, while there has been an increase in white-Latino tracts since 1970, there was a relatively larger dispersion in the 1990s than in previous decades. Finally, the relative infrequency of neighborhoods that are shared by blacks and Latinos can be seen by the scarcity of points along the left side of the plots, even into 2000.

The ternary plots can also reveal a great deal more information about the diversity of neighborhoods than is available from the transition matrix. For tracts that are shared predominantly between blacks and whites, the plot of 1970 data shows a pattern of bifurcation.

With the exception of a small cluster of tracts around 50 percent black and 50 percent white,[6] tracts are generally over sixty percent black (with a stronger clustering towards 100) or under 40 (with a stronger clustering towards 0). Also masked in the transition matrix is the increasing level at which neighborhoods shared predominantly by blacks and whites have a growing proportions of Latinos , even if the proportions are not large enough to carry the tract into the white-black-Latino mixed neighborhoods category. This can be seen by the greater distance from the bottom of the plot neighborhoods are in later decades. The level at which Latinos are present is not constant, however. The distance that tracts shared predominantly by blacks and whites are pulled away from the bottom line (indicating a larger Latino presence) varies as a function of the relative proportion of whites decreases: as whites make up a lesser proportion of the population in mixed black-white tracts, the fewer Latinos share those tracts.

Tracts shared predominantly between whites and Latinos also have a remarkable amount of diversity that is hidden by the figures in the transition matrix. The most noticeable trend in white-Latino neighborhoods is the temporal pattern showing a drift of neighborhoods toward the top vertex of the plot that indicates a greater Latino presence within neighborhoods shared predominantly by whites and Latinos. The increasing black presence in white-Latino neighborhoods over time is also evident from the growing distance from the right side of the triangle in successive decades; however, there remain a sizeable number of tracts that fall on (or close to) the right side of the plot meaning that there are no (or few) blacks present. This stands in contrast to the paucity of tracts that fall on the bottom line, possibly suggesting that whites might be more willing to live with Latinos than they are with blacks. Similar to Latinos in white-black neighborhoods, blacks are more likely to share tracts with Latinos where whites make up a

[6] The dashed line extending up perpendicular to the bottom of the triangle indicates where blacks and whites are evenly split in a tract. As the line extends toward the middle of the triangle, the percentage of blacks and whites remains equal but Latinos constitute a larger share of the tract population. Thus, wthere there are no Latinos (i.e., at the base of the triangle), blacks and whites are split at 50 percent each. Where the three dashed lines intersect, blacks, whites, and Latinos each constitute an equal share, or 33 percent, of the tract population. This means that the line extending perpendicular to the left side indicates where blacks and Latinos are evenly split and the line extending from the right marks an even split between whites and Latinos.

greater proportion of the two-race/ethnicity split between whites and Latinos, although the trend appears to be less pronounced than the trend for Latinos living in mixed white-black neighborhoods.

In summary, these results suggest that metropolitan neighborhoods are becoming more diverse and that much of the diversity comes from within the broadly defined racial and ethnic categories defined for use in the transition matrix. Specifically, neighborhoods shared by blacks and whites are less likely to be clustered toward either end of the distribution in 2000 than they were in 1970 and neighborhoods shared between whites and Latinos have been shifting to contain a greater proportion of Latino residents in recent decades. Additionally, in neighborhoods that are mixed between two races (i.e. white-black and white-Latino), residents identifying as the third race are more likely to live in those neighborhoods where whites have a greater share of the population.

Changing Levels of Diversity Within Racial and Ethnic Categories

Although the transition matrix in Table 2.1 Table 2.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000
and the plots in Figure 2.2 reveal the increasing diversity of neighborhoods in metropolitan Chicago over time and suggest possible patterns of neighborhood change, they do not provide evidence regarding how the racial and ethnic composition of individual neighborhoods changed over time. This means that it is impossible from these analyses alone to discern the degree to which neighborhood racial and ethnic composition remains stable or changes over time. In order to evaluate these patterns, I turn now to examining the changes of racial and ethnic composition within tracts over time.

Table 2.2 reports the mean percent white, black, and Latino in 1970 of tracts within each racial and ethnic category as well as the mean percentage-point change from 1970 to 2000. Starting with the last row, the aggregate pattern for all metropolitan tracts is to lose whites, and gain both blacks and Latinos. We would expect these trends from both the changes in the racial and ethnic composition of the metropolitan area as a whole and the patterns observed from both the transition matrix and ternary plots. The overall patterns within racial and ethnic groups also reveal interesting aggregate patterns. Tracts that were all-white in 1970 lost an average of 24.9 percentage points of whites from 1970 to 2000 (8.3 points per decade). This marks a substantial decline that appears to be evenly split between blacks – who gained 11.1 percentage points in previously all-white neighborhoods (3.7 per decade) – and Latinos who gained 13.8 percentage points (4.6 per decade). In contrast, all-black tracts saw very little population change. Whites were slightly less prevalent in all-black neighborhoods and the black and Latino populations remained relatively stable.

In mixed neighborhoods, there are essentially two trends in these data.[7] First, for neighborhoods mixed between whites and blacks in 1970, whites decline substantially and are replaced almost exclusively by blacks, though there is a small gain by Latinos. The second trend is one shared by neighborhoods in the mixed white-Latino and mixed white-black-Latino neighborhoods that experience a loss in the proportion of white residents and a gain in proportions of both Latinos and blacks with the former larger than the latter. One noticeable difference between these two categories is that the increase in the percentage of blacks is substantially higher in neighborhoods shared by whites and Latinos than those shared among all three groups. This could simply reflect the lower starting points for the percentage of blacks that live in each type of tract (1.6 percent for white-Latino and 29.2 for white-black-Latino neighborhoods), but could also indicate a trend that neighborhoods starting out as predominantly mixed between whites and Latinos follow a trajectory of becoming more multiethnically diverse as blacks increasingly replace whites in those communities.

However, just as the transition matrix masked much of the underlying diversity of neighborhood racial and ethnic composition, it is possible that Table 2.2 masks the heterogeneity

[7] I do not discuss the trend for neighborhoods mixed between blacks and Latinos because this category contains only two tracts.

in the trajectories of changes of racial and ethnic composition followed by tracts over time. Indeed, Figure 2.3. Ternary plots showing trend in decadal racial and ethnic change from 1970 to 2000, by racial and ethnic composition in 1970 shows that this is the case. Figure 2.3 plots the level of whites, blacks, and Latinos for tracts in 1970, 1980, 1990, and 2000 and then, for each tract, connects the point plotted at each decade with a line by category of racial and ethnic composition in 1970.[8] Therefore, the changing racial and ethnic composition of a tract can be traced by following the lines in the graph.[9]

Starting first with tracts that were all white in 1970, it is obvious that neighborhoods do not follow a single trajectory. In fact, the large increases for both blacks and Latinos in the all-white category reported in Table 2.3 appear to represent two different trends: either a large increase in the proportion black *or* a large increase in proportion Latino. There are a fair number of tracts that fall in between (more of these types of tracts can be found in other samples drawn) gaining both blacks and Latinos; however, the dominant trajectories for tracts that were all-white in 1970 is to gain either blacks or Latinos. In contrast to all-white neighborhoods, neighborhoods in the all-black category in 1970 showed very little change. Although a few tracts lost a very small proportion of blacks, the proportion living in all-black neighborhoods generally increased.

Mixed black-white neighborhoods more closely follow a single trajectory and gain in proportion black over the three decades. In this category, there are some neighborhoods that maintain the level of black residents and gain a greater proportion of Latino residents, but they are rarer than neighborhoods that increase in proportion black and decrease in proportion white. Conversely, mixed white-Latino neighborhoods had a large increase in proportion black over the time period. Although some became all-Latino or all-white, most gained in proportion black.

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[8] There were no all-Latino tracts in 1970, so there is no plot for all-Latino tracts.

[9] Due to limitations in the software, only 98 graphs can be plotted at a time. Therefore, for the all-white, all-black, mixed white-black, and mixed white-Latino plots, the trajectories of a random sample of 98 tracts were plotted. The plots shown are representative of the trajectories within each category. Additionally, arrows would be helpful to show which way the trajectories move; unfortunately, it is also not possible to include arrows in the software.

Interestingly, for most tracts, the increase in proportion black came as the proportion of Latinos became greater in the tract. This could suggest that as the tracts become increasing Latino, whites either flee or become unwilling to move to these neighborhoods and blacks then move to the homes vacated by whites. Finally, neighborhoods shared by all three groups demonstrate the least systematic patterns of neighborhood change. Most gain either in proportion black or proportion Latino, but some gain in both to become split between blacks and Latinos while decreasing in proportion white.

LATENT TRAJECTORIES OF NEIGHBORHOOD RACIAL AND ETHNIC CHANGE

Table 2.4 reports the results of the growth mixture model. Using the standard technique of comparing the Bayesian information criterion (BIC) across models with successive numbers of classes, I found that nine classes minimized the value of the BIC. This means that nine is likely the optimal number of distinct neighborhood racial and ethnic composition trajectories in the Chicago metropolitan area. The top row of Table 2.4 contains a description of the class and the second row reports the percentage of tracts best described by that trajectory. The next group of rows reports the coefficients of the black and Latino growth factors predicted for each growth factor transformed to percentage-point units.[10] The following two groups of rows report the predicted percentage of blacks and Latinos, respectively, at each decade for tracts identified in the class.

In addition to the estimates reported in Table 2.4, I also plotted the empirical racial composition by decade for the tracts in each class. To do this, I used the posterior probabilities of class membership to determine which one of the classes each tract was most likely to be a member. After classifying the tracts into classes in this manner, I plotted the observed racial composition of tracts by class for each decade on ternary plots. A matrix of these plots can be

[10] As mentioned previously, the model was estimated using the transformation $\arcsin(p_r^{1/2})$, where p_r is the proportion of the tract composed of race, r. The coefficients reported in TABLE XX are transformed by taking the sine of the growth factor coefficient, β_{fr}, estimated for growth factor, f, of race, r, squaring the result, and retaining the sign of the coefficient, i.e. $p_{\beta r}* = \sin(\beta_{fr})^2 * \text{sign}(\beta_{fr})$.

viewed in Figure 2.4. Each of the nine rows, one for each of the nine different classes, contains four plots, one for each decade from 1970 to 2000. The matrix of plots can be read across the rows to show the changes in the observed racial and ethnic composition of tracts classified into each tract.

Description of Racial and Ethnic Composition Trajectories

Racially stable neighborhoods. The two most abundant types of neighborhoods in the Chicago metropolitan area are racially stable white and black neighborhoods. Neighborhoods that follow a *stable white* trajectory are by far the most common and comprise a majority (53 percent) of neighborhoods. These tracts are predicted to have essentially no blacks and very few Latinos with no growth in either minority group from 1970 to 2000. Although the model predicts almost no growth in the non-white population in the stable white neighborhoods, the first row of plots in Figure 2.4 reveals that all-white tracts in this trajectory have become more diverse in subsequent decades so that many are no longer strictly all-white. The majority of neighborhoods in this category, however, still have a very small proportion of minority residents. *Stable black* is the next most frequent trajectory of neighborhood change with 14 percent of tracts falling in this category. They are predicted to be almost all-black in 1970 (94 percent black) and grow in the percentage black across the three decades to 98 percent black in 2000. Figure 2.4 reveals that the percentage of non-black residents increased for a small proportion of these neighborhoods, particularly in the 1990s, the majority of neighborhoods in this category remain almost exclusively black from 1970 to 2000 and do increase in the concentration of black residents.

In addition to these larger categories, a third and much smaller category of tracts have maintained a relatively *stable racially and ethnically integrated* composition from 1970 to 2000. Just over four percent of neighborhoods in the Chicago metropolitan area are predicted to belong to this trajectory with an estimated 32 percent black predicted in 1970 that increases to just below 40 percent by 2000. Latinos are predicted to be about seven percent of the population with very little growth. However, the empirical distributions of neighborhood racial and ethnic composition of tracts following this trajectory show that Latinos are increasing as a percentage of the population in many of these neighborhoods so that, by 2000, they can be accurately described as integrated multiethnic neighborhoods.

Black growth. I group the following two racial and ethnic composition trajectories together because they both start with nearly all-white populations in 1970 and then experience growth in the black share of the population; however, the two paths of black growth are very different.[11] The first can be described as following the complete racial succession described by the Duncans' (1957). In the nearly four percent of neighborhoods following this *all-white to all-black succession* trajectory, blacks were predicted to have a very small presence in 1970 – less than four percent – and then increase so rapidly that predicted values of black racial composition end up greater than 100 percent by 1990 using the continuous and normal approximation of the outcomes. Although this highlights one of the problems using this approximation for a multinomial model, looking at the empirical distribution of neighborhood racial and ethnic composition for neighborhoods classified in this trajectory in Figure 2.4, the results reveal that the model is correct in its predication of the speed of this transition. Most of the neighborhoods in this trajectory were all-white in 1970 and many had already transitioned to being all-black by 1980, and almost all had done so by 2000. Few of the neighborhoods following this trajectory contained more than a small proportion of Latinos, especially by the later decades.

The second type of black growth occurred much more slowly. In fact, it is not completely appropriate to call these neighborhoods solely "black growth" as many became places

[11] Although these two trajectories can be grouped by their increasing black presence, describing these neighborhoods as trajectories following "black growth" does not imply that the black share of the population does not grow for neighborhoods following other trajectories. Instead, the majority of the minority growth in these neighborhoods comes from an increasing black share of the population compared to other trajectories where the majority of minority growth comes from an increasing Latino share of the population. Additionally, this does not mean that there is not some Latino growth in "black growth" neighborhoods and vice-versa, only that these broad categories broadly describe the most prevalent type of racial and ethnic change.

with a large enough proportion of whites, blacks, and Latinos to be considered "multiethnic." Neighborhoods in this *all white to multiethnic integration* trajectory were predicted to start with no blacks and two percent Latinos and grow to have 14 percent black and five percent Latino respectively in 2000. Looking at the ternary plots in Figure 2.4, these figures underestimate the share of the black population in 2000, with most tracts having substantially more than 14 black. In fact, it appears that most have a black majority by 2000. Despite this black majority in many tracts, most retain a multiethnically diverse population that shows a distinctly different pattern of change from the all-white to all-black transition trajectory.

Latino growth. The four trajectories in the next group describe different patterns of Latino growth from 1970 to 2000. The first of these four trajectories can be described as *integrated white-Latino to all-Latino* trajectory. Neighborhoods in this trajectory are expected to be just over half Latino in 1970 and become 73 percent Latino by 2000. These tracts are expected to have a small proportion of blacks initially and to have virtually no growth over the entire three decades. Observing the empirical trends of neighborhoods in this category, we find that there are more blacks than would be predicted from the coefficients for this class in the model such that some tracts could be considered multiethnically diverse by 2000; however, the majority of growth in the minority population is from an increase in the Latino share of the population. Neighborhoods in the second Latino growth trajectory are tracts that are *mostly white and become predominantly Latino*. These tracts are predicted to be composed of 12 percent Latinos in 1970 that grows to a predicted value of 48 percent by 2000. Blacks grow from almost no presence (less than one percent) to a very small presence (3.5 percent) by 2000. Empirically, from Figure 2.4 we see that, again, the models likely underestimate the growth in the percentage Latino and the expansion of blacks in neighborhoods, but overall describe the trend relatively well. These neighborhoods appear to be undergoing a slow transition from white to Latino over the entire three decade period.

The next racial and ethnic composition change trajectory, late Latino growth, to be very similar to the stable all-white racial trajectory: blacks and Latinos combined are expected to compose less than three percent of the population in these tracts in 1970 and still less than seven percent in 2000. However, the ternary plots in Figure 2.4reveal that the low levels of predicted minority population for neighborhoods following this trajectory are likely the result of a somewhat dramatic growth in the Latino population during the 1990s. One can see that, although Latinos has been becoming a larger proportion of these tracts since the 1980s, a substantial number of tracts were still predominantly or very close to all-white in 1990. By 2000, there were no tracts following this trajectory that had more than 80 percent white in the tract. Thus, the growth mixture model was likely fit closer to the trajectory from the 1970s and 1980s and did not capture the increase of Latinos in the 1990s. Although the predicted values were not terribly precise because of the quadratic functional form used in the model, the model did identify this unique trajectory from the other Latino growth trajectories.

The final growth trajectory class also follows a discontinuous pattern that is revealed by looking at the ternary plots in Figure 2.4. Neighborhoods in this trajectory can be described as having *Latino growth followed by displacement* of Latinos. The model predicts a moderate percentage of Latinos with a reasonably large amount of growth such that neighborhoods are predicted to initially have about 18 percent Latino in 1970 that increases to 29 percent by 2000. Blacks are predicted to have a small presence (one percent) in these neighborhoods that slowly grows over the three decades ending with about six percent of the population. However, again looking at the plots in Figure 2.4, we see that neighborhoods in this trajectory start out as tracts that are predominantly white with some Latinos and become increasingly Latino during the 1970s and 1980s. The black share of the population grows in some neighborhoods, though most can still be relatively accurately described as mixed between whites and Latinos. Yet, after this period of Latino growth, we see a dramatic shift in the 1990s as a substantial number of tracts gain in the white share of the population and some become almost- or all-white by 2000. These figures would suggest that these tracts might be undergoing gentrification and Latinos are being displaced by white residents.

Demographic, Socioeconomic, and Ecological Characteristics of Tracts Following Racial and Ethnic Composition Change Trajectories

Beyond comparing the distribution of observed racial and ethnic composition for neighborhoods classified into each of the underlying latent trajectories, it is also instructive to examine the observed changes in socioeconomic status and ecological characteristics of neighborhoods by the different latent trajectories. Examining how racial and ethnic change is associated with changes in other characteristics of the neighborhood can provide insight about how neighborhood racial and ethnic change might be experienced on a broader level by residents and provide researchers and policy makers with a more extensive knowledge about how neighborhood racial and economic changes are related. To explore these trends, neighborhood demographic, socioeconomic, and ecological characteristics were summarized by decade for neighborhoods classified into each of the latent racial and ethnic composition trajectories. Table 2.1 reports the mean value of neighborhood characteristics for each decade from 1970 to 2000 as well as the change in means for each characteristic from the 1970 to 2000 for neighborhoods classified by their underlying latent trajectory of racial and ethnic composition change.

Racially stable neighborhoods. Looking first at neighborhoods with stable racial and ethnic populations, we find – unsurprisingly – that neighborhoods in different trajectories have very different patterns of neighborhood socioeconomic and ecological characteristics. The first three columns report the means of the racial and ethnic composition by race in each decade and summarize the patterns depicted in Figure 2.4. Looking at the values of racial composition for the stable white neighborhoods, we find evidence of what was suggested in the ternary plots: Chicago metropolitan neighborhoods, even those that are stably white, are becoming more diverse. By 2000, whites in this group of neighborhoods comprised, on average, less than 90 percent of the population. This provides further evidence of the pattern of increasing diversity that could be seen in the transition matrices. At the same time, this could indicate that some of the neighborhoods that would be included in the integrated categories (e.g., white-Latino mixed or white-black-Latino mixed neighborhoods) in the transition matrix remain, on the whole, overwhelmingly white. We find that home values among owner-occupied homes increased by almost $70,000 over three decades and the incomes of residents in these tracts increased by over $16,000.[12] These neighborhoods have a high and increasing percentage of college graduates, little poverty, high occupancy, and high levels of homeownership such that in the average stable white tract, three quarters of owners own their own home. In all, they are socioeconomically very well off.

Stable black neighborhoods have followed very different pattern of change. The absolute monetary value of home appreciation (in constant dollars) was only half that for homeowners in stable black neighborhoods compared to stable white neighborhoods. Although the rate of return is higher in the stable black neighborhoods than the stable white neighborhoods – the average home value in 2000 is 112 percent higher than the 1970 compared to a 61 percent increase in stable white neighborhoods – most of this increase came in the 1990s. Because almost 95 percent of stable black tracts are in central cities, it is possible that home values could have been driven by speculation on central-city real-estate prices. Furthermore, a far fewer proportion of residents own their own home compared to white residents. Therefore, increases in home values probably mean higher rents for those who are renting. Along with the reduction of $919 in household income among residents, this could suggest that many residents are facing more financial hardship, and the high level of growth in poverty, particularly through the 1980s, suggests that this might be the case.

Finally, the changes in the socioeconomic and ecological characteristics of stably

[12] The values of mean home value and mean household income in Table 2.5 are reported in constant 1999 dollars adjusted using the national consumer price index inflation factors.

integrated neighborhoods indicate a marked improvement during the 1990s. For example, the mean home value grew slowly, about $10,000 in constant 1999 dollars per decade from 1970 to 1990, but jumped by over $20,000 from 1990 to 2000. Thus, over half of the appreciation of home values in stably integrated came after 1990. Incomes, after declining in the 1970s and regaining those losses in the 1980s, increased in the 1990s almost twice as fast as they did in the 1980s. Similarly trends toward increased poverty, vacancy, and decreased homeownership all reversed in the 1990s. These results imply that the prospects of stably integrated neighborhoods might have improved in recent decades.

Black growth neighborhoods. The next two panels in Table 2.5 report the change in socioeconomic and ecological characteristics for the two neighborhood trajectories that experience black growth. The first, those tracts that transition rapidly from nearly all-white to all-black have modest levels of appreciation in home values but declining incomes. In constant dollars, households in neighborhoods following this trajectory made an average of $40,410 in 1990, representing a loss of almost $7,000 compared to neighborhood households in 1970. During the 1990s, neighborhood households increased their incomes by $3,000 over the 1990 level, representing a net total loss of $4,000 dollars from 1970 to 2000. Poverty also expanded in these neighborhoods from the 1970 to 1990 and leveled off in 1990 such that almost one in every four people was in poverty. Levels of homeownership declined very modestly, but the vacancy rate expanded considerably, over doubling from the 1990 rate. Thus, tracts following the rapid racial succession trajectory experienced declines in socioeconomic status, particularly in the decades when the racial transition was most pronounced.

Neighborhoods undergoing a transition from all-white to diverse integrated neighborhoods showed an interesting trend in their average racial composition. Having virtually no blacks and very few Latinos in 1970, neighborhoods following this trajectory increased in the share of black residents to seven percent in 1980 and then underwent a large increase in 1990 to an average of 36 percent black. The comparison with tracts that underwent a complete racial transition in the 1970s is instructive for understanding how racial and ethnic trajectories might have changed: neighborhoods following the complete racial transition trajectory were also about seven percent black in 1970 and transitioned to 75 percent black in a single decade. This suggests that, at least through the 1980s, large racial transitions still occurred with some frequency; however, the far smaller level of transition over a single decade (a change from seven to 35 percent black compared to a change from seven percent to 75 percent) might suggest that racial transition, when it does occur, is much more muted in the 1980s compared to the 1970s. The share of white residents continues to decline, but whites remain one in every four residents which means that these tracts remain relatively well-integrated and it appears that they might maintain that diversity.

Changes in the racial composition are also associated with neighborhood socioeconomic changes. As the share of black residents increased in the 1980s, home values underwent a dramatic $14,000 drop in home values (in constant dollars) over the decade; however, prices recovered more than $12,000 of that loss in the subsequent decade. Similarly, household incomes dropped during the 1980s and rebounded in the 1990s, though they did not completely recover to the income levels of residents in the 1970s. The percentage of residents in poverty also nearly doubled in the 1980s, but remained relatively stable into the 1990s and increased less than a percentage point. The changes in these socioeconomic conditions provide further evidence that racial transition continued to occur through the 1980s with many of the negative consequences associated with racial change (Ellen 2000; Harris 2001) but that many of these trends reversed or slowed in the 1990s suggesting that there was a greater possibility for a sustained level multiethnic integration.

Latino growth neighborhoods. The final four panels in Table 2.5 report the socioeconomic and ecological characteristics of neighborhoods following one of the trajectories of Latino growth. Examining the socioeconomic characteristics of residents living in neighborhoods following the first trajectory, those that were integrated between whites and Latinos in 1970 and became all- or mostly-Latino by 2000, show that they were relatively socioeconomically stable from 1970 to 2000. The average income of households, calculated in 1999 dollars, increased by only $770 dollars in the three decades and the percent poor, after jumping some in the 1970s remained relatively constant in the 1980s and 1990s. There was an increase in the percent of residents with a college degree in the 1990s, though the absolute value of 13 percent remained relatively low. The one socioeconomic indicator that was instable during this period was the average home value. Neighborhoods following this racial and ethnic trajectory had the lowest home values of all of the trajectories in 1970 at $12,000 in 1999 dollars and appreciated very little through the 1970s and 1980s. In the 1990s, however, the average home value increased 2.5 times from $19,024 in 1990 to $47,570. Only about 30 percent of residents lived in homes that they owned, so this increase in home values probably represented a financial hardship for many residents especially since the income of residents in this period did not increase. Just as with stable black neighborhoods, almost all of the neighborhoods in this trajectory are in a central city and could suggest that the dramatic increase in prices could represent rising real estate values and speculation by developers that could lead to displacement of Latino residents.

Neighborhoods following the next two Latino growth trajectories, those that went from mostly white to predominantly Latino and those that experienced late Latino growth, experienced similar changes in socioeconomic changes. However, neighborhoods following the late Latino growth trajectory generally neighborhoods experiencing late Latino growth started from a more socioeconomically advantaged position. Household incomes were relatively stable in both types of neighborhoods, increasing by just under $600 for households in the mostly white to predominantly Latino neighborhoods and by only $41 in the late Latino growth neighborhoods, though the latter started with incomes almost $8,000 higher than the neighborhoods with a larger

Latino population. There was a jump in the poverty rate in from 1980 to 1990 for neighborhoods in the mostly white to predominantly Latino neighborhoods which resulted in poverty rates that were twice as high those in the late Latino growth neighborhoods by 2000.

Both types of neighborhoods experienced a decline in household income during the 1980s and 1990s compared to 1970 incomes. Neighborhoods following both trajectories saw increases in home values of over $20,000; however, in neighborhoods that had late Latino growth, home values experienced a decline in the 1980s just as the percentage of Latinos increased. During this decade, the percent Latino increased from eight percent to almost 23 percent at the same time that home values declined from $81,530 to $78,746. Most of the $21,000 increase in home values in these neighborhoods came after 1990. The one area of major difference between these two trajectories is that the mostly white to predominantly Latino neighborhoods were much more likely to be in the central city compared to the late Latino growth neighborhoods: 73 percent of the former were located in the central city while only 48 percent of late Latino growth neighborhoods were located there.

The final trajectory of neighborhood racial and ethnic composition change is that of Latino growth followed by displacement. The first three columns show the shifting racial composition of neighborhoods that follow this trajectory. The proportion of neighborhoods Latinos comprised increased from just less than 20 percent in 1970 to more than 34 percent in 1980 followed by a relatively stable racial and ethnic composition when the percentage Latino declined slightly and percent black increased slightly while the white share or residents remained constant. In the 1990s, whites increased their share of the population from the 58 percent present in 1990 to just over 70 percent in 2000 while the Latino proportion dropped from 31 percent to 20 percent in the same time. Changes in the socioeconomic characteristics of the neighborhood definitely suggest that this racial and ethnic change was indeed related to gentrification. Housing prices nearly doubled every decade from 1970 to 2000 so that housing prices, in constant 1999 dollars, jumped from $15,000 in 1970 to $129,000 in 2000. Additionally, household incomes of residents nearly doubled from 1970 to 2000 and *over half* of the residents 25 and older had college degrees, far greater than the percentage of residents having college degrees in any other trajectory. Vacancy rates were declining, and owner-occupied units increasing in these neighborhoods as well, providing indications that the ecological characteristics of the neighborhood were changing as well. Despite these overall increases, 14 percent of residents still live in poverty meaning that there could be a bifurcation of residents' socioeconomic status in these neighborhoods, which would also be typical of gentrifying neighborhoods.

DISCUSSION

The results presented here point to the fact that neighborhoods in Chicago, like many multiethnic metropolitan areas, are becoming more diverse. The increased diversity, however, does not necessarily suggest that we are likely to see substantially lower levels of segregation in the Chicago metropolitan area's future. The number of all-white neighborhoods in the metropolitan area has substantially declined. Even those that still are all-white tend to have at least a small proportion of non-whites which was not true in the past. As the number and proportion of all-white neighborhoods decline, the number and proportion of mixed-race neighborhoods increased. The number of all-black neighborhoods has, however, remained very high and the probability of it becoming more diverse after moving to the all-black category is very small. Also, in the period from 1970 to 2000 marked the advent of the all-Latino tract in the Chicago metropolitan area. Although the number of these tracts is still small in comparison to all-black neighborhoods, it does potentially point to a worrisome trend.

Although transition matrices are helpful to see the broad trends of racial and ethnic change, they miss much of the diversity *within* these broad categories that is also revealing about the patterns of racial and ethnic integration. Looking at the distribution of the three racial and ethnic groups within the categories suggests that whites and Latinos are relatively evenly distributed within the white-Latino neighborhood type. Whites and blacks, on the other hand, tend to be clumped at either end of the distribution; that is, there are many tracts that are almost all-black and many that are almost all-white and very few in between. This suggests that whites' tolerance for Latinos is higher than their tolerance for blacks, which supports the idea of a racial hierarchy (Zubrinsky and Bobo 1996).

More support comes from the finding that while blacks and Latinos are sharing more neighborhoods, the level at which they do so depends on how prevalent whites are in the tract. Both blacks and Latinos have a greater presence in 2000 than in 1970 – or even 1990 – in neighborhoods shared between whites and the other race; however, as the share of whites decreases, so does the proportion of the other minority. Examining the trajectories of racial and ethnic change over time within each neighborhood reveals how these patterns might come about. It appears like it is less about blacks leaving white-Latino neighborhoods or Latinos leaving white-black neighborhoods as much as it is about whites leaving both types of neighborhoods. Because the whites leaving tend to be replaced by either blacks or Latinos, this pushes the neighborhood much closer to either an all-minority tract or a tract shared between the two minority groups. This trend appears to be more the case for white-Latino neighborhoods than white-black neighborhoods as a substantial number of neighborhoods still transition from white to black without gaining a significant number of Latinos.

That blacks and Latinos do not very frequently share neighborhoods in Chicago stands in contrast to research from both Los Angeles (Lee and Wood 1991; Clark 1993) and New York (Alba et al. 1995). In both of those locations, investigators found a substantial increase in the growth of shared black-Latino neighborhoods. There could be a number of reasons that I did not find the same in Chicago. First, the race of Latino residents might be important. Black Latinos might be doubly disadvantaged on the housing market for both their ethnicity (and potentially language difficulties) and their race. This might mean that they end up in largely black neighborhoods. Second, the older age of Chicago than Los Angeles might have made it easier for Latinos to remain segregated from whites, particularly as they moved into some neighborhoods where whites maintained segregation.

The latent class growth models reveal that the racial and ethnic compositional change in the Chicago metropolitan area follow nine separate trajectories that can be conceptually grouped into three larger categories: stable racial and ethnic compositions, black growth, and Latino growth. By far, the most common trajectories are stable white and stable black neighborhoods meaning that the majority of all tracts retain a constant racial composition and, given how racially segregated Chicago has been and continues to be, the inertia of these trajectories could indicate that there will be little change in this pattern. Further evidence that neighborhood trajectories could lead to persistent segregation is the fact that four percent of all metropolitan tracts underwent complete racial succession during these three decades as well as the increasing share of Latino residents and declining share of white residents in mixed Latino-white neighborhoods.

On the other hand, the observed levels of racial and ethnic composition in many neighborhoods suggest that there is the possibility of a more integrated metropolitan area. Some neighborhoods have retained a multiethnically diverse composition over three decades while others that appeared to be heading toward a path of complete racial transition have, in recent decades, managed to maintain an integrated racial composition. Even many of the stable white neighborhoods now have more than a token proportion of non-white residents in them, though these tend to be Latinos more than blacks. Furthermore, even in areas where the share of white residents has declined, the majority of the decline occurred in the 1970s and 1980s and slowed throughout the 1990s. Thus, while some neighborhoods might still undergo racial transition, this transition is much slower than it has been in past decades and appears to be much less "inevitable."

Socioeconomically, stable white neighborhoods have consistently remain the most advantaged areas in the metropolitan area, though the areas that have undergone Latino displacement and gentrification since 1990 are approaching stable white neighborhoods. Neighborhoods undergoing racial or ethnic transitions to larger minority populations are the most disadvantaged. The socioeconomic position of neighborhoods undergoing black growth has been declining in absolute terms as well as relative to neighborhoods experiencing other trajectories of neighborhood racial and ethnic change. Neighborhoods experiencing Latino growth have also experienced socioeconomic declines, though not to the degree that neighborhoods experiencing black growth have.

One area in need of further examination is the extent to which increasing real estate values affect residents in neighborhoods undergoing different types of racial and ethnic changes. Although the most obvious example is the trajectory of gentrifying neighborhoods that underwent a recent period of white displacement of Latinos that followed a period of Latino growth, the housing values of several other trajectories increased – sometimes by large amounts – in the 1990s. Determining the extent to which the appreciation in housing values reflects speculation in the housing and real estate market in the 1990s compared to a stronger willingness of metropolitan residents, particularly whites, to live in more multiethnic communities is important. If it is the former, the increasing multiethnic character of some neighborhoods may be fleeting as non-white incumbent residents get displaced in the reverse of the typical racial succession story. If it is the latter, there is a chance that city neighborhoods could become a place where residents of different races can both live together and reap the benefits of homeownership and appreciating housing values that have been so elusive, particularly for blacks (Flippen 2001, 2004).

Furthermore, this analysis only examined the trends in socioeconomic characteristics for the entire population of neighborhoods. Future analyses should consider how the socioeconomic trends in neighborhoods might differ for residents of different races and ethnicities. It is likely that Latinos living in the neighborhoods experiencing Latino growth followed by gentrification and displacement have very different socioeconomic profiles than the incoming white residents. Exploring these differences can provide an provide an important context for understanding the relationships between the shifting patterns of racial, ethnic, and socioeconomic composition of neighborhoods in metropolitan areas.

Conclusion

Although this analysis examined only a single metropolitan area, the results underscore the complexity of racial and economic change occurring in metropolitan neighborhoods and demonstrated the importance of measuring the full context of racial and ethnic diversity in that change. Since a substantial amount can be missed by only exploring neighborhood change using broad categories, I was able to show how alternative methods of analysis can demonstrate the diversity in both types and change of neighborhood racial and ethnic composition in the Chicago metropolitan area. This more detailed picture revealed an increase in the diversity of many tracts in the Chicago metropolitan area, and more diversity than would have been discovered by simply investigating the changes between racial and ethnic composition categories. Blacks, however, still remained in neighborhoods with substantially less diversity – particularly all-black neighborhoods in comparison to all-white neighborhoods – and neighborhoods mixed with blacks were more likely to become all-black. These results suggest that rapid racial succession might be a phenomenon of a bygone era in metropolitan Chicago, but that racial transition in neighborhoods, particularly in Latino growth areas, over the long-run is much more likely.

TABLES AND FIGURES

Table 2.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000

	1970		**1980**		**1990**		**2000**	
Racial/Ethnic Composition	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
All white	1,366	69.02	1,127	56.07	965	47.30	747	36.51
All black	231	11.67	315	15.67	329	16.13	353	17.25
All Latino	0	0.00	10	0.50	26	1.27	42	2.05
White-black Mix	134	6.77	161	8.01	191	9.36	174	8.50
White-Latino Mix	196	9.90	276	13.73	353	17.30	481	23.51
Black-Latino Mix	2	0.10	19	0.95	40	1.96	64	3.13
White-black-Latino Mix	50	2.53	102	5.07	136	6.67	185	9.04
Total	1,979	100.00	2,010	100.00	2,040	100.00	2,046	100.00

Note: See text for definition of racial/ethnic categories

Source: Neighborhood Change Database, Geolytics, Inc.

Table 2.2. Matrix of transitions from racial categories in 1970 to 2000

Racial/Ethnic Composition	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**Total**
(1) All white	666	56	10	118	387	16	111	1,364
	(0.49)	(0.04)	(0.01)	(0.09)	(0.28)	(0.01)	(0.08)	(1.00)
(2) All black	0	219	0	5	0	3	0	227
	(0.00)	(0.96)	(0.00)	(0.02)	(0.00)	(0.01)	(0.00)	(1.00)
(3) All Latino	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
(4) W-B Mix	5	62	0	33	4	9	19	132
	(0.04)	(0.47)	(0.00)	(0.25)	(0.03)	(0.07)	(0.14)	(1.00)
(5) W-L Mix	27	5	29	4	75	22	34	196
	(0.14)	(0.03)	(0.15)	(0.02)	(0.38)	(0.11)	(0.17)	(1.00)
(6) B-L Mix	0	1	0	1	0	0	0	2
	(0.00)	(0.50)	(0.00)	(0.50)	(0.00)	(0.00)	(0.00)	(1.00)
(7) W-B-L Mix	2	6	3	3	7	14	14	49
	(0.04)	(0.12)	(0.06)	(0.06)	(0.14)	(0.29)	(0.29)	(1.00)
Total	700	349	42	164	473	64	178	1,970
	(0.36)	(0.18)	(0.02)	(0.08)	(0.24)	(0.03)	(0.09)	(1.00)

Notes: Row proportions in parentheses; no tracts were all-Latino in 1970; see text for description of racial/ethnic categories

Table 2.3. Initial percent and change in percent white, black, and Latino by types of racial compostion in 1970

		WHITE		BLACK		LATINO	
Racial/Ethnic Composition	**N**	**Percent in 1970**	**Change 1970-2000**	**Percent in 1970**	**Change 1970-2000**	**Percent in 1970**	**Change 1970-2000**
All white	1364	97.3	-24.9	0.5	11.1	2.2	13.8
		(2.7)	(27.7)	(1.4)	(22.7)	(2.0)	(19.6)
All black	227	2.6	-1.1	96.4	0.7	1.0	0.3
		(2.3)	(4.5)	(3.0)	(6.4)	(1.3)	(4.0)
W-B Mix	132	47.8	-25.3	48.8	20.4	3.3	4.9
		(25.3)	(23.9)	(25.9)	(24.6)	(2.3)	(13.1)
W-L Mix	196	68.5	-28.3	1.6	11.8	29.8	16.5
		(18.5)	(28.8)	(2.4)	(20.8)	(18.1)	(25.8)
B-L Mix	2	3.5	37.6	77.3	-24.8	19.1	-12.8
		(3.4)	(52.3)	(10.0)	(42.5)	(6.7)	(9.8)
W-B-L Mix	49	43.4	-17.7	29.2	6.6	27.4	11.1
		(20.1)	(25.7)	(16.7)	(24.7)	(14.9)	(26.7)
All tracts	1970	78.7	-22.3	15.7	10.4	5.6	11.8
		(33.3)	(27.1)	(32.7)	(21.9)	(11.1)	(19.7)

Note: See text for description of racial/ethnic categories; no tracts were all-Latino in 1970

Table 2.4. Transformed coefficients of latent growth trajectories and predicted values of tract proportion black and tract proportion Latino populations in metropolitan tracts

	Racially Stable			**Black Growth**		**Latino Growth**			
	Stable white	**Stable black**	**Stable multi-ethnic integration**	**All-white to all-black succession**	**All-white to multi-ethnic integration**	**Integrated white-Latino to all-Latino**	**Mostly white to predom-inantly Latino**	**Late Latino growth**	**Latino growth followed by displace-ment**
Percent of tracts	52.50	14.27	4.16	3.86	3.84	3.60	3.92	9.39	4.46
Percent black	0.18	94.22	32.44	3.64	0.04	2.23	0.62	0.15	1.02
Linear change in percent black	0.10	1.60	2.48	72.61	4.14	0.10	1.02	0.04	2.06
Quadratic change in pct. black	0.00	-0.10	-0.11	-4.64	0.12	0.00	-0.02	0.01	-0.10
Percent Latino	1.58	0.90	7.27	3.79	2.03	51.36	11.50	2.54	18.37
Linear change in percent Latino	0.01	-0.12	0.08	-0.01	1.25	8.68	12.94	0.31	5.47
Quadratic change in pct. Latino	0.01	0.01	0.00	0.00	-0.05	-0.50	-0.23	0.29	-0.62
% Black 1970	0.18	94.22	32.44	3.64	0.04	2.23	0.62	0.15	1.02
% Black 1980	0.28	95.73	34.81	71.61	4.30	2.33	1.62	0.20	2.98
% Black 1990	0.38	97.04	36.96	130.32	8.79	2.44	2.59	0.28	4.75
% Black 2000	0.49	98.17	38.89	179.75	13.51	2.55	3.52	0.39	6.33
% Latino 1970	1.58	0.90	7.27	3.79	2.03	51.36	11.50	2.54	18.37
% Latino 1980	1.60	0.79	7.36	3.78	3.23	59.53	24.21	3.14	23.22
% Latino 1990	1.66	0.71	7.44	3.77	4.34	66.70	36.46	4.33	26.82
% Latino 2000	1.74	0.64	7.54	3.76	5.34	72.86	48.26	6.10	29.17

Table 2.5. Observed racial and ethnic composition, socioeconomic characteristics, and ecological characteristics of tracts from 1970-2000 by most likely neighborhood latent trajectory class membership

	Pct. black	Pct. Latino	Pct. white	Mean home value	Mean HH income	Pct. Coll. educ.	Pct. poor	Pct. vacant	Pct. owner-occupied	Pct. central city
Stable white										
1970	0.56	2.03	97.40	$112,255	$62,617	15.68	4.28	4.00	74.45	15.02
1980	1.82	2.95	95.23	$140,288	$58,766	23.06	4.46	4.79	74.60	
1990	2.63	4.32	93.05	$155,871	$72,636	29.10	4.84	4.20	73.77	
2000	4.48	8.21	87.31	$181,348	$78,968	34.77	5.23	3.66	75.76	
Change 1970-2000	3.92	6.18	-10.10	$69,093	$16,350	19.09	0.96	-0.34	1.31	
Stable black										
1970	92.08	1.47	6.45	$31,084	$36,172	4.09	24.55	7.37	36.89	94.56
1980	96.86	1.17	1.96	$34,359	$31,645	5.94	35.04	7.93	29.92	
1990	97.51	0.81	1.68	$44,487	$28,485	7.96	41.22	14.18	31.55	
2000	96.43	1.42	2.16	$65,747	$35,253	11.24	34.51	14.18	34.26	
Change 1970-2000	4.35	-0.05	-4.30	$34,664	-$919	7.15	9.96	6.82	-2.63	
Stable diverse integration										
1970	33.75	9.23	57.02	$44,809	$44,599	12.17	15.33	7.49	50.21	55.29
1980	46.01	11.65	42.33	$54,856	$39,917	18.04	20.59	9.83	40.36	
1990	49.65	12.91	37.44	$64,245	$43,818	22.82	23.77	10.48	41.51	
2000	50.13	17.44	32.43	$87,609	$50,400	25.67	21.06	8.96	46.19	
Change 1970-2000	16.38	8.21	-24.59	$42,800	$5,801	13.49	5.73	1.46	-4.02	
All-white to all-black transition										
1970	6.52	5.06	88.42	$54,895	$48,632	7.33	7.41	3.85	58.55	82.28
1980	74.97	6.21	18.82	$57,280	$44,369	9.13	18.77	5.68	57.05	
1990	89.06	3.60	7.34	$53,653	$41,681	9.72	23.08	9.21	57.00	
2000	90.36	3.71	5.92	$70,194	$44,410	11.45	23.57	8.45	55.58	
Change 1970-2000	83.84	-1.35	-82.49	$15,299	-$4,222	4.12	16.16	4.60	-2.97	
All-white to diverse integration										
1970	0.39	2.43	97.18	$91,581	$56,789	11.61	3.91	2.85	71.90	28.21
1980	7.20	8.24	84.56	$94,032	$53,868	14.80	6.02	3.55	69.59	
1990	35.92	7.77	56.31	$79,651	$52,399	17.11	11.77	5.58	68.20	
2000	64.12	9.38	26.50	$92,057	$54,351	18.89	12.43	5.75	67.42	
Change 1970-2000	63.73	6.94	-70.68	$476	-$2,438	7.28	8.52	2.90	-4.47	

Table 2.5. Observed racial and ethnic composition, socioeconomic characteristics, and ecological characteristics of tracts from 1970-2000 by most likely neighborhood latent trajectory class membership (continued)

	Pct. black	**Pct. Latino**	**Pct. white**	**Mean home value**	**Mean HH income**	**Pct. Coll. educ.**	**Pct. poor**	**Pct. vacant**	**Pct. owner-occupied**	**Pct. central city**
Integrated white-Latino to all-Latino										
1970	4.39	51.18	44.43	$12,110	$37,890	2.48	16.35	7.89	30.62	94.59
1980	6.39	72.40	21.21	$14,003	$34,675	3.79	28.32	10.94	27.54	
1990	8.79	78.74	12.47	$19,024	$32,432	5.42	31.54	12.44	29.24	
2000	11.62	73.64	14.74	$47,570	$38,660	13.06	27.82	10.67	29.79	
Change 1970-2000	7.23	22.46	-29.69	$35,460	$770	10.58	11.47	2.78	-0.83	
Mostly white to predominantly Latino										
1970	2.58	12.66	84.76	$36,935	$43,415	4.28	9.60	4.61	41.24	72.50
1980	4.54	39.37	56.09	$41,852	$40,393	7.44	16.62	7.34	43.00	
1990	9.21	59.40	31.39	$44,592	$38,101	8.08	21.78	8.35	42.21	
2000	9.10	71.86	19.04	$63,581	$44,007	10.16	21.51	6.97	42.58	
Change 1970-2000	6.52	59.19	-65.72	$26,646	$592	5.88	11.91	2.36	1.33	
Late Latino growth										
1970	0.63	3.11	96.26	$71,662	$51,285	6.72	5.39	3.53	60.33	47.62
1980	1.96	8.32	89.72	$81,530	$47,843	10.23	7.10	4.95	58.77	
1990	3.80	22.75	73.45	$78,746	$47,781	12.45	9.15	4.91	59.14	
2000	6.26	53.03	40.71	$92,744	$51,327	13.45	11.59	4.62	59.37	
Change 1970-2000	5.63	49.91	-55.55	$21,082	$41	6.73	6.21	1.09	-0.96	
Latino growth followed by displacement										
1970	2.57	19.49	77.94	$15,369	$38,439	5.86	15.18	6.91	26.71	100.00
1980	7.03	34.63	58.33	$29,849	$37,518	16.38	20.86	11.21	23.77	
1990	10.56	31.25	58.18	$68,820	$46,937	31.02	19.43	11.92	27.30	
2000	9.46	19.90	70.64	$129,460	$71,059	53.20	13.58	7.42	34.71	
Change 1970-2000	6.88	0.41	-7.30	$114,091	$32,620	47.34	-1.60	0.51	8.00	

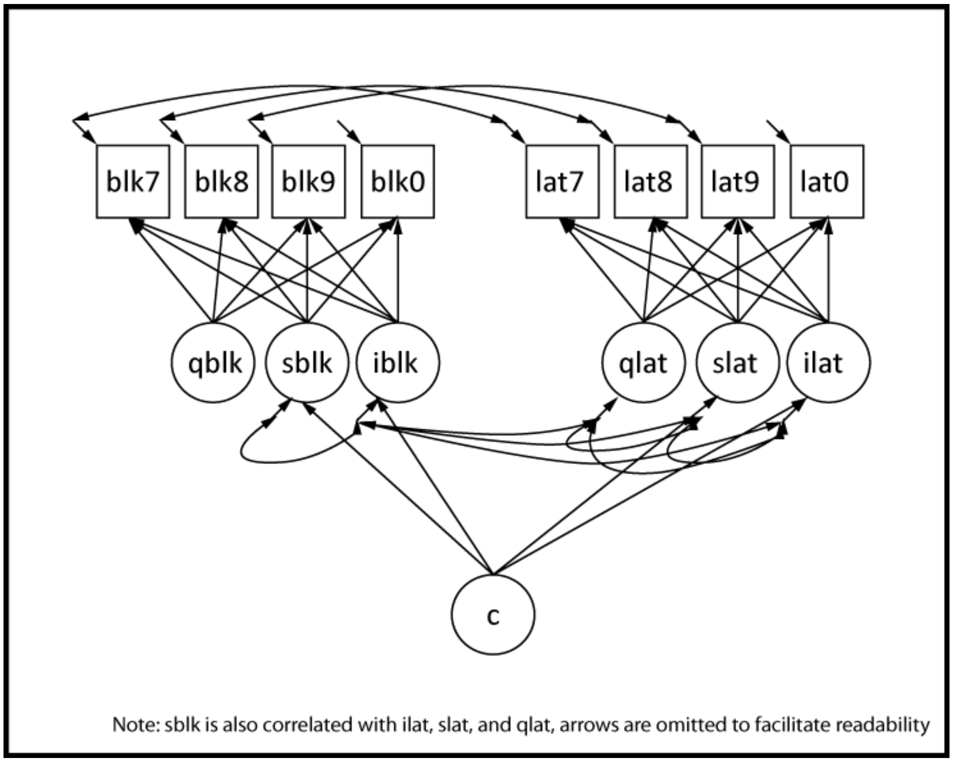

Figure 2.1. Conceptual diagram of growth mixture model

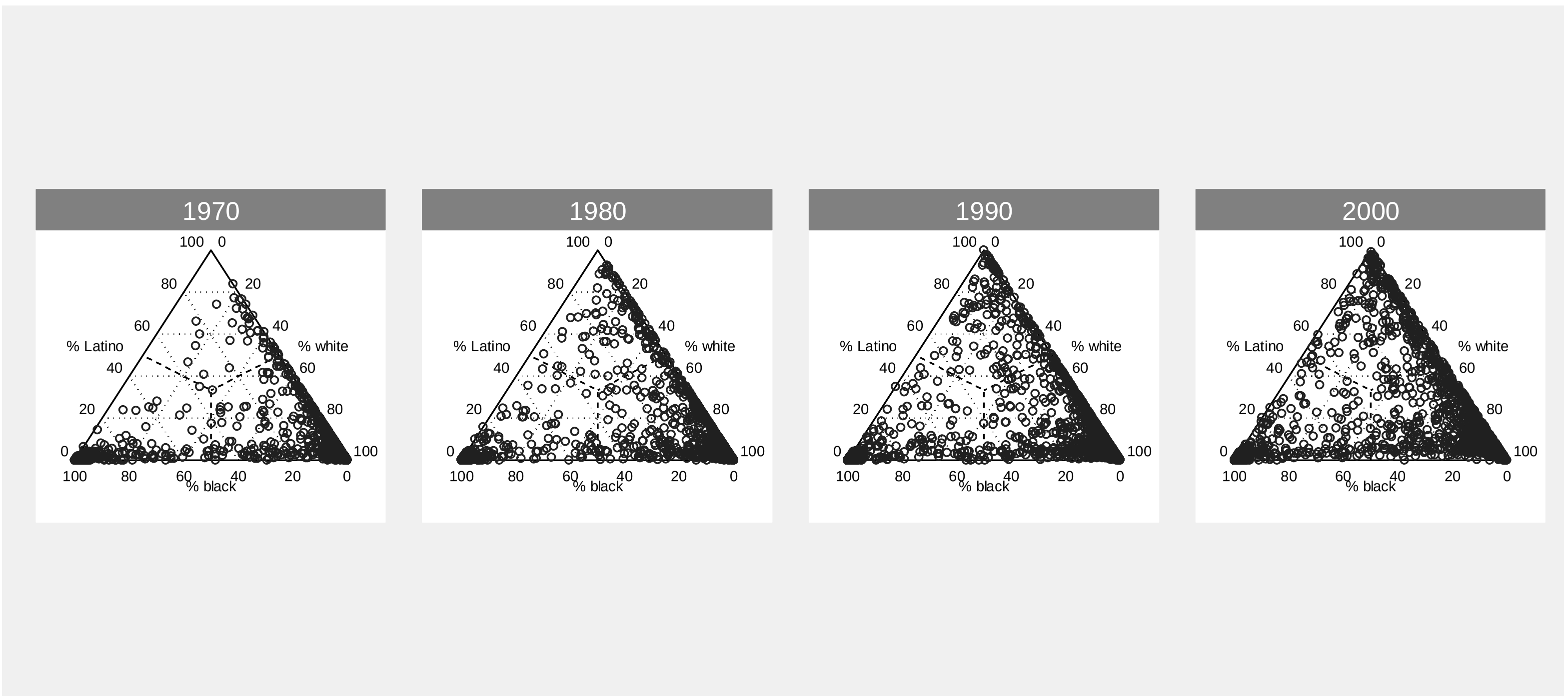

Figure 2.2. Ternary plots of non-Latino white, non-Latino black, and Latino racial and ethnic composition in 1970, 1980, 1990, and 2000 for tracts in the Chicago-Gary-Kenosha, IL-IN-WI CMSA

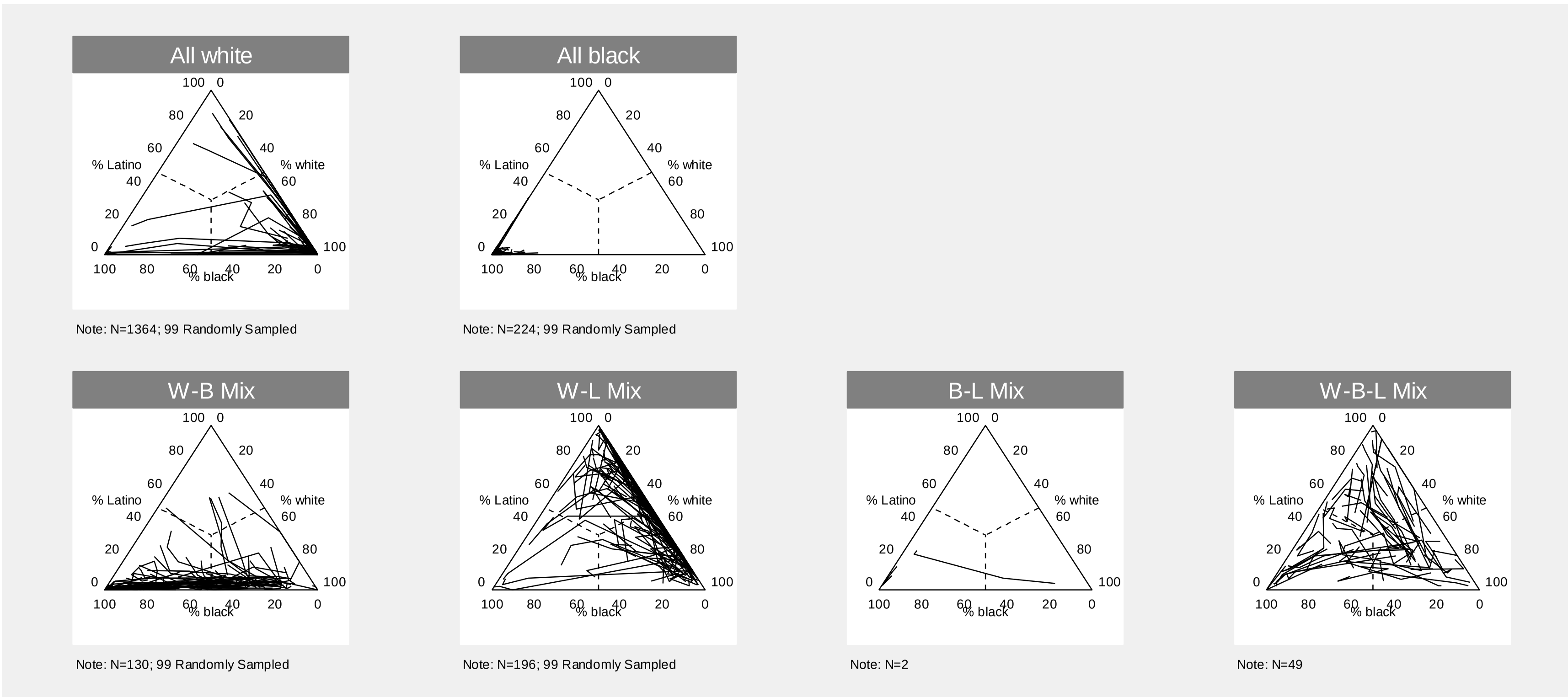

Figure 2.3. Ternary plots showing trend in decadal racial and ethnic change from 1970 to 2000, by racial and ethnic composition in 1970

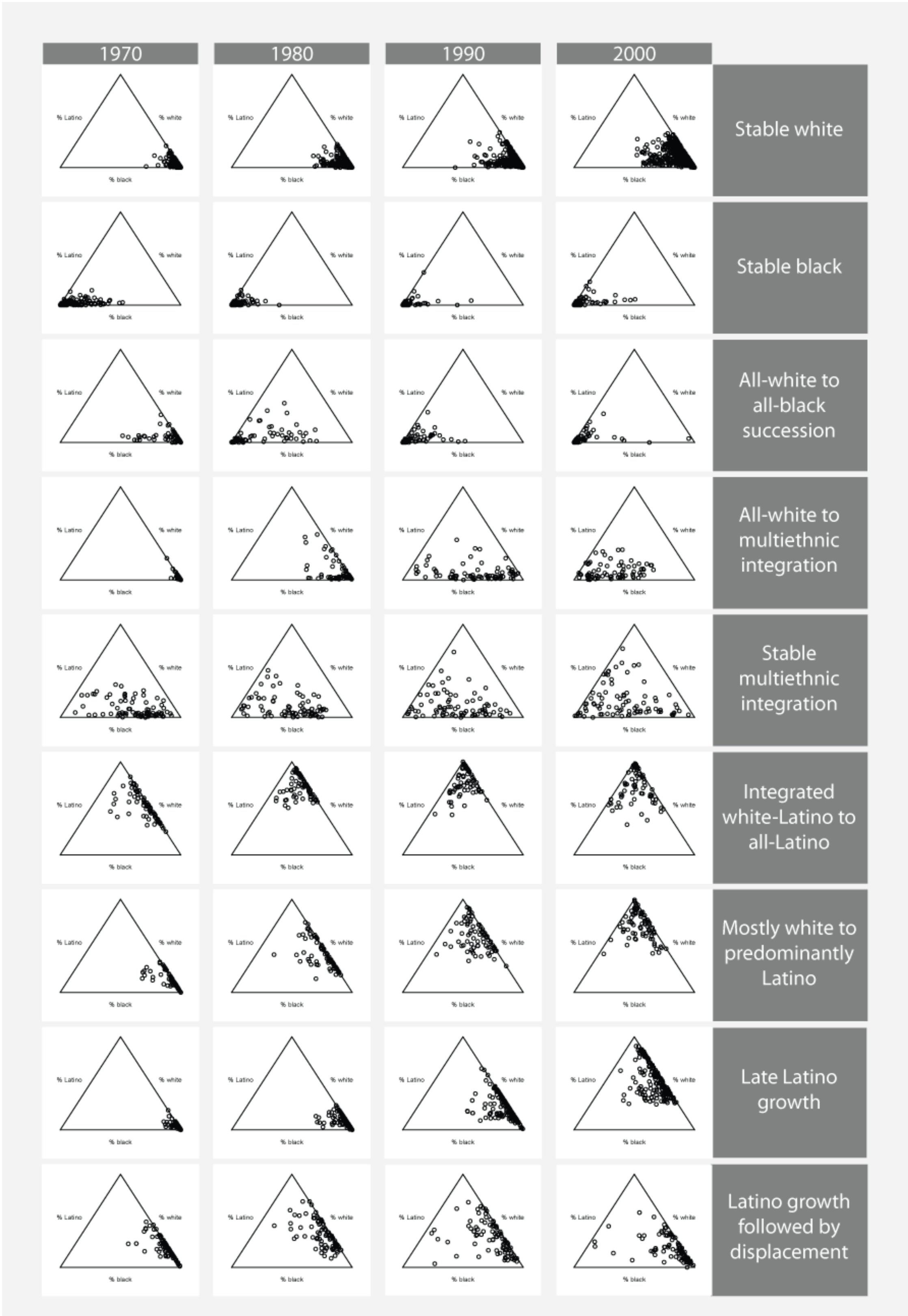

Figure 2.4. Ternary plots of observed racial and ethnic compositions in 1970, 1980, 1990, and 2000 by neighborhood latent growth trajectory class

CHAPTER 3

REDEVELOPMENT AND THE RUSTBELT: PATTERNS OF RESIDENTIAL PREFERENCES FOR REDEVELOPED CHICAGO NEIGHBORHOOD

There is no doubt that gentrification and redevelopment have transformed American cities in recent decades (Smith 1996; Wyly and Hammel 1999). While a constellation of economic, political, and cultural factors has contributed to the creation and expansion of urban redevelopment, part of the expansion is due to the growth in demand for redeveloped neighborhoods and urban lifestyles. The growth in demand suggests that traditional theories of middle-class suburban preferences and urban flight should be reconsidered (Hamnett 1991). Urban neighborhoods that were thought to be an anathema to the middle-class – particularly the white middle-class – have become popular residential destinations for many middle-income professionals. Observing the increasing number of middle-income professionals in urban neighborhoods, several scholars have theorized that the redevelopment of urban neighborhoods indicates the emergence of a new class that can be defined by their distinct preferences for the amenities provided by an urban lifestyle (Ley 1996; Florida 2002; Bridge 2001). Some have even argued that policies to "revitalize" cities should focus on attracting this emergent class of professionals (Florida 2002).

In their work, these demand-side theorists have tended to accentuate the uniqueness of gentrifiers' residential preferences compared to other metropolitan residents. For these theorists, the increasing demand for urban neighborhoods is a result of the status associated with residential preferences for those neighborhoods. The preferences for urban neighborhoods distinguish this emergent class from the more "traditional" middle-class that seeks out suburban refuge and the lower- and working-classes living in central city neighborhoods (Jager 1986; Bridge 2001;

Hamnett 1991). Yet, despite arguing that the rise and expansion of urban redevelopment is largely based on the unique preferences of this emerging class, researchers have almost exclusively focused on the preferences of middle-class residents living in redeveloping neighborhoods and neglected the preferences and perspectives of other residents (Tom Slater 2006; Bridge 2006). Overlooking the residential preferences of other groups makes it impossible to ascertain how unique the residential preferences of middle-class gentrifiers are because researchers cannot compare the preferences of middle-class gentrifiers to other people who might prefer to live in a redeveloped neighborhood, but for one reason or another, are unable to move to one. Furthermore, and what is perhaps even more troubling in the American context, is that the topic of race and its influence on the development of preferences is hardly broached (Lees 2000). Given both the historical impact of race on the development of segregated metropolitan residential patterns that unevenly distribute the risks and benefits of redevelopment (Massey and Denton 1993) and the continuing influence of race on residential preferences (Farley et al. 1978, 1993; Emerson et al. 2001) and mobility decisions (Crowder 2001), this is a key oversight.

In this paper, I examine the social and economic factors that influence who would consider moving to a redeveloped neighborhood in an American city. To address the shortcomings of previous research, I use the responses from a representative sample of residents drawn from the population of Cook County, Illinois (the county containing Chicago and its surrounding suburbs) to investigate who would consider moving to a redeveloped neighborhood in the city of Chicago. Using the responses from this representative sample of residents allows me to explore the social and economic characteristics of residents who would consider moving to a redeveloped neighborhood from a much broader perspective than has been accomplished in previous studies. In particular, the breadth of respondents includes urban and suburban residents; blacks, whites, and Latinos; homeowners and renters; and residents with a diversity of economic and educational backgrounds. Examining how residential preferences are distributed across racial, socioeconomic, and urban/suburban groups, I shed light on the multiple influences that shape who would consider moving to redeveloped neighborhoods and how continued redevelopment might affect the residential patterns across the Chicago metropolitan area.

POLITICAL ECONOMIC CONTEXT OF AMERICAN URBAN REDEVELOPMENT

In the years following World War II, federal policies – particularly the funding and construction of the interstate highway system – favored suburban expansion over urban development. This was true for both industry and housing. Much of the manufacturing base that had provided employment and tax revenue for cities began leaving those cities for undeveloped suburban land with access to the new highways that provided a cheap method for transporting goods (Sugrue 1996). Cities, and their residents, were hit hard by these policies and the structural transformations in the manufacturing sector. As factories left central cities in the traditional manufacturing belt across the Great Lakes and Northeast, first for the suburbs and later for more distant locations, cities lost their traditional employment bases and the tax revenue generated from both the manufacturers and their former employees (Wilson 1996).

Housing policies to alleviate crowding in central cities before and during the war also favored new home construction and homeownership opportunities in the suburban rings surrounding central cities (Jackson 1985). However, owing to the racially discriminatory practices in both the mortgage lending and home sales markets, many of the opportunities created by these policies were closed to racial minorities (Massey and Denton 1993; Jackson 1985). To make matters worse, the government programs that did support urban housing opportunities tended to reinforce the existing racial segregation and expanded existing racial ghettos (Hirsch 1983; Sugrue 1996). The economic restructuring and discriminatory housing policies meant that the economic devastation that occurred throughout many formerly industrial cities was borne by the disproportionately poor and minority residents that were concentrated in central cities with poor services, inadequate housing, and few jobs (Massey and Denton 1993; Wilson 1987, 1996).

After decades of eschewing urban neighborhoods, the number of middle-class residents began to slowly increase in some neighborhoods as early as the 1960s. Watching the process in

London, which was going through a similar economic transformation as American cities, Ruth Glass (1964) coined the term "gentrification" to describe the process of working class Londoners being displaced by a new "gentry" of middle-class professionals. A number of factors led to the redevelopment and gentrification of cities. Many of these factors are structural in nature and created supply-side incentives for redevelopment. These include the devaluation of urban land that created profitable investment opportunities (Smith 1996), the movement towards laissez faire housing and urban policies that favored private intervention (Harvey 2001; Weber 2002; Ahlbrandt 1984), and positioning of certain cities as financial and service "control" centers of an increasingly global economic finance and distribution system (Sassen 2000). However, while these factors might have increased financial incentives to channel investment to central cities, without a demand-side inclination on the part of residents to move to urban neighborhoods this redevelopment would not have been sustainable.

MIDDLE-CLASS PREFERENCES FOR REDEVELOPED NEIGHBORHOODS

Presumably because the growth of the middle-class in urban neighborhoods was an unexpected reversal of middle-class suburban expansion, researchers have been interested in the social and economic characteristics and residential preferences of the middle-class residents who were moving to urban neighborhoods (Hamnett 1991). The characteristics and preferences of the middle-class residents moving to urban neighborhoods have been explored using a combination of ecological methods describing changes in neighborhood composition based on aggregate-level data and qualitative studies of residents living in neighborhoods undergoing change.

Much of the research on "demand-side" explanations for gentrification has been informed by Ley's (1996) investigation of redevelopment in Canadian cities in the 1970s and 1980s. Using census data from 1971 to 1991, he finds that neighborhoods with central locations, higher socio-economic status, high levels of public-sector and non-profit employment, proximity to amenities (e.g., parks or waterfronts), a large number of artists, a high proportion of group households, and a large proportion of unmarried, separated, or divorced residents lived in gentrifying neighborhoods. Empirical ecological analyses using census characteristics from later decades in Canada show similar results in that that higher socioeconomic status, increased rents, and historical architecture were related to gentrification (Meligrana and Skaburskis 2005) and studies from the United States revealed that, in addition, educational attainment (Wyly and Hammel 1999) and racial composition (Nelson 1988; Wyly and Hammel 1999, 2004) were also important factors in identifying gentrifying neighborhoods. Based on his empirical results, Ley (1996) highlights how the growth of redevelopment in urban neighborhoods is connected to the "new middle-class" affinities for urban lifestyles and the social and political movements of the 1960s that rejected the ideas of traditional middle-class suburban existence.

Based on the contours of social and economic change exposed by ecological studies, a number of scholars have explored why the middle-class residents prefer living in redeveloped neighborhoods using qualitative methods. What almost all of these qualitative studies have in common is that they identify the preference to live in a redeveloping urban neighborhood as a visible marker of taste. Several scholars have noted the role of artists and other cultural elites in defining the cultural field of residential preferences as they form the vanguard of redevelopment (Zukin 1982; Ley 2003; Lloyd 2002) and an expanding literature has linked Bourdieu's (1984) notion of distinction to this cultural production and argued that residential preferences form a field of cultural production (Bridge 2001). For instance, studying London neighborhoods, Smith and Holt (2007) have described how urban university students learn to appreciate the amenities offered by urban neighborhoods and, during their course of study, become "apprentice gentrifiers." Butler (2007) has noted that the ability to socially distinguish oneself has been facilitated by the increasing separation of where one is employed from where one needs to live. Thus, the tendencies of individuals with similar consumption patterns, educational attainment, and occupation to spatially cluster in urban neighborhoods can be attributed to the unique preferences among mobile professionals (Webber 2007; Butler and Robson 2001; Florida 2002).

The problem with understanding redevelopment by investigating the characteristics of people who move into redeveloping neighborhoods is that their residence in these neighborhoods expresses more than just the preferences of the residents. Residing in redeveloped neighborhoods also represents the ability of those residents to afford those particular types of neighborhoods and to be free from geographic constraints of employment. This is not to say that the substantial spatial clustering of people based on consumption patterns, educational attainment, and professional occupation is not an important trend shaping political economic realities in cities; largely, those professionally employed residents do desire living in redeveloping neighborhoods. However, investigating these trends provides an incomplete picture of the extent to which preferences, and especially the uniqueness of these preferences, are implicated in shaping the residential patterns in urban neighborhoods.

GENTRIFICATION'S "OTHERS"

Despite calls to examine the preferences and effects of other residents, the preferences of the (usually white) middle-class gentrifiers have received disproportionate attention (Tom Slater, Curran, and Lees 2004; Lees 2000). Bridge (2001) argues that the process of cultural distinction represented by the gentrification of urban neighborhoods requires that residents both act on their own preferences and account for the complex social calculus to anticipate the preferences of others. Yet, not measuring the preferences of the working-class and non-white residents has resulted in the assumption that the preferences of non-gentrifying residents are simply the "'other' of gentrification" (Bridge 2001:215). While a few studies have begun to examine the preferences of gentrification's "others", particularly members of lower- or working-class residents and African Americans, they have only indirectly captured the preferences of these groups.

Lower- and Working-class Preferences for Redevelopment

While the terms "lower-" and "working-" class are somewhat ambiguous and open to interpretation, I simply mean residents with fewer resources than the middle-class residents who are typically understood to drive redevelopment. There is scant evidence regarding the preferences for redevelopment among working-class residents. Those studies that do exist have used macro-level analyses of administrative data and determined that incumbent residents, particularly non-elderly residents, are willing to pay a premium for housing in order to remain in their current dwelling rather than move to a non-gentrifying area (Freeman and Braconi 2004; Vigdor 2002). In a subsequent qualitative study further investigating the effect of redevelopment on current residents, Freeman (2006) finds that incumbent residents in gentrifying neighborhoods welcome the commercial investment and improved services, but worry that they will be priced out of their neighborhoods (see also Sullivan 2006). However, because these studies only investigate the reactions of residents who live in neighborhoods redeveloping around them, they are silent on the preferences of lower- and working-class residents who do not live in redeveloping neighborhoods.

African American Preferences for Redevelopment

Measuring African American preferences is particularly important in the context of redevelopment for two reasons. First, inferring residential preferences based on where one currently lives is particularly problematic for blacks. This is because African Americans have more difficulty converting their mobility preferences into actual moves independent of their socioeconomic position, both generally (Crowder 2001) and in redeveloping neighborhood (Wyly and Hammel 2004). Second, intra-racial class differences among blacks have tended to be glossed over in favor of comparisons between blacks and whites. Blacks are often assumed to have similar preferences regardless of class and those preferences are defined in opposition to white preferences. This problem is not unique to investigations of gentrification and redevelopment (Pattillo 2003); however, because the process of redevelopment is located at the intersection of race and class, this is a particularly problematic oversight when investigating issues surrounding redevelopment and gentrification.

Recent investigations have begun examining both the historical role that middle-class African Americans had on gentrification (Bostic and Martin 2003) and the negotiation of black middle-class identities in gentrifying neighborhoods (Jackson 2001; Pattillo 2007; Anderson 1990). These latter studies are consistent in finding that black middle-class residents—particularly homeowners—have different preferences and priorities for their neighborhoods than their working-class neighbors. Studying community investment programs in Newark, New Jersey, Newman and Ashton (2004) found that middle-class African American homeowners were most the likely to take advantage of the housing opportunities in redeveloped neighborhoods and Bostic and Martin (2003) showed that the black middle-class helped drive the first wave of gentrification in the 1970s. Again, these studies only examine neighborhoods that are already undergoing redevelopment and do not attempt to examine the degree to which race and class might have an impact on whether residents would consider moving to a redeveloped neighborhood. And, despite the paucity of research on African American preferences, these studies represent a relatively large body of work compared to the complete lack of research investigating Latino preferences for redeveloped neighborhoods.

Redevelopment in a Metropolitan Context

Understanding both the immediate causes and potential implications of redevelopment requires the ability to make comparisons about the relative level of preferences among residents in the metropolitan area. In part, this means uncovering the preferences of gentrification's "others" described above; however, this by itself is insufficient. It also requires measuring the preferences of residents across the metropolitan area. Surveying only residents who have moved to redeveloped neighborhoods or who have remained as their neighborhoods redeveloped around them cannot inform the potential effects that redevelopment and specific policies might have on reshaping the residential patterns in American metropolitan areas. This is especially true for examining the possibility of attracting suburban residents to move to urban neighborhoods.

Informing these questions requires knowing who would consider moving to a redeveloped neighborhood from the entire metropolitan population, both from central cities and surrounding suburbs. Therefore, I examine who would consider living in a redeveloped neighborhood based on a representative sample of metropolitan residents from Chicago and its surrounding suburbs. I also examine how respondents' willingness to consider redeveloped neighborhoods might differ across and within the city of Chicago compared to the surrounding Cook County suburbs.

DATA AND METHODS

The data for this study come from the 2004 Chicago Area Study (CAS). The CAS is a multi-stage area probability sample surveying respondents 21 years and older living in Cook County, Illinois. The city of Chicago and many of its surrounding suburbs are located in Cook County and while many of Chicago's suburbs fall outside of Cook County, the suburbs that are inside of the county boundaries include a diverse array of communities typical of the Chicago suburbs. Computer-assisted personal interviews were conducted between August 2004 and August 2005. Respondents were sampled from 80 clusters, which were generally a single block group. Some clusters are defined across two different block groups. In these cases, the characteristics of the block group in which the majority of respondents live are used for analysis. The overall response rate was 45%, resulting in 789 completed interviews.[13]

Dependent Variable

One module of the CAS was devoted to measuring respondents' perceptions of redeveloped neighborhoods and their willingness to consider living in one. The module was introduced with the prompt, "In recent years, older places like Chicago have made efforts to redevelop the neighborhoods in their central cities. Think about what this brings to mind for you". The study used the term "redevelop" because alternatives such as "gentrify" have strong racial and class connotations (Hartigan 1999; Pattillo 2007) and "revitalize" implies a lack of activity occurring in

[13] Response rate is based on AAPOR standard RR2; the calculation can be found at http://www.aapor.org/pdfs/standarddefs_4.pdf

neighborhoods prior to redevelopment that is often not true (Jackson 2001; Smith 1996). Although "redevelop" could connote the historical forms of large-scale urban housing projects and urban renewal programs, the fact that the prompt asked about neighborhoods redeveloped "in recent years" should mitigate this interpretation. The dependent variable in the analysis is the response to the question, "If you were thinking of buying or renting a new home, would you consider moving to a redeveloped neighborhood in the city of Chicago?" Affirmative responses were set equal to one and negative responses were coded zero; there were 26 respondents who either refused or otherwise did not respond to the question.

Race/Ethnicity and Socioeconomic Status. *Race/ethnicity* is constructed from self-reported measures of race and Hispanic ethnicity. Respondents were allowed to select more than one racial identity; however, few respondents used this option (N=6). Respondents are coded into mutually exclusive categories: non-Hispanic black if they selected African American either alone or in combination with another race; non-Hispanic white if they selected white alone; and Latino if they indicated Hispanic ethnicity, regardless of race. Only respondents identifying as one of these three racial/ethnic categories are included in the analysis because there are an insufficient number of respondents in other racial categories to permit statistical comparisons. Socioeconomic status is measured in two ways: *educational attainment* and *annual family income*. Educational attainment tends to be a more stable indicator of class position across the life-course and has also been one of the strongest predictors of gentrification (Wyly and Hammel 1999). Income, on the other hand, is more variable across the life-course and indicates the immediate financial resources available to the respondent which could influence one's residential preferences. Educational attainment is classified into four categories: less than a high school diploma or general equivalency diploma (GED), those with a high school diploma or GED, those with some college, but less than a bachelor's-level degree, and those with a bachelor's level degree or higher. Annual family income is also divided into four categories: less than $20,000;

$20,000 to $39,999; $40,000 to $79,999; and $80,000 or more. Because there was substantial missing data on the income variable (10%), values for income were imputed for the missing cases.[14] The highest category for both education and income are used as reference categories.

Residential characteristics. In order to determine the possible influence of respondents' current housing situation on their willingness to consider moving to a redeveloped neighborhood, I include measures of *homeownership* and *years lived in the Chicago metropolitan area*. Homeownership is measured as a dichotomous variable with homeowners being set equal to one and renters equal to zero. It is important to note that homeownership also represents a dimension of socioeconomic status since purchasing a home requires access to enough wealth to provide a down-payment and to pay the mortgage. The years lived in the Chicago metropolitan area is a self-reported measure asking respondents how long they have lived in the metropolitan area and is coded to equal their age if they indicate they lived there for their whole lives.

Life-course and demographic characteristics. To control for life-course characteristics I include in the model whether the respondent is *currently married* (1 = yes) and whether the respondent has a *child in school* less than 18 years of age (1 = yes). No distinction is made whether the child is their own child. I also control for whether the respondent is *female* (1 = yes) as well as the respondent's *age*. Age is broken into two categories: respondents aged 21-40 years and respondents aged 41 or more years. The younger category is the reference category.

Current neighborhood characteristics. In order to measure and control for the effect that the resident's current neighborhood might have on her or his willingness to consider moving to a redeveloped neighborhood, several variables measuring the characteristics of the respondent's current neighborhood, measured as the block-group, were included. Most importantly, I

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[14] The variable was imputed using the "impute" command in Stata and included the race/ethnicity of the respondent, housing tenure, education, median family income of the block group in which the respondent resided, gender, marital status, presence of children under 18 in the home, welfare receipt, employment status, and age in the imputation model.

measured whether the respondent *lives in the city of Chicago*. Block-groups in the city of Chicago were set equal to one while suburban block-groups were set equal to zero. I also control for the racial composition of the neighborhood by including the percent of the respondent's block-group that is *non-Hispanic black* and the percent *Hispanic*. The socioeconomic position of the neighborhood was controlled by including the percent of the respondent's block group with a *college degree* and the *median home value* of owner occupied homes. The final four variables were obtained using the Census 2000 Summary File-3. Descriptive statistics for all independent variables are presented in Table 3.1.

[Table 3.1about here]

Analytic Methods

I begin by examining the bivariate relationships between the dependent variable and the set of individual-level variables. I do this by calculating the percent of respondents in each category of independent variables that would consider living in a redeveloped neighborhood. In order to compare city versus suburban preferences, I also include the neighborhood level variable indicating whether the respondent lives in the city of Chicago to determine if there are bivariate differences across city/suburban location.

I use logistic regressions to determine the independent contribution of these variables on a respondent's willingness to consider a redeveloped neighborhood. Initially, I regress the willingness to consider a redeveloped neighborhood on the individual-level variables only. I then add the neighborhood level characteristics to determine whether they have any effect on considering a redeveloped neighborhood and if controlling for these characteristics might explain or reveal individual-level associations. Because the respondents are clustered in 80 block-groups, the effect of these characteristics cannot be assumed to be independent across respondents within the same block group. Therefore, I employ hierarchical generalized linear models to account for this clustering (Raudenbush and Bryk 2002). The probability, P_{ij}, that the *i*th respondent in the *j*th neighborhood considers a redeveloped neighborhood is modeled:

$$\ln\left(\frac{P_{ij}}{1-P_{ij}}\right) = \gamma_{00} + \sum_{R}\gamma_{0r}W_{rj} + \sum_{Q}\gamma_{q0}X_{qij} + u_{0j} \tag{3.1}$$

where γ_{00} is the conditional mean of the willingness to consider a redeveloped neighborhood; γ_{r0} is the independent effect attributable to the neighborhood variable W_{rj}; and γ_{0q} is the independent effect attributable to the individual variable, X_{qij}. The neighborhood-specific residual, u_{0j}, is normally distributed around a mean of zero and variance, τ^2.

Since one of my primary interests is determining the degree to which residents' consideration of redeveloped neighborhoods differs across the city/suburban divide, I also want to systematically test whether the individual-level effect of homeownership might differ for respondents who live in the city of Chicago versus those who live in the suburbs. I also want to examine whether racial differences in homeownership and city residence can account for any moderating effects of city residence on homeownership. This requires that cross-level interactions be included; cross-level interactions mean that the individual level variables (i.e. homeownership and race) be interacted with, or "cross", the neighborhood level variable indicating residence in the city of Chicago. Specifically,

$$\ln\left(\frac{P_{ij}}{1-P_{ij}}\right) = \gamma_{00} + \sum_{R}\gamma_{0r}W_{rj} + \sum_{Q}\gamma_{q0}X_{qij} + \sum_{Q}\gamma_{qr}X_{qij}W_{rj} + u_{0j} \tag{3.2}$$

where γ_{qr} is the unique effect of interacting individual level variable X_{qij} with the neighborhood level variable W_{rj}. The bivariate relationships and initial logistic regression were examined using Stata 9.2. The multilevel logistic regressions were conducted in HLM 6.04. Due to the stratified clustered sample, I apply sampling weights to all analyses in order to reduce bias caused by unequal sampling probabilities.

RESULTS

Who Would Consider a Redeveloped Neighborhood?

Across all respondents, 55% indicate that they would consider moving to a redeveloped neighborhood, but the willingness to consider a redeveloped neighborhood is not distributed evenly across the population. The bivariate relationships between considering a redeveloped neighborhood and independent variables are presented in Table 3.2 along with the 95% confidence interval for each estimate. From Table 3.2, we can see pronounced racial, home-ownership, and city/suburban differences. Racially, blacks are more likely to consider a redeveloped neighborhood than either Latinos or whites. Almost three in four African Americans would consider a redeveloped neighborhood compared to approximately three in five Latinos and less than half of whites, the latter being significantly different from blacks. Only 47% of homeowners would consider a redeveloped neighborhood compared to 72% of renters, a difference that is statistically significant. Similarly, 41% of suburban residents compared to 71% of residents from Chicago would consider redeveloped neighborhoods; again the difference is statistically significant.

[Table 3.2 about here]

There are also noticeable education and income trends among residents who would consider moving to a redeveloped neighborhood but they are in the opposite direction than would be expected if higher class predicted a greater preference for redeveloped neighborhoods. As educational attainment increases, respondents show *less* of a willingness to consider a redeveloped neighborhood; however, none of these comparisons is statistically significant. Income shows a similar pattern. As income increases, the likelihood of considering a redeveloped neighborhood decreases to the point where the difference between the wealthiest and the poorest respondents is statistically significant.

Finally, there are some differences across respondents with different demographic and life-course characteristics. First, younger respondents are significantly more likely to consider redeveloped neighborhoods than older respondents and married respondents are more likely than unmarried respondents. Surprisingly, however, there is little difference between respondents who have a school-aged child in their home versus respondents without children. Among the former, 52% indicate they would consider a redeveloped neighborhood, compared to 58% among the latter.

Independent Effects on Considering a Redeveloped Neighborhood

Given the substantial amount of research positing that a distinctive taste guides the preferences for urban neighborhoods among wealthier and more educated residents, the picture painted by these comparisons is surprising. Table 3.2 reveals that respondents with the least income and lowest education are just as likely, or possibly more likely, to consider redeveloped neighborhoods and that blacks and Latinos are more likely than whites to consider them. These simple figures might cover more complex relationships among the independent variables that could be revealed by considering their multivariate relationships. Therefore, the results of the logistic regression analysis are presented in Table 3.3.

[Table 3.3 about here]

The first model of Table 3.3 includes independent variables that have been associated with previous studies of gentrification. These include race/ethnicity, education, and income as well as controls for the number of years lived in the metropolitan area and whether the respondent is female, married or has a child at home. Model 1 reveals that there is still a racial divide after controlling for other individual-level characteristics. African Americans are more than three times more likely than whites to consider a redeveloped neighborhood.[15] Also, contrary to the surprisingly small difference in Table 3.2 , respondents with school-age children at home are three fifths as likely to consider a redeveloped neighborhood as respondents without children

[15] Odds are obtained by exponentiating the logistic coefficient, i.e. $\exp\{1.277\} = 3.387$.

after controlling for other individual level characteristics.[16] With the exception of these few significant differences, Model 1 shows that there is broad agreement among respondents to consider a redeveloped neighborhood.

Model 2 in Table 3.3 presents the results of the hierarchical logistic regression model adding the neighborhood characteristics of the respondent's current neighborhood. In this model, we see that controlling for neighborhood characteristics does little to the effects of race and having schoolchildren as both remain significant after inclusion of the neighborhood characteristics.[17] After controlling for neighborhood characteristics, a significant effect of education emerges as respondents with a high school degree are approximately half as likely to consider a redeveloped neighborhood as respondents with a bachelor's degree. At the neighborhood level, median home value and Chicago residence predict a respondent's willingness to consider a redeveloped neighborhood. The effect of median home value is relatively small. A respondent coming from a neighborhood at the 75th percentile of neighborhood home values is only 1.37 times more likely to consider a redeveloped neighborhood than a respondent living in a neighborhood at the 25th percentile. Living in Chicago, on the other hand, doubles the likelihood that a respondent would consider a redeveloped neighborhood compared to living in the suburbs.

It is unlikely that the homeownership effect seen in Model 2 is constant across residents living in the city of Chicago and those living in the suburbs. First, residents who already own in

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[16] Supplemental analysis reveals that this is the result of a greater proportion of African American respondents having children than whites. A simple model regressing respondents willingness to consider a redeveloped neighborhood on having a child at home was predicted. Other independent variables were rotated into the model one at a time. The model controlling for respondent race revealed the significant negative effect of having children on considering a redeveloped neighborhood.

[17] Further analyses were also conducted attempting to determine the individual-level effects net of all measured and unmeasured characteristics of the community following the strategy of centering all individual-level variables on their neighborhood means as presented in (Raudenbush and Bryk 2002). This has the effect of statistically controlling for the neighborhood of residence by comparing the effects of individual-level variables on considering a redeveloped neighborhood from respondents living in the same neighborhood. The results are substantially the same as those presented in Model 2 of Table 3.3; however, it should be noted that while the effect of having school children remains negative, it is not significant in the group-centered model. This suggests that there may be neighborhood characteristics influencing the willingness of respondents with children, such as the quality of schools, compared to those without to consider a redeveloped neighborhood that are not measured in Table 3.3.

the city of Chicago might be more willing to consider another neighborhood in the city. Second, Chicago homeowners could realize a substantial financial reward for purchasing properties in redeveloped neighborhoods by purchasing property appreciating in value while the same appreciation represents an increase in rent for renters. To test the hypothesis that the effect of homeownership depends on whether the resident lives in the city or suburbs, Model 3 includes a "cross-level" interaction of homeownership with residence in the city of Chicago. Model 3 reveals that Chicago homeowners do, in fact, have a much higher willingness to consider a redeveloped neighborhood than Chicago renters: Chicago homeowners are almost four times more likely to consider a redeveloped neighborhood than renters who live in the city of Chicago. Meanwhile, it is apparent from the coefficient for homeownership that suburban owners are three times less likely than suburban renters to consider a redeveloped neighborhood. Notably, however, there is no statistically significant difference between suburban renters and Chicago homeowners in their willingness to consider a redeveloped neighborhood. Again, the individual-level effects of race, education, and having children remained relatively unchanged.

Finally, because race substantially affects residential patterns in the Chicago metropolitan area, both with respect to who owns homes and where people choose to live, it is necessary to determine whether the interaction between homeownership and city residence (versus suburban residence) can simply be explained by controlling for racial differences in homeownership and city/suburban residence among the respondents. Therefore, in Model 4, I also include two two-way interactions of race with homeownership and race with Chicago residence. Adding the two additional two-way interactions to the model controls for the possibility that the significant modifying effect homeownership has on Chicago residents considering a redeveloped neighborhood is really an artifact of racial differences in homeownership and urban/suburban residence.[18] To facilitate the interpretation of the multiple interactions and their implications for understanding preferences for redevelopment, the predicted probabilities across racial groups by urban/suburban residence and homeownership are graphed in Figure 3.1.

[Figure 3.1 about here]

The results reveal that the pronounced urban/suburban divide among homeowners found in Model 3 cannot be attributed to racial differences in either homeownership or residence in the city of Chicago. Instead, Figure 1 shows that the urban/suburban line still divides Chicago homeowners. For each racial group, Chicago homeowners have higher probabilities of considering a redeveloped neighborhood than their suburban counterparts of the same race,[19] and notably, there are almost no racial differences among Chicago homeowners. The persistence with which residential preferences have been found to differ across race and ethnicity, particularly between blacks and whites, makes it remarkable to find such similar preferences among all three racial/ethnic groups. This is not true among suburban homeowners; African Americans have a significantly higher probability of considering a redeveloped neighborhood than white suburban homeowners ($p<0.05$) and moderately higher probability than Latino suburban homeowners ($p=0.10$). Thus, among homeowners, considering a redeveloped neighborhood is largely determined by whether the respondent lives in Chicago or one of the surrounding suburbs; however, the difference between urban and suburban residence is more pronounced for whites and Latinos than it is for blacks.

Among renters, there are substantial racial differences that are much stronger than differences that are present between urban and suburban residents. African American renters have the highest probability of considering a redeveloped neighborhood while white renters have

[18] An alternative hypothesis, that that effect of urban homeownership might differ for whites when compared to black and Latinos was tested by adding a three-way interaction effect including race, homeownership, and Chicago residence. This interaction was not significant for either blacks or Latinos.
[19] For whites and Latinos, this difference was highly significant ($p<0.001$) using multivariate hypothesis tests in HLM while the difference was borderline significant for blacks ($p=0.12$).

the lowest and Latino renters are between these two extremes. Among blacks and whites, suburban renters are more likely to consider a redeveloped neighborhood than Chicago renters. For Latinos, there is virtually no difference between urban and suburban renters.

Controlling for the additional interactions of race with homeownership and Chicago residence does not account for the educational difference in a respondent's willingness to consider a redeveloped neighborhood. Respondents with a high school degree are still half as likely to consider a redeveloped neighborhood compared to those with at least a bachelor's degree or higher meaning that class still matters, even after accounting for the roles of homeownership, race, and urban residence. Also, the presence of a child in school living at home remains significant and negative for considering a redeveloped neighborhood. After controlling for these interactions, there is also a small but significant gender effect as women are less than 1.5 times less likely to consider a redeveloped neighborhood than men.

In summary, based on the results in Table 3.3, the patterns of who would consider a redeveloped neighborhood differ whether one considers homeowners or renters. Among homeowners, the starkest difference is between Chicago and suburban residents. Chicago homeowners are more likely to consider a redeveloped neighborhood than suburban homeowners. Racial/ethnic differences, particularly between whites and Latinos, are not as strong as the urban suburban divide. Among renters, on the other hand, racial patterns are much more pronounced. African Americans are much more likely to consider a redeveloped neighborhood than whites with Latinos in between. To the degree that there are urban/suburban differences in the willingness to consider a redeveloped neighborhood, they are in the reverse direction from owners as suburban renters are generally more likely to consider a redeveloped neighborhood than Chicago renters.

Influence of Respondent Age on Considering a Redeveloped Neighborhood

The final dimension along which the results in Table 3.3 are examined is whether the effects differ by the age of respondents. There are several reasons why age of the respondents warrants additional attention. First, existing theories of gentrification predict that I would detect differences across age groups, particularly for the influence of class. For instance, Ley's (1996) hypothesis that the initial waves of gentrification are the result of class-based preferences among the generation of young people who came of age during the political movements of the "New Left" would predict a greater class distinction among older respondents. Smith and Holt's (2007) hypothesis that college students become "apprentice gentrifiers" and learn to appreciate redeveloped neighborhoods would also predict a division between college education and non-college educated respondents as they age. Second, preferences are likely to be influenced by anticipated life changes. While I control for the experience of particular life-course events (e.g. marriage, having children), it is impossible to control for respondents' anticipation of experiencing these events. For example, planning for having children in the near future or, alternatively, the anticipation of having one's children leave the household might lead one to consider the possibility of moving to redeveloped neighborhoods in a different light.

In order to examine how the age of the respondent might influence the patterns of respondents who would consider a redeveloped neighborhood, I stratify Model 4 from Table 3.3 and run the model separately for the two age categories: those 40 years old or younger and those older than 40 years.[20] The results of these models are reported in Table 3.4.

[Table 3.4 about here]

The results from Table 3.4 reveal that almost all of the significant effects on considering a redeveloped neighborhood found in Table 3.3 are consistent between the two age groups but are

[20] Alternative categorizations of age were modeled and results examined to detect whether the conclusions were sensitive to the particular categorization of age used. These alternative specifications yielded substantively similar results to those presented. The decision to draw the cut-point at 40 years of age was driven by both theoretical interest and methodological considerations. Theoretically, respondents 40 and younger would likely not have been looking to move into their own homes until the mid- to late-1980s which is after the first wave of limited redevelopment and gentrification which was arguably driven more by cultural distinction than market investment (Ley 1996; Zukin 1982). Methodologically, categorizing the variable at 40 years of age permitted a nearly balanced number of respondents between the age categories.

strongest among older residents. This is true of the black/white racial effect in addition to the black homeownership interaction and Chicago homeowner interaction effects which were all significantly different than zero among the older respondents, but not the younger. Although effects were smaller in magnitude and, thus, not statistically significant for the younger respondents, these coefficients were in the same direction, suggesting that the trend is constant across age groups but perhaps stronger among older respondents.

There are a few effects in Table 3.4 that do not follow the same pattern. The most notable of these is the effect of educational attainment. A respondent with a bachelor's degree is nearly three times as likely as a respondent with a high school degree to consider a redeveloped neighborhood among respondents 41 and older. The effect among younger respondents is, however, almost zero. Thus, class differences in preferring redeveloped neighborhoods are confined to older respondents.

Other effects that do not follow the same overall pattern include homeownership and gender. The effect of being a homeowner is not significant in either age group and the magnitude of the effect is stronger among younger respondents. It is unsurprising that the magnitude is higher among younger respondents as they are more likely to have purchased a house that they intend to settle down in while older respondents might be looking to move out of their homes to potentially more accessible neighborhoods in the city. Younger women are significantly less likely to consider a redeveloped neighborhood than younger men, though the gender effect is in the same direction among older women. An effect of marriage is revealed in the model among older respondents: older married respondents are significantly less likely than non-married older respondents to consider a redeveloped neighborhood.

Why Would Residents Consider Moving to a Redeveloped Neighborhood?

Thus far, I have examined the social and economic characteristics associated with residents considering a redeveloped neighborhood. Now I turn my attention to *why* residents would consider redeveloped neighborhoods. After the respondents answered that they would consider a redeveloped neighborhood, they were asked why they would consider a redeveloped neighborhood and given ten response categories plus the option to specify another reason. These ten reasons are: *close to work*, *close to cultural and recreational activities*, *close to shopping*, *housing more affordable*, *high quality of housing*, *reduced property taxes*, *racial and ethnic mix*, *want to see people I know on the street*, *city services will be better*, and *more job opportunities*. Table 3.5 reports the reasons receiving 40 percent or more endorsement (unweighted) by each of the categories defined by racial/ethnic, urban/suburban, and housing tenure categories depicted in Figure 3.1. Although the small numbers in many categories makes it impossible to draw definitive conclusions, the trends in responses are nevertheless instructive.

Table 3.5 reveals that there are differences across the twelve categories. Racially, being close to activities is a frequently cited reason whites consider redeveloped neighborhoods. Additionally, whites and Latinos/as both identify being close to work as a reason. Latinos also report job opportunities with a high frequency. Blacks, on the whole, report quality housing and city services as reasons to consider redeveloped neighborhoods. By tenure status, renters, on both sides of the urban/suburban divide and across racial categories, also frequently indicate the quality of housing and job opportunities as being reasons to consider redeveloped neighborhoods. Finally, suburban residents – across racial/ethnic and housing tenure categories – report that being close to activities is a reason to consider redeveloped neighborhoods. Therefore, Table 3.5 reveals that redeveloped neighborhoods tend not to be desirable for the same reasons across these different categories.

Beyond the general patterns, it is also instructive to look at differences among Chicago homeowners. Recall from Figure 3.1 the remarkable similarity in the marginal probabilities of white, black, and Latino/a Chicago homeowners to consider moving to a redeveloped neighborhood. Such racial similarities in residential preferences are a rarity (Charles 2003); however, examining the reasons why Chicago homeowners would consider redeveloped neighborhoods reveals substantial racial differences. White Chicago homeowners most frequently report “cultural” reasons – being close to shopping (68%), quality housing (65%), and being close to activities (59%) – that are traditionally cited by demand-side scholars as reasons residents consider redeveloping or gentrifying neighborhoods. Additionally, whites report being close to work, seeing people they know, racial mix, and city services as reasons for considering a redeveloped neighborhood. These cultural reasons are not among those cited by black and Latino Chicago homeowners. Instead, black Chicago homeowners indicate improved city services as by far the most frequent reason (59%) to consider a redeveloped neighborhood while Latinos point to the largely financial reasons of job opportunities (49%), affordable housing (43%), and being close to work (40%). Therefore, while whites, blacks, and Latino homeowners in Chicago have similar levels of preferences for redeveloped neighborhoods (controlling for other social and economic characteristics), they have very different reasons for doing so. This suggests that redevelopment might not help reduce racial segregation because the racial differences in the reasons whites, black, and Latinos to consider redeveloped neighborhoods might lead each to seek very different types of redeveloping communities.

DISCUSSION AND CONCLUSIONS

In this analysis I use data obtained from a sample of residents living in metropolitan Chicago to examine who would consider moving to a redeveloped neighborhood in the city of Chicago. The results indicate that a majority of residents would consider moving to such a neighborhood but that considering these neighborhoods is influenced by the demographic and socioeconomic characteristics of residents. In particular, I find that homeownership and age shape the patterns of who would consider a redeveloped neighborhood. I discuss these patterns in more detail below and conclude by discussing the implications and limitations of this analysis to inform the ways that redevelopment might influence metropolitan residential patterns.

Preference Patterns among Homeowners and Renters

I find that considering a redeveloped neighborhood shows two distinctly different patterns, one among homeowners and the other among renters. Homeowners' preferences are divided by whether they live in the city of Chicago or the surrounding suburbs. Chicago homeowners are more likely than suburban homeowners to consider a redeveloped neighborhood and this is true among all races, though this difference is considerably larger for Latinos and whites. Smith (1996) has argued that urban property owners are the most likely to support redevelopment policies in urban neighborhoods, despite the rhetoric of bringing residents "back to the city" (see also Gale 1979). To the extent that we consider homeowners alone, these results support Smith's argument.

Among renters, racial differences are more pronounced than the urban/suburban difference seen among homeowners. African American renters, in both Chicago and surrounding suburbs, are far more likely than their white counterparts to consider a redeveloped neighborhood, while Latinos are somewhere in between. This analysis suggests that desiring these neighborhoods might not be limited to urban renters desiring reinvestment since suburban renters would also consider redeveloped neighborhoods at high rates (Freeman 2006). It also suggests, however, that this effect is largely limited to African Americans and Latinos as white renters are unlikely to consider redeveloped neighborhoods. Furthermore, while Smith's (1996) argument regarding the preferences of urban property owners is supported by this evidence, it also indicates that he does overlook a substantial amount of preference among African American and Latino renters to move to redeveloped neighborhoods.

Additionally, this analysis informs the growing body of work highlighting important class dimensions of racial preferences and experiences. While others have examined the negotiation of racial and class identities for residents already living in redeveloped neighborhoods, I find that even the preferences to move into redeveloping neighborhoods might signal important intersections of racial and class identities. Lacy (2007) finds that one way that middle-class blacks mobilize or prioritize class-based identities is through their residential preferences, though she does not examine residential preferences in the context of redeveloped neighborhoods. These results suggest that considering a redeveloped neighborhood might follow a similar pattern where preferences are based more on class similarities than racial similarities. For black homeowners, particularly those living in Chicago, considering a redeveloped neighborhood is more strongly characterized by their similarity to homeowners of other races than to black renters; among renters, there are stark racial differences in considering a redeveloped neighborhood. Yet, even among Chicago homeowners, the reasons for considering a redeveloped neighborhood are very different. Black Chicago homeowners seek redeveloping neighborhoods mostly for the improved city services (possibly because predominantly black communities have traditionally been so poorly supported by city agencies), whites tend to do so for the cultural reasons cited by gentrification researchers and Latinos tend to do so for financial reasons.

Age-specific Class Effect on Preferences

Age also patterns respondents' willingness to consider redeveloped neighborhoods, especially with respect to social class. After controlling for the characteristics of a respondent's neighborhood, respondents who received a high school degree were significantly less likely to consider a redeveloped neighborhood than respondents who had a bachelor's degree or higher. While educational attainment only measures a particular dimension of class differences, this result certainly lends some validity to arguments highlighting middle-class preferences as a catalyst to redevelopment and gentrification (Ley 1996; Zukin 1982; Jager 1986).

The fact that this effect is found almost exclusively among older respondents, however, could be the result of either cohort adaptation of redeveloping neighborhoods as a preferable residential destination or age-specific residential preferences. The former would suggest that the cultural distinction of acquiring a preference for redeveloping urban neighborhoods has become less distinguishing as preferences for these neighborhoods have been adopted by younger generations regardless of class as desirable places to live. Seen in this light, redeveloped neighborhoods are a contested field of cultural production that, over time, have lost their distinguishing character as they become more widely adopted as a residential destination among all classes (Bourdieu 1984). Alternatively, the emergence of educational attainment as a predictor of considering a redeveloped neighborhood at older ages might indicate that the education itself plays a role in modifying preferences for redeveloping neighborhoods across the life-course. Examining one possible mechanism, Smith and Holt (2007) find evidence that university students are “apprentice gentrifiers” who first learn to appreciate gentrifying neighborhoods by experiencing housing similar to that developed in more established gentrifying neighborhoods. They argue that these students go on to become more established gentrifiers themselves as they progress through their own life and career courses. Because this study examines only a single point in time I cannot distinguish the relative validity of these two theories, though distinguishing the two has important implications for understanding the way that preferences for redevelopment are formed and should be investigated further.

Influence of Redevelopment on Metropolitan Residential Dynamics: Implications and Limitations

Considering these results, it is important to note that I only investigate whether a respondent would consider any redeveloped neighborhood in the city of Chicago which limits the scope of the conclusions that can be drawn from this analysis in two ways. First, examining whether a respondent would consider any redeveloped neighborhood in the city of Chicago might gloss over preferences that reveal more nuanced distinctions among residents. In particular, I do not examine *which* redeveloped neighborhoods residents would consider. For example, even among Chicago homeowners where we see relative uniformity across African Americans, Latinos, and whites to consider a redeveloped neighborhood there might be racial differences in the particular neighborhoods respondents would consider, particularly since each tends to desire redeveloping neighborhoods for different reasons. These differences could easily lead to substantially different neighborhoods being chosen by each of these groups which would reinforce, rather than reduce, current segregation, particularly racial segregation. Second, this analysis is also limited in that I do not consider how strong of a preference respondents have for redeveloped neighborhoods relative to other types of neighborhoods. Presumably, any respondent who would consider a redeveloped neighborhood—no matter how strongly or weakly they would consider it—responded affirmatively when asked if they would consider a redeveloped neighborhood. Determining the relative strength of preferences for redeveloped neighborhoods compared to other types of neighborhoods is important for predicting the potential impact of redevelopment on the metropolitan residential patterns.

While these limitations do not permit definitive conclusions, these results imply that, based on the preferences of metropolitan residents, redevelopment will do little to improve overall racial integration of metropolitan Chicago. Attracting whites "back to the city" to reduce levels of metropolitan racial segregation and isolation is one of the reasons that redevelopment is advocated by its proponents (Massey 2002). However, these results reveal that, among whites, homeowners already living in Chicago are the most likely to consider a redeveloped neighborhood. Dynamic models of residential selection demonstrate that knowing where people *move from* is equally important as knowing where they will consider *moving to* (Schelling 1971; Bruch and Mare 2006). This means that the whites most likely to consider a redeveloped neighborhood are the ones already living in central-city neighborhoods which would limit the effect that white migration to redeveloping neighborhoods will have on reducing racial segregation. Furthermore, with the exception of Chicago homeowners, there are marked racial patterns in which residents would consider redeveloped neighborhoods. The overall unwillingness of whites to consider redeveloped neighborhoods, especially compared to blacks, leaves the prospect of redeveloped neighborhoods helping racial integration across the metropolitan area relatively bleak.

Finally, this study reveals the problems with drawing conclusions about the preference for redeveloped neighborhoods from observations of residents already living in them. Socioeconomically, there is some evidence that older college-educated residents would consider redeveloped neighborhoods more than older high-school educated residents, as current theories would predict. Revealing the age-specific context of this effect, however, indicates that further research is required to examine whether preferences change as residents age or it is the result of a generational change among residents. The problems resulting from investigating only residents living in redeveloped neighborhoods are even more obvious when one considers race. Black and Latino renters are among the most likely to consider redeveloped neighborhoods. This stands in sharp relief to the population patterns observed in redeveloping neighborhoods that show a consistent decline in the number of black and Latino renters. Thus, the growing proportion of whites and homeowners in redeveloped neighborhoods might be due less to unique preferences than to the inability of black and Latino renters to convert their preferences into actual mobility. It appears that fostering redevelopment policies is likely to do little to improve—if not actually worsen—the problems of metropolitan inequality.

TABLES AND FIGURES

Table 3.1. Descriptive statistics for individual- and neighborhood-level variables, Chicago Area Study

	Mean	S.D.
Individual Variables (N=728)		
Race/Ethnicity		
Non-Hispanic Black	0.31	0.46
Hispanic	0.31	0.46
Non-Hispanic White	0.37	0.48
Education		
Less than H.S. degree	0.21	0.41
H.S. degree or G.E.D.	0.21	0.41
Some college, less than a Bachelor's degree	0.32	0.47
Bachelor's degree or higher	0.25	0.43
Income		
Less than $20,000	0.28	0.45
$20,000-$39,999	0.22	0.42
$40,000-$79,999	0.29	0.45
$80,000+	0.21	0.41
Life-course and Demographic Characteristics		
Age: 20-40 years	0.45	0.50
Age: 41+ years	0.55	0.50
Respondent's Sex (Female=1)	0.63	0.48
Currently marital status	0.44	0.50
Kids under 18 in school	0.45	0.50
Residential characteristics		
Years lived in the Chicago Metro Area	32.18	18.66
Respondent owns own home	0.57	0.49
Neighborhood Variables (N=80)		
Percent non-Hispanic black	28.96	38.08
Percent Hispanic	32.03	36.17
Percent college educated	19.20	15.98
Median home value	143.70	106.66
Chicago resident	0.63	0.49

Table 3.2. Proportion (weighted) of respondents who would consider a redeveloped neighborhood by individual characteristics and Chicago residence

	Mean	95% C.I.
Race/Ethnicity		
White	0.45	[0.37 - 0.53]
Black	0.74	[0.66 - 0.82]
Latino/a	0.62	[0.50 - 0.74]
Education		
Less than H.S. degree	0.66	[0.51 - 0.80]
H.S. degree or G.E.D.	0.47	[0.35 - 0.59]
Some college, less than a Bachelor's degree	0.55	[0.47 - 0.64]
Bachelor's degree or higher	0.56	[0.46 - 0.67]
Income		
Less than $20,000	0.70	[0.60 - 0.79]
$20,000-$39,999	0.62	[0.52 - 0.73]
$40,000-$79,999	0.53	[0.42 - 0.64]
$80,000+	0.46	[0.37 - 0.54]
Age		
20-40	0.64	[0.55 - 0.73]
41+	0.48	[0.42 - 0.54]
Sex		
Male	0.59	[0.51 - 0.66]
Female	0.53	[0.45 - 0.60]
Currently Married		
Not Married	0.64	[0.57 - 0.70]
Married	0.48	[0.40 - 0.56]
School-children Under 18 in Home		
No	0.58	[0.51 - 0.65]
Yes	0.52	[0.45 - 0.59]
Homeownership		
Renter	0.72	[0.64 - 0.79]
Owner	0.47	[0.40 - 0.54]
Chicago Residence		
Suburban resident	0.41	[0.33 - 0.49]
Chicago resident	0.71	[0.65 - 0.76]

Table 3.3. Logistic regression and hierarchical logistic regression results of considering redeveloped neighborhood on individual and neighborhood characteristics

	Model 1	Model 2	Model 3	Model 4
Race (reference: Non-Latino white)				
Non-Latino Black (Non-Latino White=0)	1.277***	1.318***	1.167**	3.211***
Latino	0.455	0.316	0.359	0.423
Education (reference: Bachelor's or higher)				
Less than H.S. degree	-0.117	-0.04	-0.048	-0.065
H.S. degree or G.E.D.	-0.626	-0.623*	-0.668*	-0.691*
Some college, less than a Bachelor's degree	-0.265	-0.178	-0.228	-0.151
Income (reference: $80,000+)				
Less than $20,000	0.277	0.227	0.13	0.112
$20,000-$39,999	0.196	0.118	-0.037	0.002
$40,000-$79,999	-0.035	-0.074	-0.201	-0.108
Life-course and Demographic Characteristics				
41 or more years old	-0.219	-0.276	-0.347	-0.378
Female	-0.293	-0.321	-0.318	-0.38*
Married	-0.193	-0.271	-0.294	-0.338
Kids under 18 in school	-0.495*	-0.475*	-0.412*	-0.449*
Residential Characteristics				
Years lived in the Chicago Metro Area	-0.011	-0.009	-0.008	-0.007
Respondent owns own home	-0.575	-0.341	-1.158**	-0.859*
Neighborhood Characteristics				
Percent non-Latino black[a]		0.001	0.004	0.003
Percent Latino[a]		0.004	0.005	0.004
Percent college educated[a]		-0.016	-0.013	-0.012
Median home value, in $1,000s[a]		0.004**	0.004**	0.005***
Chicago resident		0.689**	-0.247	-0.704
Interactions				
Chicago Resident x Homeowner[b]			1.375**	2.049***
Black x Homeowner				-2.170***
Latino x Homeowner				-0.464
Black x Chicago resident				-0.619
Latino x Chicago resident				0.770
Intercept	1.331***	0.895*	1.672***	1.384**
N (Level 1)	728	728	728	728
N (Level 2)	n.a.	80	80	80

* p<0.05, ** p<0.01, *** p<0.001

[a] Variables are centered around their grand mean

[b] Homeownership is measured at the individual level and Chicago residence is measured at the neighborhood level

Table 3.4. Hierarchical logistic regression results of considering a redeveloped neighborhood on individual and neighborhood characteristics, by age

	21-40	41 and older
Race (reference: Non-Latino white)		
Non-Latino Black (Non-Latino White=0)	2.072	4.212***
Latino	-0.734	1.515
Education (reference: Bachelor's or higher)		
Less than H.S. degree	0.065	-0.516
H.S. degree or G.E.D.	-0.209	-1.023**
Some college, less than a Bachelor's degree	-0.026	-0.348
Income (reference: $80,000+)		
Less than $20,000	0.891	-0.331
$20,000-$39,999	0.263	-0.452
$40,000-$79,999	0.128	-0.379
Life-course and Demographic Characteristics		
Female	-0.735*	-0.262
Married	0.242	-0.92**
Kids under 18 in school	-0.488	-0.229
Residential Characteristics		
Years lived in the Chicago Metro Area	-0.018	0.002
Respondent owns own home	-0.998	-0.467
Neighborhood Characteristics		
Percent non-Latino black[a]	0.011	-0.004
Percent Latino[a]	0.01	-0.001
Percent college educated[a]	-0.006	-0.02
Median home value, in $1,000s[a]	0.005	0.005**
Chicago resident	-0.78	-0.544
Interactions		
Chicago Resident x Homeowner[b]	1.071	2.449***
Black x Homeowner	-1.123	-2.951***
Latino x Homeowner	-0.103	-0.538
Black x Chicago resident	-0.097	-0.879
Latino x Chicago resident	0.895	1.257
Intercept	1.843*	0.507
N (Level 1)	331	397
N (Level 2)	78	79

* p<0.05, ** p<0.01, *** p<0.001

[a] Variables are centered around their grand mean

[b] Homeownership is measured at the individual level and Chicago residence is measured at the neighborhood level

Table 3.5. Reasons respondents would consider redeveloped neighborhoods by racial/ethnic, urban/suburban, and housing tenure categories, reasons receiving 40 percent or more responses per category

OWNERS				RENTERS			
CHICAGO		**SUBURBAN**		**CHICAGO**		**SUBURBAN**	
WHITE (N=34)		*WHITE (N=45)*		*WHITE (N=19)*		*WHITE (N=13)*	
Close work	52.9	Close work	46.7	Close work	57.9	Close work	46.2
Close shopping	67.6			Close shopping	47.4	Quality housing	46.2
Quality housing	64.7			Housing affordable	57.9	Job opportunities	46.2
Racial mix	44.1			Quality housing	52.6		
People know	47.1			Racial mix	47.4		
City services	41.2						
BLACK (N=54)		*BLACK (N=19)*		*BLACK (N=82)*		*BLACK (N=19)*	
Quality housing	46.3	Close activities	63.2	Housing affordable	51.2	Quality housing	57.9
Racial mix	48.1	Close shopping	57.9	Quality housing	40.2		
City services	59.3	Racial mix	47.4	Racial mix	47.6		
		City services	47.4	City services	51.2		
		Job opportunities	42.1	Job opportunities	43.9		
LATINO/A (N=47)		*LATINO/A (N=8)*		*LATINO/A (N=93)*		*LATINO/A (N=10)*	
Close work	40.4	Close work	50.0	Close work	49.5	Close work	60.0
Housing affordable	42.6	Close activities	62.5	City services	49.5	Close activities	40.0
Job opportunities	48.9	Quality housing	50.0	Job opportunities	43.0	Housing affordable	80.0
		Reduced taxes	50.0			Quality housing	40.0
		City services	50.0			Reduced taxes	60.0
		Job opportunities	50.0			Racial mix	50.0
						City services	50.0
						Job opportunities	40.0

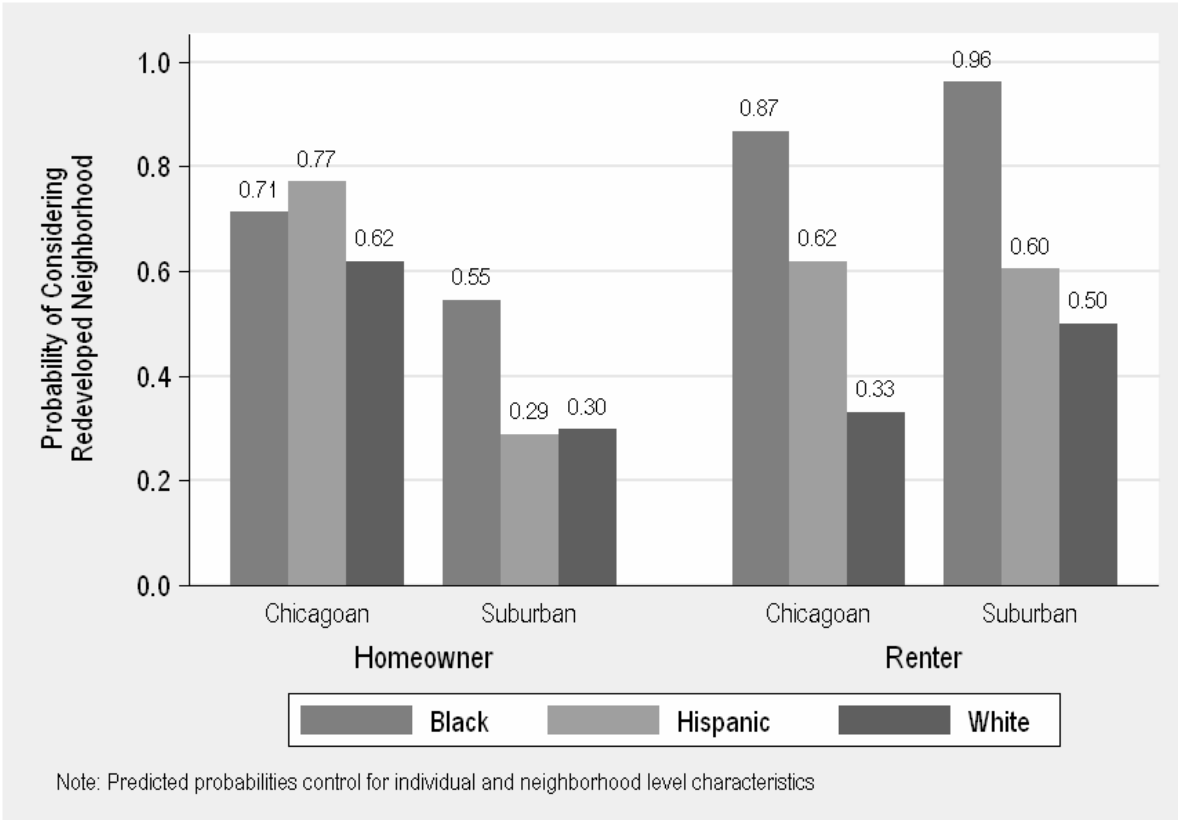

Figure 3.1. Predicted probabilities of considering a redeveloped neighborhood for blacks, Latinos, and whites by ownership and residential location

CHAPTER 4

SPATIAL DYNAMICS OF PHYSICAL DISORDER AND ITS EFFECT ON FEAR IN CHICAGO NEIGHBORHOODS

INTRODUCTION

In recent years, the number of studies reporting associations between the outcomes experienced by individuals and the characteristics of the neighborhoods surrounding those individuals has burgeoned (Entwisle 2007). This growth has been accompanied by a similar growth in the diversity of outcomes that have been explored and have included, for example, high school dropouts (Harding 2003), teenage pregnancies (Harding 2003), school test scores (López Turley 2003), childhood cognitive development (Sampson, Sharkey, and Raudenbush 2008), as well as a large number of health outcomes and behaviors (Sampson et al. 2002; Leventhal and Brooks-Gunn 2000; Robert 1999). These studies have consistently shown that residents of socially and economically disadvantaged neighborhoods have higher risks of negative outcomes than those living in more advantaged areas, even after controlling for individual-level risk factors.

While these studies have consistently documented disparities in a number of outcomes, they have been less successful in explaining why these disparities exist. Largely, this is because they lack data characterizing residential environments that would allow them to test their hypotheses about the possible ways in which those environments affect individual outcomes. Some investigators have begun overcoming this shortcoming by looking to “non-routine” data sources and developing methods to measure more theoretically-relevant aspects of the residential environment (Cummins et al. 2005). Especially important in the development of these data sources has been the “ecometric” framework of characterizing neighborhood environments (Raudenbush and Sampson 1999; Mujahid et al. 2007). This framework uses multiple observations that researchers believe capture an underlying characteristic of the environment hypothesized to be important to individual-level outcomes and aggregates and weights those observations to create neighborhood-level measures. This has permitted a greater level of flexibility in determining the theoretically relevant attributes of the residential environment thought to influence specific outcomes and has allowed researchers to become less reliant on the Census as a single source of data.

Despite the promise that this framework offers in its flexibility to measure theoretically relevant characteristics of the urban environment, I argue that it does not represent the true nature of variation for many environmental attributes researchers are interested in measuring. Modeling the urban environment as a patchwork of discrete neighborhood entities that are internally homogenous and externally independent of each other fails to capture the fluid patterns of spatial change that are more characteristic of many environmental attributes. As sociologists and other social scientists become more interested in explaining how residential environments affect individual outcomes, measures of the environment that they use to analyze their effects on individual outcomes should be able to capture the small-scale variability and gradual change across space.

In order to study the effect of small-scale effects and variability on individuals, researchers need to be able to capture the textured spatial change in contextual attributes. Additionally, since surveys conducted in the social sciences are generally collected to examine multiple outcomes, each of which might be influenced by contextual environments at different spatial scales, researchers need methods to create measures at different spatial scales to study these effects. In other words, while ecometric methods allow researchers the flexibility to design instruments that measure theoretically relevant contextual characteristics, they lack the flexibility required to capture spatial variation in residential environments at different geographic scales.

In this chapter, I argue that thinking of environments as spatially continuous surfaces rather than a patchwork of neighborhoods both more accurately captures the way that some environmental characteristics change over space and allows researchers interested in contextual effects a greater flexibility to measure environmental exposures at theoretically relevant spatial scales. I present statistical methods adapted from the physical and environmental sciences that are specifically designed to model the continuous spatial variation of attributes over space and demonstrate how these models can be adapted to improve ecometric measures of the residential environment. Using this framework, I explore the association between physical disorder and the fear a resident has to walk alone in their neighborhood at night. Using data obtained from systematically observing items related to disorder on a sample of 1,663 city blocks, I estimate the value of physical disorder on the over 24,000 blocks in the city of Chicago. Based on the block-level estimates of physical disorder, I aggregate measures to two different spatial scales and examine the relationship between physical disorder and a resident's fear of walking alone at night. We choose to examine the effect of physical disorder on a residents' sense of fear for several reasons. First, researchers have proposed fear as both a direct and indirect mechanism to explain neighborhood-level variation on different individual-level outcomes and behaviors (Bursik and Grasmick 1993; Ross and Mirowsky 2001). Second, there is some evidence that of a significant amount of small-scale variability in physical disorder that might not be captured at larger geographic scales (Hipp 2007). Finally, there is some question about whether perceived or observed levels of neighborhood physical disorder matter more for residents' perceptions (Ross 2000; Caughy, O'Campo, and Patterson 2001).

THEORY AND MEASUREMENT OF NEIGHBORHOOD RESIDENTIAL ENVIRONMENTS

Role of Neighborhoods on Individual Well-Being

Interest in exploring the relationship between neighborhoods and individual life-chances was renewed by debates about the rise of the "urban underclass." Many of the explanations given at the time focused on individual pathologies and cultural deficiencies – a "culture of poverty"

(Lewis 1959) – to explain the persistence of urban poverty. Wilson (Wilson 1980, 1987)and Massey and Denton (Massey and Denton 1993)countered this dominant trend and reshaped the debate by highlighting how structural factors that concentrated the poor into geographically and socially isolated neighborhoods limited the ability of residents to improve their life chances. Although they disagreed about the relative importance of the different structural factors that were most important, their debate recast the frame in which the causes and consequences of urban poverty were viewed. In pointing to the structural causes of urban poverty and demonstrating how residential contexts constrain individual agency, they helped reinvigorate the debate about contextual factors on individual outcomes.

This focus on contextual effects of neighborhood environments recalled a long tradition of sociological research that has argued for the fundamental role that neighborhoods play in social life privileged neighborhoods as a location to understand structural influences on individuals (Park and Burgess 1984; Suttles 1972; Du Bois 1996). This long sociological tradition has conceived of the city as a living laboratory and sociologists have used neighborhoods as a unique vantage point from which they could study the impact of social forces on the life chances of individuals (Gieryn 2006). By studying the residential environments of neighborhood inhabitants, researchers explored how the physical, social, and economic characteristics of those environments helped shape the attitudes and beliefs of residents and the outcomes they experienced.

Building on this long tradition and especially Wilson's (1987, 1996) hypothesis of material deprivation, a great deal of research followed as investigators expanded the number and diversity of outcomes they studied for evidence of neighborhood contextual effects. With the aid of advancements in geographic information systems (GIS) software and the development of multilevel statistical modeling techniques that allow proper statistical inferences, studies have increasingly been designed to study factors that influence individual outcomes at both the individual- and neighborhood-levels (Sampson et al. 1997; Sastry et al. 2006; Morenoff et al.

2007). This research has grown to have a substantial presence across a variety of disciplines that has challenged the assumption that individual outcomes are solely the result of individual attributes and specific pathologies.

Measurement of Neighborhood Environments

The expansion of outcomes being studied by researchers has not been matched by a concomitant expansion in the measures of the residential environment used to predict those outcomes. Although researchers develop specific hypotheses regarding the way that socially and economically deprived neighborhoods might negatively affect residents, they often lack the data to test these hypotheses. Therefore, researchers tend to rely almost exclusively on data from census to measure neighborhood residential environments and, even among these variables, have predominantly relied on a single characteristic – concentrated socioeconomic disadvantage – to explore neighborhood effects (Entwisle 2007).

To overcome the limitations of existing data, researchers have begun to develop innovative methods for collecting measures of the residential environment. These have included spatially indexing data from secondary sources (e.g. municipal business registries and commercial business listings) to measure local conditions (Moore and Diez Roux 2006; Laraia et al. 2004; Rundle et al. 2009), fielding supplemental surveys querying independent samples of respondents about neighborhood conditions (Sampson et al. 1997; Auchincloss et al. 2007), and using trained observers to systematically observe standard items in the physical and social environment (Reiss 1971; Sampson et al. 1997; Pikora et al. 2003). The "non-routine" (Cummins et al. 2005) data obtained from these methods allow researchers to examine and test specific relationships between attributes of the residential environment and individual-level outcomes. Furthermore, because they are collected independently of the respondents for whom outcomes are measured, they avoid the problem of confounded measurement error that can arise when outcome measure and environmental predictors are reported from the same source (Kirtland et al. 2003;

Greg J. Duncan and Raudenbush 1999).

Among these methods, systematic social observation (SSO) is particularly useful for measuring physical characteristics of the residential environment such as physical signs of disorder, building upkeep, and the condition of sidewalks and paths. In this method, trained observers rate the conditions of the physical environment based on the SSO instrument that is designed by investigators (Reiss 1971). By systematically deploying staff to implement the SSO instrument to collect observations on the physical environment to a sample of neighborhoods (e.g. city-blocks or neighborhoods), researchers can use those observations to compare the condition of residential environments across neighborhoods in a way that is analogous to survey responses from a systematic instrument being compared across respondents (Reiss 1971; Sampson and Raudenbush 1999). SSO is advantageous for this type of data collection because it can be implemented relatively inexpensively (especially in comparison to fielding a separate survey to gauge residents' perceptions of neighborhoods) and, since the instruments are designed by the investigators, there is a great deal of latitude to determine which measures to obtain based on theoretically driven research hypotheses (Caughy et al. 2001; Pikora et al. 2002).

PROMISE AND PROBLEMS WITH CURRENT NEIGHBORHOOD MEASUREMENT METHODS

"Ecometric" Measurement Methods

Collecting the type of rich data available from SSO is, however, a resource-intensive process that limits the number of observations that can be collected by researchers. This means that the geographic scope that can be covered by observers is also limited. In response, the "ecometric" measurement approach was developed to create neighborhood-level measures from data observed at the sample of smaller geographic entities (e.g. blocks) (Raudenbush and Sampson 1999; Mujahid et al. 2007).

Developed from item response theory and psychometric measurement methods, ecometric measurement models are used to obtain values for latent variables that measure theoretically relevant constructs in the residential environment. The theory underlying these methods is that some characteristics of the neighborhood, for example physical disorder, are complex in nature and are likely to be measured better by multiple items that indicate the presence of that attribute than any single item because any individual item is prone to random measurement error. Thus, the variable we are interested in measuring (e.g. physical disorder) can be thought of as latent, in that we cannot "see" this variable itself and can only measure it through the multiple manifest indicators that we can measure. Furthermore, some of the items indicate a greater presence of the latent variable than others (e.g. while litter and drug paraphernalia both indicate disorder, the latter is likely to indicate a more severe level of disorder than the former). Ecometric measurement models are designed to combine the items into a single scale that is purged of measurement error on the individual items, accounts for random variation in the multiple locations sampled within neighborhoods, and are weighted by the severity of the items that are observed within neighborhoods (Raudenbush and Sampson 1999; Sampson and Raudenbush 1999, 2004).

The primary function of these methods is to discriminate among the various neighborhoods along the dimension being measured. In this way they are analogous to the psychometric methods from which they are derived that use tests to discriminate between individuals based on underlying levels of intelligence or skill. Yet, in the context of ecological studies, they have the added benefit over psychometric scales of being created at the appropriate level of analysis for contextual studies; that is they create measures at the neighborhood-level rather than at the individual level (Raudenbush and Sampson 1999). Because the measures are created at the appropriate unit of analysis, this also means that the measurement properties of the scale, such as the reliability and intra-class correlation, are also assessed at the appropriate unit of analysis (Mujahid et al. 2007).

Moving Beyond Neighborhood Boundaries

Despite the promise of ecometric methods to support and improve ongoing research exploring the effects of residential environments on individual outcomes, they have some drawbacks that might make them untenable for some applications of neighborhood research. First, these models assume that the best way to represent the environment likely to affect individual outcomes is by using discrete ecological units. Because maximizing the reliability of scales created using the ecometric method requires a relatively dense sample within neighborhoods, optimizing sample designs requires defining these ecological boundaries before entering the field. This compels researcher to determine, *a priori*, the scale of analysis and limits the flexibility researchers have in creating multiple environmental measures from the same instrument that could vary at different spatial scales from the same instrument. Given the cost of collecting independent data, this is a serious drawback (Fotheringham, Brunsdon, and Charlton 2002). Second, the ecometric approach does not account for the spatial nature of variations in the built environment. While the ecometric approach can account for the clustering of observations within geographic entities, the measurement within these entities is assumed to capture a spatially constant process (Chaix et al. 2005).

The diagram depicted in Figure 4.1 can help illustrate these problems. In the figure, there are three blocks: Block A falls in Tract 1 and is adjacent to Block B which falls in Tract 2 because the street separating the two blocks is the border between Tracts 1 and 2. Block C is some distance away from Blocks A and B, but still falls inside Tract 2. If we are measuring some characteristic of the environment using ecometric models, say physical disorder, the assumptions above mean that the values obtained for the adjacent blocks (A and B) are, statistically speaking, independent of each other while the measures of physical disorder for the distant blocks that fall in the same tract (B and C) are exactly the same. Yet, intuitively, adjacent blocks are more similar to each other than distant blocks and measures of the residential environment should be able to capture this reality. The problem becomes more severe when the spatial scale and ecological definitions used by researchers are not appropriately defined for the effect being studied.

I should hasten to add that these are not problems associated only with ecometric models, but are problems of all models that use ecological units to define neighborhoods – including those that use census boundaries and census data (Lee et al. 2008). In fact, by parsing the variance in measurements between the level of observation (e.g. street or block-face) and the neighborhood-level ecological unit, ecometric measures are less susceptible to the problem of small-scale variability than studies that naively aggregate observations to larger ecological units; however, in that they assume that neighborhoods are internally homogenous and spatially independent units, these methods are limited in their ability to capture the true extent of small-scale variability in residential contexts.

Although these issues are statistical in nature, the assumptions underlying these measurements speak to a more fundamental question about the way that social and physical process unfold over space. Most studies investigating contextual effects have conceived of the residential environment as a patchwork of discrete neighborhood entities with relatively cohesive and internally homogenous environments. Indeed, this is the model that was put forth by the Chicago School sociologists. However, the temporal context of the Chicago School studies compared to contemporary studies is important for understanding the influence of spatial context. The Chicago School sociologists were studying Chicago during the transition to modernism with massive migration to urban centers, both from overseas and domestic rural areas (Park 1928). As neighborhoods in Chicago were built by and for these waves of immigrants as they moved to the city, the Chicago School sociologists noted the physical barriers created by construction and social barriers by language that helped defined distinct neighborhood units (Burgess 1984).

It is unclear how broadly this model applies to the different contextual effects thought to influence the behaviors, attitudes, and outcomes of individuals as well as how accurately it describes contemporary urban settings. If, for example, one is interested in studying how neighborhood environments could be linked to racial and ethnic disparities in asthma, one would likely want to measure airborne pollutants. Measuring pollutants using neighborhood boundaries will be fraught with error because air particles are impervious to census tract or neighborhood boundaries. Although this is an obvious example where measures are based on the physical properties of airflow, it is reasonable to expect that some environmental exposures in the man-made social and physical worlds might follow similar trends. Furthermore, it is possible that the same environmental factor might have an effect on different individual-level outcome measures at different geographic scales.

Therefore, my argument is not that one method of defining neighborhoods to examine contextual effects is universally better than another. Rather, I argue that researchers should consider theories about the scale at which different environmental variables are likely to influence specific outcomes and develop measures based on those theories. Further, attention should be paid to the way that the contextual attribute of interest varies over space. If there is a great deal of small-scale variability, ecological units are not likely to accurately capture the variation that exists in contextual environments; if, on the other hand, there is little small-scale variability and the contextual measure is highly reliant on shared definitions of community areas, then ecological boundaries are more likely to yield accurate assessments of the neighborhood environment.

Relationship between Physical Disorder and Fear

The physical disorder in the environment is one attribute that has been connected to individual- and neighborhood-level outcomes. One path through which disorder is thought to influence individual-level outcomes is by invoking fear in residents. As physical signs of disorder in a neighborhood increase, residential environments seem more disorganized and become less hospitable for residents who then fear being out-and-about their neighborhoods (Ross and Mirowsky 2001). This process can reduce the size of social networks, limit the capacity of neighborhood residents to confront neighborhood problems, and reduce structural investment in neighborhoods (Taub et al. 1984; Ellen 2000; Sampson and Raudenbush 2004; Bursik and Grasmick 1993)

It is possible, however, that fear could be heightened based not on the physical disorder present in the entire neighborhood, but on the areas more proximate to a residents' house. Hipp (2007) has shown, using a measure of neighborhood disorder acquired from a spatial tabulation of the American Housing Survey, that disorder is more strongly related to perceptions of crime when included in a block-level compared to tract-level models. He concludes from his analysis that the small-scale variation in disorder could make the spatial scale of the analysis have a substantial impact on the inferences drawn; however, because he measures disorder based on the same scale and models other environmental covariates at the block- and tract-levels, it is not clear how much this is related to the spatial scale of disorder compared to the spatial scale of the other covariates.

Furthermore, it is possible that fear is not even entirely related to the level of physical disorder observed in an environment but is related instead to the level of disorder perceived to exist by neighborhood residents (Ross and Mirowsky 2001). Since the association between a resident's environment and his or her surroundings is mediated by the way that they perceive that environment, perceptions of neighborhood conditions are perhaps more important to study for their effect on fear than the level of observed disorder (Ross 2000). Although perceptions of disorder are obviously influenced by the level of disorder observed in a neighborhood, observed disorder does not perfectly predict the level of neighborhood disorder perceived by residents. Perhaps more importantly, the differences between the levels of observed and perceived disorder are not random. Rather, the differences are systematically related to the racial composition of neighborhoods (Krysan, Farley, and Couper 2008; Sampson and Raudenbush 2004). Measuring the extent of this systematic bias and its sensitivity at different spatial scales to the effect of disorder on fear requires that measures be created against which perceptions can be compared. Because the relationship between physical disorder and fear is important theoretically for the study of neighborhood contextual effects on individual outcomes and the potential for small-scale variation in physical disorder, I investigate the relationship between disorder and fear.

DATA AND METHODS

Data

Individual-level measures. The data used for this analysis come from the Chicago Community Adult Health Study (CCAHS). The CCAHS is a multi-stage area probability sample of 3,105 adults living in Chicago, IL interviewed between May 2001 and March 2003. The sample was stratified into 343 neighborhood clusters (NCs) defined in the Project on Human Development in Chicago Neighborhoods (PHDCN) as one or more geographically contiguous census tracts which were joined based on the demographic characteristics of the population, local knowledge of the city's neighborhoods and major ecological boundaries (Sampson et al. 1997). Residents were over-sampled from the 80 focal neighborhoods defined in the PHDCN. One adult aged eighteen years or older was interviewed from each sampled household with an overall response rate of 71.82 percent (Morenoff et al. 2007). The sample contains an average of 9.1 subjects per NC. The outcome measure in this analysis is the answer to the question "How safe is it to walk around alone in your neighborhood after dark?" Respondents were given four response categories from which to choose: 1) completely safe, 2) fairly safe, 3) somewhat dangerous, and 4) extremely dangerous. There were 30 respondents who refused or otherwise did not answer the question. All models include variables to control for the demographic and socioeconomic traits of the respondent. *Race/ethnicity* is constructed from the respondent's self-reports of race and Latino ethnicity into four mutually-exclusive categories: non-Latino black (reference), non-Latino white, Latino, and non-Latino other. Age is categorized into six groups (18-29, 30-39, 40-49, 50-59, 60-69, 70 and over) with the youngest age group used as the omitted category. For *gender*, males are the reference category. *Immigrant status* is a three category distinction between first generation, second generation, and third generation and higher, with the last category treated as the reference.

Educational attainment is measured in three categories: less than a high school degree (reference), a high school degree or G.E.D., and a bachelor's degree or higher. Finally, a measure of *family income* is included that divides income into 5 categories representing less than $10,000, $10,000-29,999, $30,000-49,999, and $50,000+ with the highest income category used as the reference. Because there was significant missing data on income we include an additional category for missing on income to retain those individuals in the analysis.

A measure of perceived disorder is also included in the analysis. The respondent-level measure of perceived disorder is created from the responses to five questions asking about the disorder in the neighborhood: how much 1) broken glass or trash on sidewalks and streets and 2) graffiti do you see on buildings and walls do you see, 3) how often do you see deserted houses or storefronts, how often do you see 4) people drinking in public places and 5) unsupervised children hanging out on the street in your neighborhoods? Each question is measured on an ordinal scale coded such that a low response means either none or never and a high response being a lot or very often. A perceived disorder scale was created using an item-response model to create a person-level scale purged of measurement error introduced from individual items based on the method described by Sampson and Raudenbush (1999).

Residential context measures. Residential context measures included in the analysis come from two sources. The first is the SSO component of the CCAHS developed based on the instrument used by the PHDCN. Trained raters walked around blocks where housing units were sampled. The raters observed particular items listed on the instrument and rated the condition of those items on both sides of the streets enclosing the block. In total, 1,663 blocks were observed containing 13,251 block faces. Because respondents were over-sampled in the 80 focal neighborhoods and the SSO ratings were conducted on blocks containing sampled respondents, naturally there is also an over-sample of SSO ratings in the 80 focal neighborhoods.

In order to build the spatially continuous measure of physical disorder, I require measurements of disorder at a sample of locations. Therefore, I take advantage of the benefits of the ecometric measurement methods described previously – the ability to combine, empirically weight, and eliminate measurement error on multiple items – by creating ecometric scales of physical disorder at the city-block level. The value of the physical disorder scale and the geographic coordinates can then be used to create the spatially-continuous kriged measures described in a following section.

The scale is composed of nine items measuring the presence of markers signaling physical disorder in the environment. These nine markers of disorder are 1) garbage, litter, or broken glass; 2) cigarette or cigar butts or discarded cigarette packages; 3) empty beer or liquor bottles; 4) gang graffiti; 5) other graffiti; 6) evidence of graffiti painted over; 7) abandoned car; 8) discarded condoms; and 9) needles, syringes, or drug related paraphernalia. Raters marked whether each of these nine items was present on each block-face in a block. A block-face is a single side of a street that forms the boundary of a block; a typical block is bounded four streets and eight block-faces. The block-level measure of disorder, *Z*, is created by adding the fitted value to the block-level random component of the multilevel item-response model:

$$\eta_{ijk} = \pi_{000} + \sum_{i}^{8} \pi_{i00} X_{ijk} + \sum_{t}^{5} \pi_{00t} T_{tk} + r_{ojk} + u_{ook} \tag{4.1}$$

where η_{ijk} is the log odds of an item *i* being present on block-face *j* and block *k* and π_{i00} is the item severity of item *i* that is measured by the dichotomous indicator X_{ijk} for eight of the nine items (with garbage and litter being the reference item). All items are centered on their grand mean, making π_{000} the conditional mean level of disorder on the average block. The block-face and block random components, r_{0jk} and u_{00k} respectively, are normally distributed around means of zero and variances τ and ω (respectively). Because some indicators of disorder are likely to vary by the time of day, the models also include a series of dichotomous indicators, T_{tk}, that measure the independent influence of the time of day the block was observed, π_{00t} .

The remainder of variables that measure residential context comes from the Summary

File 3 of the 2000 Census. To measure the demographic and socioeconomic surroundings of individuals, I used four scales constructed from census block-group-level measures. The scales are created by first standardizing the items in the scale to have a mean of zero and a standard deviation of one and then summed across all of the items. The items were selected based on a principal components analysis. The first scale measures neighborhood *disadvantage* and includes the percentage of residents with incomes less than $10,000, percentage with incomes greater than or equal to $50,000 (reverse coded), percent unemployed, percent in poverty, and the percent on public assistance (α=0.94). The second scale measures neighborhood *affluence* and includes the percent of residents with sixteen or more years of education, percent employed in managerial or professional positions, and the median home value (α=0.93). The third scale measures *residential stability* and includes the percent of residents living in the same house that they had five years previously and the percent owner-occupied units (α=0.73). The final scale measures *Latino and foreign-born neighborhood composition* and includes the percent of the tract identifying as Latino and the percent of residents that are foreign-born (α=0.87). I also include the *percent of residents that identify as non-Latino black* and the natural log of *population density*.

Analytic Strategy

This analysis proceeds in two steps. First I describe how kriging can be used to develop a continuous measure of physical disorder and validate the specific measures used for this analysis. In order to validate the kriged values of physical disorder, I divide the SSO data into two subsets by randomly placing two-thirds of the blocks (N=1108) into the first subset and reserving the final third (N=555) in the second subset. Using the coordinates at the centroids of each of the blocks in the first subset of the data as the sampled locations, I calculate the variogram and kriged estimates of physical condition at the location of each of the block centroids for the reserved third of SSO blocks. I then compare the estimates calculated by kriging to the measured values at the reserved locations to determine how well kriging estimates the value of physical condition at unsampled locations.

In the second step, I examine the relationship between physical disorder and the level of fear reported by respondents at three geographic scales. The primary interest is to examine whether the small-scale variation surrounding a respondent's home more accurately captures the influence of physical disorder on the level of fear that respondents report. In order to examine this relationship, I measure the spatial context as the area that is covered by drawing a circular buffer around the centroid of the block on which respondents live with 250-meter, 500-meter, and one-kilometer radii. Using measures created at each of these three scales, I use ordered logistic regression to model the level of fear reported by a respondent on physical disorder controlling for the other social and economic characteristics of the residential context.

This analysis requires that measures of the residential context be created at each spatial scale surrounding each block on which a resident lives. For the characteristics measured using census data, I create each variable by multiplying the proportion of the area inside the circular buffer that is comprised by a block-group times the value of the census measure for that block-group. This method provides a good approximation of the social and economic context surrounding an individual given that most census measures are not available for geographic units smaller than the block-group (Downey 2006; Rundle et al. 2009; Mohai and Saha 2006). Since kriging physical disorder will permit me to obtain estimates of disorder at the block-level, I create the measure for physical disorder surrounding a respondent's home by adding the estimated values of disorder for all of the block centroids that fall within the buffers surrounding a respondent's block weighted by the proportion of the block's area of the area covered in the buffer.

USING KRIGING TO MEASURE THE BUILT ENVIRONMENT

Description of Kriging

Kriging is a geostatistical method that uses values measured at locations sampled across space to interpolate unknown values at un-sampled locations. It is based on a two-step process. In the first step, we determine if and how sampled data co-vary across space. In the second step, we use the spatial covariance structure determined in the first step to assign a weight to each sampled location and then take the sum of the product of the sampled value and its corresponding weight at each sampled location. This can be depicted schematically as

$$\textit{(Interpolated Value)} = \sum\left[(\textit{Value Measured at Sampled Location}_i) * (\textit{Weight for Location}_i)\right].$$

In practice, a separate set of weights is applied for each un-sampled location being estimated. As I will show later, the weight applied to each sampled location is directly proportional to the proximity of that sampled location to the point being estimated and inversely proportional to the proximity of that sampled location to other sampled locations. Using this method, any point in the study region can be estimated based on the weights applied to the sampled values and, if many points across the study region are estimated, we can create a smoothed surface of attribute values across the entire study region.

In the current analysis, we are interested in examining the effect of the physical condition of buildings on respondents' feelings of fear; however, we are only able to observe the physical disorder of buildings on 1,663 of the over 20,000 blocks in the city of Chicago. Kriging was developed to handle a similar problem in natural resource exploration and has been used to investigate problems in epidemiology (Auchincloss et al. 2007; Jerrett et al. 2005) and real estate prices (Basu and Thibodeau 1998).[21] In the sections that follow, I describe the properties of kriging that make it attractive for application for studying the role of the built environment on health followed by a brief introduction and overview of the method.

[21] Because of the expense of digging mines to extract resources, operators would sample locations across a field determining the amount of the desired resource could be found at each of the sampled locations. Based on these samples, operators would then determine a spatially continuous surface estimating the amount of the resource at each point on the field in order to minimize the cost and maximize the amount of the resource where they dug (Matheron 1963).

Properties of the Kriging Method

Kriging has several properties which make it particularly useful for measuring the built environment. The first property that makes kriging attractive for interpolating values at unknown locations is that the spatial structure used to interpolate those values is derived from the data itself. This means that one uses the empirical data from the sampled locations to estimate the spatial correlation or spatial decay function. This *data derived* method stands in contrast to other spatial interpolation methods that weight observations by an assumed decay function, such as inverse distance, inverse distance squared, or Gaussian decays. In fact, as we have mentioned and is described in more detail below, the first step to implement kriging is to evaluate the covariance of sampled locations as a function of the distance separating those observations.

The second attractive property of kriging is that it is an *exact interpolator*, meaning that the estimated value of a sampled point is exactly equal to the observed value at that point. Again, this stands in contrast to methods such as inverse distance weighting where the value at a sampled point is undefined (because one cannot divide by a separation distance of zero). Beyond the theoretical value of having a single function that can describe the entire study surface, having an exact interpolator has the added practical benefit that it is not necessary to add this additional step of substituting measured values at the end of the interpolation process.

The third beneficial property of kriging is that it provides both an estimate of the value at any location in the study region, as well as an *estimate of the error* surrounding the estimated value. These errors provide a considerable advantage over other methods of spatial interpolation. Because analysts can determine the confidence with which they predict a value at any given point in the study region, they can target areas where they can either collect more data (if the survey is still in the field) or to interpret results more cautiously because there is more measurement error at those particular locations.

How Kriging Works

In order to describe how this method can be usefully applied to research on the built environment, we provide a brief introduction to the concepts and calculations used in this method.[22] This introduction is not intended to be comprehensive, but is instead intended to provide enough of the background to understand its particular application to the measurement of the built environment. As I have mentioned, kriging can be understood as a two-step process. The first step determines if and how the sampled data co-vary across space. Determining this spatial covariance is necessary to first determine if kriging is a useful methodological tool for a particular problem and, second, to uncover the functional form of the spatial covariance structure among the sampled locations. The second step—interpolating the values—is accomplished through weighting the measured observations at each of the sampled locations to generate estimates of the attribute at non-sampled locations.

Determining if and how the sampled data co-vary across space. To examine if and how the data co-vary across space, we use an instrument called a variogram. A variogram visually depicts the amount of variation between the values measured at two sampled points as a function of their separation distance. Formally, for any point, *x*, separated by another point by separation distance *h*, the variogram function can be estimated as

$$\gamma(h) = \frac{1}{2}\mathrm{E}[(Z_{x+h} - Z_x)^2] \tag{4.2}$$

where E[.] is the expectation operator, $\gamma(h)$ is the value of the variogram for any two points separated by a distance, *h*; Z_x is the measurement of the attribute at point *x*; and Z_{x+h} is the value of the measurement separated from point *x* by the distance, *h*. In order to assess the spatial dependence in the sampled data, I calculate this variogram value for all n*(n-1) pairs of sampled locations and then plot the value by the distance that separates the two points. The resulting

[22] For a more comprehensive treatment, see Chiles and Delfiner (1999) or Isaaks and Srivastava (1989); and for social science applications see (Bailey and Gatrell 1995).

n*n(n-1) pairs of points are plotted in a "variogram cloud;" however, with so many data points, it is difficult to assess whether and how the values at sampled locations are spatially dependent. Therefore, in order to determine the functional form of the variogram, I average the variogram values within bins defined as equal intervals of separation distance, also known as the "lag distance." The averaged values within bins are then plotted at the midpoint of the separation distance to provide an "empirical" or "sample" variogram function.[23] After creating this empirical variogram, a functional form of the variogram, $\gamma(h)$, can be estimated that fits the form of the empirical variogram well.

Interpolating values. As I mentioned previously, the values of the physical attribute are estimated at any location by assigning a weight to each of the sampled locations. The weights are based on the spatial structure and are determined through the creation of the variogram in the previous step. The particular value at any location is simply the summed products of the measured value at the sample location and the sampled locations corresponding weight. In matrix form, this can be expressed as

$$z_0^* = \boldsymbol{\lambda}^{\mathbf{T}}\mathbf{z} \tag{4.3}$$

where z_0* is the estimated value at a particular location; $\boldsymbol{\lambda}$ is a vector of weights for each sampled location, $\boldsymbol{\lambda} = \{ \lambda_1, \lambda_2, \ldots, \lambda_N\}$ and $\boldsymbol{z}$ is a vector of measured values at each of N sampled location, $\boldsymbol{z} = \{z_1, z_2, \ldots, z_N\}$.

Calculating the weight. The weights used to calculate the interpolated value are based on the function estimated from the variogram determined in the first step. More precisely, the weights are based on the spatial covariance, $\sigma(h)$, which, for a stationary process can be

[23] There is no reason why other smoothing techniques, like lowess estimators or kernel smoothers cannot perform the same function; however, binning across lag distances tends to provide reasonable estimates of the variogram value, particularly if multiple lag distances are attempted and the functional form remains similar across the various lag distances.

calculated by

$$\sigma(h) = \sigma - \gamma(h)$$

(4.4)

where $\sigma(0)$ is the covariance at a separation distance of zero and $\lambda(h)$ is the variogram function calculated in Figure 4.1. Simply, a stationary process is one where the covariance between two points varies only as a function of the separation distance between two points. This implies that the attribute has a spatially constant variance around a constant, if unknown, mean.

Using this covariance function, the vector of weights is calculated for every location at which a value of the attribute is being interpolated. It can be shown that the interpolated value, z_0^*, from Figure 4.2 is the best linear unbiased estimate based on the spatial covariance using the following system of equations:

$$\underset{\boldsymbol{A}}{\begin{bmatrix} \sigma_{11} & \cdots & \sigma_{1N} & 1 \\ \vdots & \ddots & \vdots & \vdots \\ \sigma_{N1} & \cdots & \sigma_{NN} & 1 \\ 1 & \ldots & 1 & 0 \end{bmatrix}} \underset{\boldsymbol{B}}{\begin{bmatrix} \lambda_i \\ \vdots \\ \lambda_N \\ -\nu \end{bmatrix}} = \underset{\boldsymbol{C}}{\begin{bmatrix} \sigma_{01} \\ \vdots \\ \sigma_{0N} \\ 1 \end{bmatrix}}$$

(4.5)

In the matrix, ***A***, the values σ_{ij} in each cell equal the value of the covariance function determined in Figure 4.3 above, $\sigma(h)$, at the separation distance, h, between sampled points, i and j while the values of σ_{0i} equal the value of the covariance function for the separation distance between the point being estimated and the sampled point, i. Since the values of λ_i and υ—the weight assigned to sample location, i, and a Lagrange multiplier to constrain the sum of the λ_is to one, respectively—are the only unknowns in the system, one can simply solve for the vector, ***X***, to obtain the weights and constraint. The first N elements of the vector ***X*** comprise the vector of weights, λ, introduced in Figure 4.2 and which can now be used to calculate the interpolated value.

From the system of equations above, one further beneficial property unique to kriging bears mentioning now that the process of estimation has been described. In order to solve for the matrix, $\boldsymbol{X}$, we multiply the inverse of matrix $\boldsymbol{A}$ by matrix $\boldsymbol{B}$, i.e. $\boldsymbol{X} = \boldsymbol{A}^{-1}\boldsymbol{B}$. Remembering that the value of the covariance function, $\sigma(h)$, is larger as separation distance decreases, one will notice that the kriging weights are based on two pieces of information. First, the weights are directly proportional to the proximity of a sampled location, i, to the location for which values are being interpolated. This can be seen because the value of $\sigma(h)$ in the elements of matrix $\boldsymbol{B}$ are larger the closer they are to the sampled location, i, and the matrix $\boldsymbol{B}$ is proportional to the value of element i in vector $\boldsymbol{X}$. Second, taking the inverse of matrix $\boldsymbol{A}$ indicates that the weights are inversely proportional to the proximity of sampled locations with each other since the value of element ij in matrix A is larger the closer the two sampled values are to each other and value of the matrix $\boldsymbol{A}$ is inversely proportional to the value of $\boldsymbol{X}$. This means that kriging not only accounts for the spatial proximity of the point being estimated to the sampled points, but that it also weights spatially clustered sample locations less heavily so that the interpolated value is not inflated by assuming that each sampled point provides independent information to be used in the interpolation. In other words, the weight assigned to each sampled location is penalized not only for its distance from the point being estimated, but it is also penalized for providing less unique spatial information if it is close to other points that are sampled.

Assumptions. This type of estimation is formally known as "ordinary kriging" and is used for the estimation of stationary random functions. As mentioned previously, stationarity implies that there is a constant mean throughout the study region (i.e. first-order stationarity) assuming that the measured values of the attribute at the sampled locations are independently and identically distributed. Ordinary kriging also assumes that the variance of the attribute is constant throughout the entire study region (i.e. second-order stationarity). Based on these assumptions, the variance of the estimates (i.e. the estimation error) can be estimated as

$$\sigma_{OK}^{2*} = \sigma_{00} - \boldsymbol{\lambda}^{\boldsymbol{T}}\boldsymbol{\sigma}_{\boldsymbol{0}} + \nu$$

(4.6)

where σ_{00} is the value of the covariance function at a separation distance of zero. Methods have been developed that relax assumptions about a constant mean, constant variance and normality, though they are beyond the scope of this paper.

ANALYSIS & RESULTS

Validation of Kriging

A histogram of the physical disorder variable (not shown) also reveals that the variable is approximately normally distributed. I use the geographic coordinates at the block centroid as our location of measurement on the larger subset and as the location of estimation on the smaller subset. Using the block centroids does introduce some level of imprecision into the measurement; however, I feel it is justified for two reasons. First, blocks are an appropriate basic human ecological level from which to build measurements in an urban setting. Second, developing estimates at any smaller level (e.g. streets) quickly increases the number of calculations and, given that blocks are created by the street grid, it does not significantly improve the spatial precision of measurement.

A plot of the variogram can be viewed in Figure 4.2. This figure shows the empirical variogram at a lag distance of 1000m for the points in the subset of sampled blocks and the theoretical variogram. The value of the variogram is plotted for all pairs of points in the data on the vertical axis against the separation distance between the pairs on the horizontal axis and the empirical variogram is created by taking the mean value of points falling within successive 1000m bins plotted at the midpoint of the bin. This summarizes the empirical distribution of the spatial correlation in the raw data. Based on this empirical diagram, it appeared that an exponential functional form was best suited to model physical disorder over space which can be described in the following equation:

$$\gamma(h) = b + c\left(1 - \exp\left\{-\frac{h}{a}\right\}\right) \text{ where: } b = \begin{cases} b_s, & h > 0 \\ b_s + b_m, & h = 0 \end{cases}$$

(4.7)

Using this functional form, the value of *a* one-third of the practical range, meaning the distance at which the function so closely equals zero that no spatial variation practically exists beyond that distance. The value of the sill, *c*, is the asymptotic limit as the separation distance, *h*, moves toward infinity minus the nugget effect, *b*.

The nugget effect, named because in geological applications it would often be possible to discover nuggets of ore without a larger deposit, reflects the sum of two components. The first is the small-scale variability, b_s, in the data that is at a spatial scale that is too small to be captured by the sample taken. This would reflect, for instance, the difference between two streets on the same block. The second component of the nugget effect is the measurement error in the instrument, b_m. Because the instrument (the ecometric scale based on the items rated in the SSO) imperfectly measures the latent construct of physical disorder, we must also account for the error surrounding the estimate even at measurement locations. As an approximation of the measurement error, I used the overall block-level scale reliability of the ecometric scale, which was 0.928 for this scale. Therefore, I considered 92.8 percent of the nugget effect to be due to very small-scale variation and the remaining 7.2 percent to be attributable to measurement error. I estimate the values of these variables to be: a=3100, b_s=0.79, b_m=0.06, and c=1.70.[24]

Using the the variogram function estimated in the previous step, I calculated the covariance function using . Based on this covariance function, I estimated the values at the location of each of the 555 reserved blocks using the subset of 1,108 as my sampled locations. To assess how closely the kriged estimates reproduced the values at the 555 reserve locations I subtracted the estimated value of the physical condition from the measured value of the physical conditions to obtain the errors. A histogram of these errors is shown in Figure 4.3 along with a line following a normal distribution. The errors approximate a normal distribution around a mean of -0.022. In addition to the estimate I obtained the variance of each estimate based on $\sigma_{OK}^{2*} = \sigma_{00} - \boldsymbol{\lambda}^{\boldsymbol{T}}\boldsymbol{\sigma}_{\boldsymbol{0}} + \nu$

(4.6. Using this value, I calculated the 95 percent confidence interval for each location and found that 525 of the 555 measured values (94.6 percent) fell within the confidence intervals.

[24] This estimate is based simply on fitting the exponential function by eye to the empirical variogram. This process can also be accomplished through restricted maximum likelihood estimation (Chiles and Delfiner 1999).

These statistics indicate that kriging performs well at estimating the value of block-level physical disorder. Comparisons of the variances of the measured versus kriged estimates at locations, however, revealed that the kriged estimates smooth over a substantial amount of the variation in physical disorder: while the variance of the kriged estimates was only 1.45, the variance of the measured values was 2.69.

Effect of Physical Disorder on Fear

After validating the kriged measures of physical disorder on the reserved subsample of locations, I then estimated the value of physical disorder on all 24,777 census blocks in the city of Chicago and then averaged these estimates for the blocks within 250 meter, 500 meter, and 1 kilometer of respondents' own blocks. I used these measures to model the effect of physical disorder on fear at different spatial scales. The neighborhood-level results of the ordered logit model are reported in Table 4.1.

The coefficients for the effect of physical disorder on a resident's level of fear can be found in the last row of the table. One can notice from these coefficients that the effect size of physical disorder decreases as the spatial scale of the analysis increases and the standard errors increase. Measuring the residential context at 250 meters, a one-unit increase in the physical disorder scale increases the odds of a respondent reporting a higher category of fear by 1.61 times (i.e., $\exp\{0.474\}=1.61$). When measured at the 500 meter scale, the odds of increasing a level are 1.51 times higher for every one-unit increase in physical disorder and only 1.46 times higher at one kilometer.

Additionally, if one were analyzing only a single geographic scale, the inferences drawn about the effect of physical disorder in the residential environment would be different depending on which scale one chose. At 250 meters, the standard errors are low enough to be reasonably confident that there is an effect of physical disorder on fear ($p<0.01$) while at the one kilometer scale, the statistical inference would be that physical disorder has no effect on the fear of residents in their neighborhoods. These results suggest the effect of physical disorder on fear is localized to the areas immediately surrounding a person's home and measuring the small-scale changes in the physical environment are important for detecting these spatial effects.

Interestingly, the coefficients for the variables measuring the characteristics of the social and economic environment actually *increased* as the spatial scale increased. The positive effects of disadvantage, affluence, Latino and foreign-born composition, and black racial composition were all significant at all three scales of analysis and the effect sizes of all three increased along with the scale.[25] Especially important is the effect of proportion black in the community. Although the variables are on different scales, the size of the effect is noticeably large. At 250 meters, the effect of going from a residential context with no blacks to one that is all black increases the odds of a respondent reporting a point higher of fear by 12 times and this effect increases to almost 21 times at one kilometer. The effects of the other significant predictors had similar relative gains as the spatial scale of analysis increased. These findings imply that the physical characteristics of the residential environment matter most in the immediate proximity to where a resident lives when they perceive their residential environment while social characteristics matter most at larger scales.

Next, I turn to investigating whether the effect of physical disorder on fear is mediated by the residents' perceptions of disorder in the environment. I used the same modeling strategy to that reported in Table 4.1 and add the individual-level disorder scale to the model. The results of this model are reported in Table 4.2. Looking first at the effect of perceived disorder on fear in the first row of the table, I find a strongly significant relationship between the perceived level of disorder and higher levels of fear among residents. The effects for all three spatial definitions are

[25] Examining the counterintuitive finding that areas with greater affluence predict higher levels of fear in more depth, it is likely due to the collinearity between the affluence scale and the other neighborhood-level characteristics in the model. Affluence is negatively correlated with perceptions of fear and it is only after all of the variables are entered into the model that the positive effect of affluence is revealed. Since my interest is primarily in trying to describe the effect of physical disorder, I retained the variable in the model to control for possible relationships that could explain the relationship between fear and physical disorder. Future studies, however, should attempt to reduce the number of dimensions included in the model in order to isolate specific effects of the residential environment.

relatively similar in predicting a one-point increase in the perceived disorder of a neighborhood increases the odds of reporting a higher category of fear by approximately 2.69 times. These effects are similar across the three spatial scales defined for this analysis, meaning that the psycho-social relationship between perceptions of disorder and fear are not mediated by the residential context at different scales.

The reverse, however, does seem to be true. Controlling for the level of disorder respondents perceive in their neighborhoods controls away the effect of observed physical disorder on fear and lowers the effect of the two socioeconomic indicators such that they are statistically insignificant at the two smallest scales and only become significant at the one kilometer scale. It appears from these results that the effects of residential context on fear, especially at very small spatial scales, are mediated almost entirely through the respondent's perceptions about aspects of the environment. The one very important exception to this trend is the stable and strong effects of racial composition on fear. These effects are not mediated by either the level of physical disorder in the neighborhood or the perception of disorder. Racial composition has the effect of amplifying residential fear even after controlling for perceived disorder, which is known to be correlated with the perceptions of disorder. This supports the growing evidence of place-based racial stereotyping (Quillian and Pager 2001; Sampson and Raudenbush 2004; Krysan et al. 2008).

DISCUSSION AND CONCLUSIONS

As research on the associations between neighborhood residential context and individual outcomes continues to grow, more attention must be paid to focusing on how neighborhood environments can influence the outcomes experienced by individuals and developing measures of residential context that can be used to test those associations. As they do so and continue to build a larger inventory of contextual attributes theoretically linked to a wide range of outcomes, they must also consider how to best measure those attributes and think carefully about the spatial scale at which the attributes are association with the outcomes.

In this chapter, I have demonstrated how kriging can be added to the toolbox of researchers interested in contextual effects that will enable them to be more explicit about environmental characteristics that vary over space. It also provides the ability to model how residential exposures can continuously vary over space and move away from a sole reliance on ecological neighborhood units that can miss much of the variation that occurs within their boundaries. I showed how this tool could be used to create measures of physical disorder at different spatial scales. Doing so revealed that physical disorder has a greater effect on fear the more proximate it is to one's residence, highlighting the importance of capturing small-scale spatial variation in the environment. I find that social and economic indicators, on the other hand, had larger effects as wider spatial contexts were considered. This suggests that the physical and social contextual affect fear – and potentially on outcomes such as crime and health status that are associated with fear – at different spatial scales. This might indicate that people look to a much broader spatial context to situate themselves socially, but are influenced at a much more local level by their physical environments.

I find that a resident's perception of disorder has strong effects on the level of fear felt by a respondent and that they control for the effects of measured physical disorder on fear. Perceptions also attenuate the relationship between the socioeconomic characteristics of residential context and fear at small spatial scales; racial composition characteristics, however, remain strong predictors of the level of fear that a resident feels in their neighborhood. The strong relationship between perceptions of disorder and fear remain constant at all three spatial scales implying that the relationship between a person's perception of disorder and fear and remains unaffected by the spatial scope of residential context that one considers.

Implications

Substantively, the most important implication of this study is that the physical and social environments affect residents' sense of fear at two different scales. The physical environment most proximate to residents' homes is most influential on how much fear they perceive, an effect that dissipates as the spatial scale of the environment expands. On the other hand, the social and economic characteristics of the residential environment have their smallest influence near the resident and grow at increasing spatial scales.

This underscores the importance of considering the potentially complicated relationships between measures of residential environments with the characteristics and outcomes being studied. Without considering the small-scale variation of the residential environment, it would be possible to conclude that there was no effect of physical disorder on residents' perceptions of fear when, in actuality, there is an effect at small spatial scales that could easily be masked by using standard administrative boundaries. What is more, drawing conclusions based only on the characteristics available from the census administrative data would imply that the only effect of residential context on resident perceptions increased as a function of the spatial scale. Future research should consider whether the small-scale association of physical disorder with perceptions of fear is a common with other attributes in the physical environmental or if it is unique to measuring fear.

This study also has methodological implications for the investigation of residential contexts. Since kriging is based on measures obtained at specific points and their spatial relationship to each other, sampling based on a spatial frame rather than a frame based on samples of individuals or households may be better. Individual-level samples are designed to maximize individual-level variation on important dimensions. But, for spatial items, a spatial sample has the potential to be more cost-effective. Unlike the cluster-based, stratified sampling designs used to explore contextual effects in neighborhood studies by maximizing within- and between-neighborhood variance, the geographic coverage of measures is more important for studies interested in examining the relationship between neighborhood context and individual outcomes. Additionally, when developing measures of the residential environment, the "population" of residential contexts is the population to which we would like to generalize;

creating measures from samples of people could miss important aspects of residential environments (Lee, Moudon, and Courbois 2006). Sampling and measurement strategies, such as kriging, can provide a valuable tool for researchers interested in accurately depicting the residential environment. While this study used SSOs to estimate characteristics of the residential environment, another future advantage of this method is that it can be applied to other sources of data such as surveys given to independent samples of respondents or municipal data sources that can be sampled more efficiently to provide sufficient coverage of the residential environment.

Limitations

One limitation to this study is that using the best kriged estimate of blocks smoothes over a substantial amount of variation that occurs in the level of physical disorder in the environment. The fact that the variance of the measured values of the subsample of locations was so much higher than the variance of the estimates at the same location signals this problem. This has the result of inflating the precision with which it appears that I am able to measure physical disorder which could potentially overstate the relationships revealed in this study. To quantify this problem, I attempted a Monte Carlo approach of drawing multiple random samples – or "conditional realizations" (Isaaks and Srivastava 1989) – from the spatially co-varying errors to multiply impute physical disorder at unsampled locations; however, because computing the covariance structure from which the random samples are drawn requires decomposing a matrix with $(24,777)^2$ cells. This was computationally impractical and future studies should consider how to randomly draw from the spatial covariance distribution in order to implement this strategy with more computational efficiency.

The sample of used for this study was also limited in a number of ways. First, this is an urban sample at a single point in time. It is difficult to determine how well the substantive findings would generalize to other types of settings and how dependent the results are to the changing conditions in residential environments. But, how well these results generalize to other types of settings and locations is an empirical question that can be studied using the methods described here. Second, this sample consists only of blocks where a respondent was sampled for the CCAHS. This, by definition, makes the sample one consisting exclusively of residential blocks and means that the influence of other types of blocks (e.g. all-commercial or all-industrial) is unmeasured in this data. Because both physical disorder and feelings of fear could be influenced by non-residential land-uses, it is important to consider the absence of those blocks in this study.

Finally, one aspect of the residential environment that remains unmeasured in these models is the level of crime in the residential environment. Higher crime could obviously influence the level of fear a respondent feels in their neighborhood environment. Unfortunately, crimes measured at a sufficiently small spatial scale to create reliable estimates of exposure were unavailable; but, it is an important attribute of the residential environment that future studies should consider.

Conclusion

As researchers continue to explore the effects of residential contexts on individuals, more attention must be paid to measuring the aspects of the environment that influence the specific outcome under investigation. This includes both developing measures theoretically related to the outcome being investigated and the spatial scale at which environmental factors affect individual outcomes. The method developed in this chapter offers tools for researchers to accomplish these goals more effectively, and in doing so, can help researchers become less reliant on census data and atheoretical administrative boundaries to study neighborhood context.

Table 4.1. Neighborhood-level coefficients and standard errors of ordered logistic regression of fear of walking at three spatial scales

	Spatial Scale of Analysis		
	250 meters	500 meters	1 kilometer
Neighborhood-Level			
Disadvantage	0.483 ***	0.483 ***	0.528 ***
	(0.112)	(0.111)	(0.123)
Affluence	0.239 *	0.269 *	0.348 **
	(0.097)	(0.105)	(0.121)
Residential Stability	0.010	-0.012	0.048
	(0.084)	(0.096)	(0.120)
Hispanic/Foreign Born	0.964 ***	1.051 ***	1.092 ***
	(0.137)	(0.142)	(0.157)
Proportion of people non-Hispanic black	2.514 ***	2.812 ***	3.040 ***
	(0.324)	(0.339)	(0.383)
Population density (per km-sq., logged)	0.146	0.068	0.026
	(0.131)	(0.147)	(0.169)
Kriged physical disorder	0.474 **	0.412 *	0.377
	(0.172)	(0.193)	(0.238)

* p<0.05, ** p<0.01, *** p<0.001

Note: All analyses control for individual-level race/ethnicity, gender, age, immigrant status, educational attainment, and income

Table 4.2. Individual-level perceived disorder and neighborhood-level coefficients and standard errors of ordered logistic regression of fear of walking at three spatial scales

	Spatial Scale of Analysis		
	250 meters	500 meters	1 kilometer
Individual-Level			
Perceived disorder	0.994***	0.986***	0.989***
	(0.083)	(0.083)	(0.084)
Neighborhood-Level			
Disadvantage	0.221	0.223	0.265*
	(0.112)	(0.114)	(0.128)
Affluence	0.173	0.203	0.263*
	(0.102)	(0.110)	(0.125)
Residential Stability	0.003	-0.021	0.021
	(0.084)	(0.097)	(0.122)
Hispanic/Foreign Born	0.774***	0.854***	0.877***
	(0.147)	(0.151)	(0.165)
Proportion of people non-Hispanic black	2.130***	2.417***	2.639***
	(0.336)	(0.352)	(0.397)
Population density (per km-sq., logged)	0.114	0.026	-0.025
	(0.127)	(0.141)	(0.162)
Kriged physical disorder; 250m buffer	0.177	0.141	0.116
	(0.172)	(0.193)	(0.239)

* p<0.05, ** p<0.01, *** p<0.001

Note: All analyses control for individual-level race/ethnicity, gender, age, immigrant status, educational attainment, and income

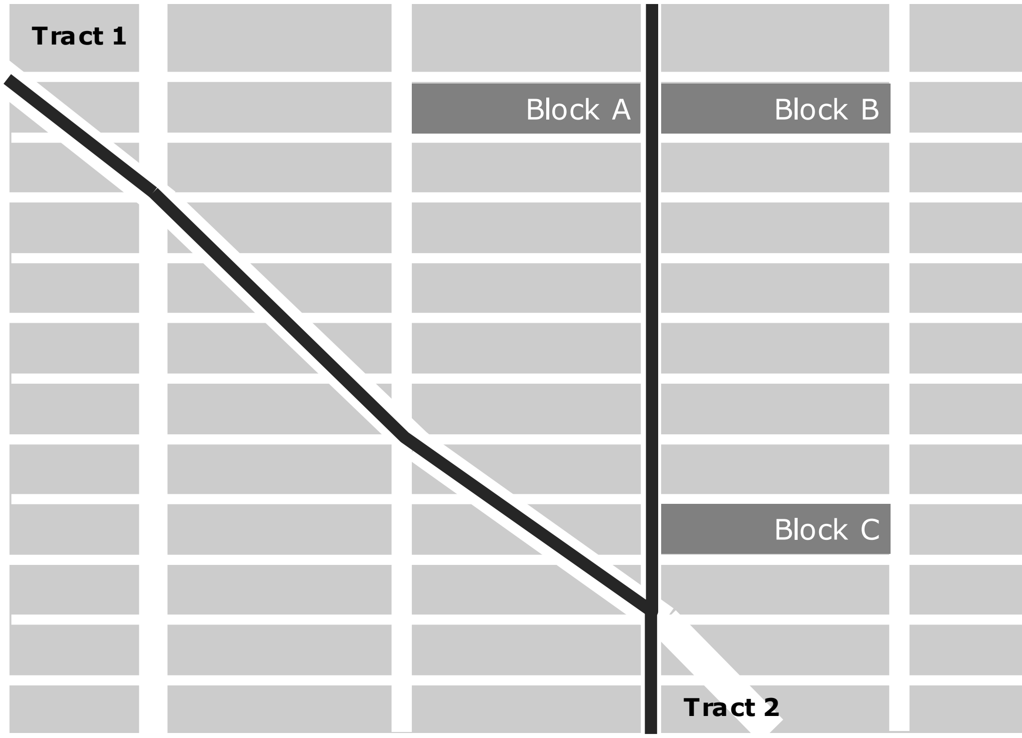

Figure 4.1. Diagram of hypothetical city-blocks

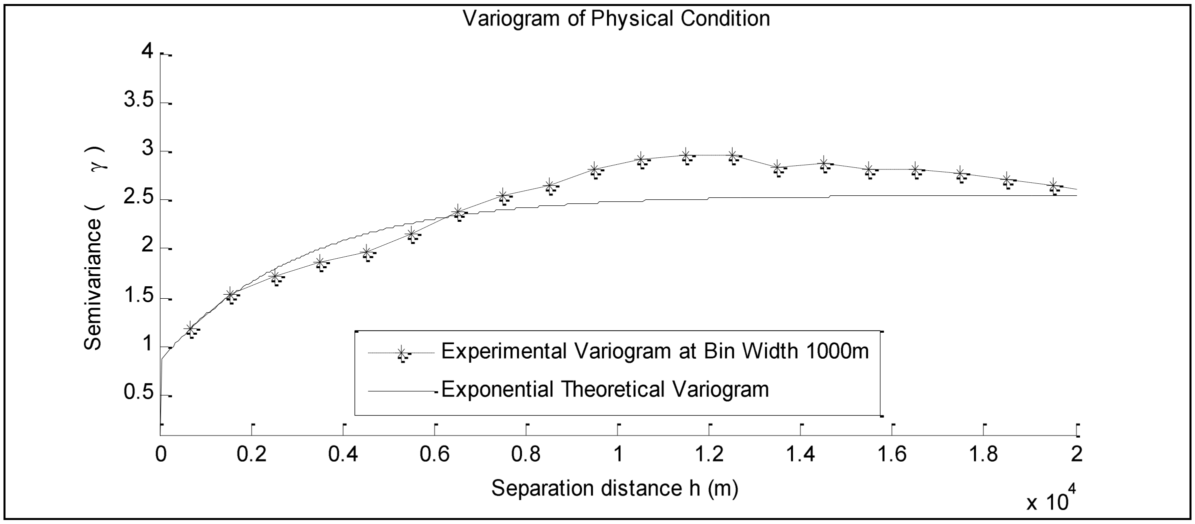

Figure 4.2. Empirical and theoretical variograms of physical disorder

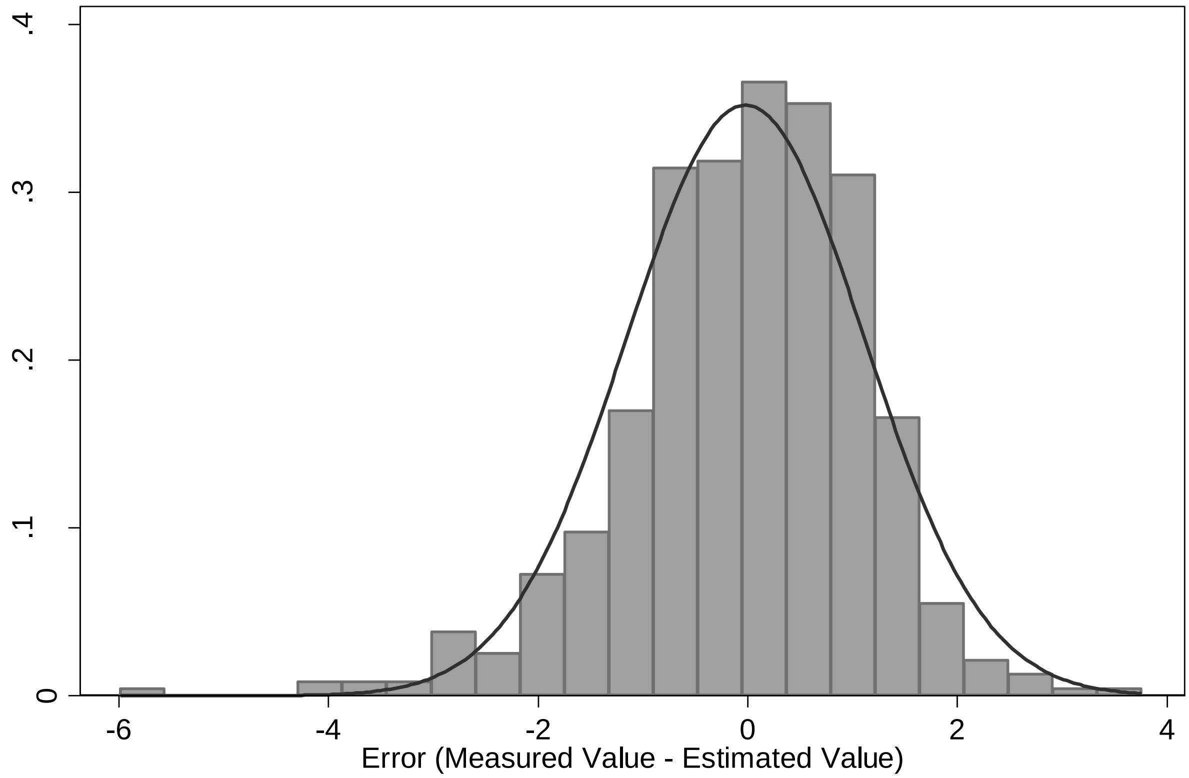

Figure 4.3. Histogram of errors comparing measured values of physical disorder at reserved sampled locations to kriged estimates at the same locations

CHAPTER 5

CONCLUSIONS

In the preceding chapters, I examined three aspects of neighborhood environments that can help discern the ways that structural forces can influence the set of choices available to individuals and showed how studying neighborhoods could elucidate the relationship between larger social forces and the environments in which individuals live. In the second chapter, I explored the patterns of racial and ethnic change in metropolitan neighborhoods and found that Chicago residents are living in increasingly diverse neighborhoods but that only certain types of diversity had increased. In the third, I investigated one possible solution to overcome the continued racial and class segregation of the metropolitan area, urban redevelopment, and found that preferences do not conform to popular notions of a white yuppie gentrifying a neighborhood. Instead, the pattern was much more nuanced in that race was an important factor, but its full importance was not revealed until the intersections of homeownership and urban residence were considered. In the last chapter, I demonstrated methods to develop more sophisticated measures of residential contexts that permit more flexible geographic definitions of environmental exposures. Doing so, I revealed that neighborhood researchers need to seriously consider multiple and sometimes conflicting trends across space on the way residents view their community.

Based on the evidence presented in these chapters, I propose three general conclusions that can be drawn from them cumulatively. First, race continues to be a significant structural reality in the lives of metropolitan residents. Second, to more fully understand the reality in which metropolitan residents increasingly live, metropolitan communities must be viewed from a wider perspective by incorporating multiethnic contexts into analysis. Third, studying the influence of neighborhoods on individuals requires a dynamic approach that does not look at single effects in isolation, but examines the process through which neighborhoods change and influence residents. I describe each of these more in detail below.

CONTINUING SIGNIFICANCE OF RACE

The evidence in the preceding three chapters points to the continuing significance of race influencing the structural opportunities available to residents. Although many neighborhoods in the Chicago metropolitan area became more diverse in the three decades from 1970 to 2000, all-black tracts not only did not become more diverse but more tracts became all-black in the same period. Furthermore, descriptive evidence showed that whites were unwilling to share neighborhoods exclusively with blacks and, even where Latinos were the predominant minority group, the proportion of the neighborhood that was white dropped drastically after more than a small number of blacks were present. Thus, whites were not willing to live with substantial numbers of Latinos, either. Although whites were more likely to live in neighborhoods with larger numbers of Latinos only, a similar trend could be observed for some tracts.

In the fourth chapter, a resident's fear of being in his or her neighborhood at night is strongly tied to the surrounding racial composition – an effect that increases as the area surrounding the respondent increases. The growing size of the effect with an increasing area around individuals could suggest that the influence on neighborhood perceptions is not so much about individual black residents as it is about the structural racial stigma attached to black neighborhoods and "ghettos" (Sampson and Raudenbush 2004; Ellen 2000). This is not mediated by a resident's perceptions of neighborhood disorder or the actual level of measured disorder in the neighborhood.

This is not to say that all outcomes are shaped entirely by race. For example, in studying the residential preferences for redeveloped neighborhoods, there was a considerable amount of variation within racial groups. Black renters were the most willing to consider moving to a redeveloped neighborhood, far outpacing whites and Latinos. Black urban homeowners, on the other hand, looked much more like white and Latino urban homeowners than they did like black renters. This actually fits well with Wilson's (1980) theory of the declining significance of race: at an individual-level the preferences of black homeowners are closer to their class compatriots than their racial compatriots. But, given the evidence from the other two chapters, it is difficult to tell whether middle-class blacks will be able to succeed in keeping their neighborhoods from being perceived with the same negative stigma that is attached to other black neighborhoods or be able to reap the financial gains of homeownership since black areas tend to attract very few white residents.

Importance of Studying Multiethnic Contexts

The three studies presented in the preceding chapters underscore the importance of engaging with the increasing diversity of multiethnic metropolitan areas. Too often, the experience of groups other than whites and blacks are simply ignored or all minorities is lumped into a single group. This is particularly relevant to the neighborhood change literature that has tended to examine white loss at the cost of the nuance about the multiple relationships among different racial and ethnic groups (Lee and Wood 1991; Ellen 2000; Denton and Massey 1991). Yet, the analysis in the second chapter reveals that the diversity of metropolitan neighborhoods is much more complex than understanding the gain of a single group or loss of another. By exploring this diversity, we see that Latino neighborhoods do not experience the same kind of succession and turnover of black neighborhoods but that, as the proportion Latino increases in a neighborhood, the more whites are likely to be replaced by blacks – potentially driving further white residents away. Although there are differences, it is important to note the similarities as well. Investigating the social and physical environmental influences on feelings of fear to be alone in one's neighborhood, residents reported greater levels of fear in Latino as well as black communities. Although there is a growing literature investigating the racial stigma attached to places for blacks, far less is known about what kinds of stigma are attached to Latino neighborhoods.

Dynamic Approach to Understanding Neighborhood Effects

Exploring the significance of neighborhoods in structuring the life-chances of individuals requires a greater attention to the fact that the process is dynamic. It is not only neighborhoods that affect the behaviors of individuals. Neighborhood residential environments are created through the decisions of people by deciding where they are going to live, how they are going to intervene in their environments, and through the social networks that they build. Although some research is moving in this direction either through theory-generating complex modeling of neighborhood dynamics (e.g., Bruch and Mare 2006) or through explicitly incorporating changes in neighborhood environments on individuals (e.g., Sampson and Sharkey 2008; Quillian 2002), more research needs to be developed in this area.

One of the obstacles is being able to assemble all of the necessary components to piece together the puzzle of how dynamic individual- and structural-level processes work to create neighborhood environments. I believe that the studies in the preceding chapters provide some, though certainly not all, of the building blocks from which to be able to build a picture of this dynamic process. Understanding neighborhood processes requires first knowing how residents end up living in the neighborhoods that they do. Asking not only where they would want to live but, as I do in Chapter 3, why they would want to move there enables researchers to study the interaction between structural forces that either help (e.g., intergenerational transfers of wealth) or hurt (e.g., housing discrimination) residents end up living where they would prefer. Although I focus on redeveloping neighborhoods in particular in this study, this process can be extended to explore influences on other types of neighborhoods.

The willingness of a resident to consider moving to a particular place corresponds to the history of that location and where the resident sees himself or herself fitting in that trajectory. While neighborhoods change in part because of residential turnover – a process I investigate in Chapter 2 with respect to the race of residents – change can also occur within neighborhoods based on the activities of the residents themselves. Being able to follow the trajectories of neighborhoods over time and how incoming residents are absorbed (or not) into those trajectories will enable researchers to investigate the processes through which individual agents can create structural changes. Just as importantly, we also must develop a better picture of how residents perceive various neighborhoods. Decisions are always mediated through the perceptions that residents hold of areas. If, on the whole, areas that are predominantly black or Latino are perceived as invoking more fear or worse places to live, then that has important consequences for the trajectories of those residents of those neighborhood environments.

This way of exploring the effects of neighborhoods stands in contrast to the recent turn towards randomized control trials or other quasi-experimental methods (Oakes 2004; Goering and Feins 2003; Harding 2003). These methods are interested in defining a specific causal effect for a single variable. For instance, in the effort to uncover the specific effect of poverty on an outcome for residents in a neighborhood, one would want to eliminate the potential association with the racial stigma attached to a neighborhood to isolate only the single effect of poverty. I would argue, however, that the stigma attached to the neighborhood is part of why the neighborhood matters on the outcomes of individuals. To eliminate that stigma, if it were even possible, is to eliminate a large portion of the lived experience that makes the neighborhood a salient location for its residents.

Developing this more comprehensive framework requires that researchers be attendant to collecting the appropriate kinds of data that can be linked to explore how these processes unfold. For example, asking residents about their housing preferences and then following where they live in subsequent moves can be an excellent way to ascertain how well the respondent is able to obtain his or her stated housing preference and why he or she was not able to if that were to be the case. The chapters in this dissertation can become the building blocks for this kind of analysis. Studying how neighborhoods change over time can help contextualize individual-level moves. Asking respondents why they would consider different neighborhoods can provide information about how residents do or do not end up living together. And finally, developing methods to cost-effectively measure large spatial areas can all provide researchers with the tools to develop this research.

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