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Violent Crime, Mobility Decisions, and Neighborhood Racial/Ethnic Transition

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Numerous studies have observed a positive cross-sectional relationship between the size of racial/ethnic minority groups and crime and posited that this relationship is entirely due to a causal effect of minorities on crime rates. We posit that at least some of this relationship might be due to the opposite effect: neighborhood crime increases the number of racial/ethnic minorities. This study employs a sample that allows nesting housing units within census tracts in a number of cities to test the effect of violent crime rates on residential mobility. We find that racial/ethnic transformation occurs due to two effects: first, white households are more likely to exit neighborhoods with higher rates of violent crime than are African American households. Second, whites are significantly less likely to move into a housing unit in a tract with more violent crime, particularly if this violent crime rate is increasing. On the other hand, African American and Latino households are more likely to enter neighborhoods with higher levels of violent crime. And Latinos are particularly likely to enter neighborhoods experiencing an increasing level of violent crime over the previous four years. Keywords: violent crime; residential mobility; race/ethnicity; racial transition; neighborhood change.

Studies have consistently found a positive relationship between the proportion of racial/ethnic minorities and the rate of crime in neighborhoods and cities (Krivo and Peterson 1996; McNulty 2001; Ouimet 2000; Roncek 1981; Roncek and Maier 1991). Scholars often conclude from this evidence that the presence of more racial/ethnic minorities leads to more crime, despite the fact that these studies almost always utilize cross-sectional data. There are numerous theoretical explanations for such a relationship, including a culture of violence theory positing that African Americans are inherently more violent (Wolfgang and Ferracuti 1967), a strain theory argument that the disadvantaged economic position of racial/ethnic minorities pushes them to respond with criminal behavior (Agnew 1999; Defronzo 1997), a structural cultural explanation positing that neighborhoods with concentrations of poor racial/ethnic minorities lack the economic resources and social institutions to provide the social control that would otherwise reduce the level of crime (Sampson and Wilson 1995), and a structural explanation positing that the economic dislocation and unemployment in minority-dominant neighborhoods results in more broken households that decrease the ability to provide social control to reduce the amount of crime (Sampson 1987). A commonality in such theories is the assumption that the causal direction runs from the presence of minority residents to more crime. Even scholars who suggest that this is a spurious relationship nonetheless argue that this is because racial/ethnic minorities are more likely to live in economic deprivation, which is the true cause; nonetheless, such studies do not consider the possibility that crime may in fact affect the racial/ethnic composition. Given that these are almost exclusively cross-sectional studies, this assumption is generally neither questioned nor tested.

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Some scholars have raised the possibility that this empirical observation is at least in part due to a process working in the opposite causal direction: higher levels of crime in neighborhoods increase the proportion of minority residents residing there. The implication is striking: if this causal direction is, at least in part, reversed, prior research employing cross-sectional data overestimates the size of the effect by assuming that the relationship is entirely due to an increase in racial/ethnic minorities increasing crime rates. For example, two studies have employed data aggregated to the level of cities and shown an over-time relationship in which higher crime rates lead to a change in the racial/ethnic composition of cities (Liska and Bellair 1995; Liska, Logan, and Bellair 1998). An important next step is drilling down to the neighborhood level to assess whether higher rates of crime in the neighborhood in fact change the racial/ethnic composition of a neighborhood (Bursik 1986; Schuerman and Kobrin 1986; Skogan 1990; Taylor 1995). As we elaborate in more detail below, if households wish to avoid neighborhoods with higher levels of crime, and racial/ethnic minorities have constrained choices when selecting a neighborhood in which to move (South and Crowder 1997a, 1997b; Turner et al. 2000), neighborhoods with more crime may experience an increase in racial/ethnic minorities over time through these residential mobility decisions.

Bringing this question down to the neighborhood level of aggregation can provide even more insight, although this still leaves unanswered whether such neighborhood change occurs due to disproportionate in-mobility or out-mobility of members of certain racial/ethnic groups in response to crime rates. For example, occasional studies using neighborhood-level aggregated data have obtained mixed results (Bursik 1986; Morenoff and Sampson 1997). To address whether this change occurs due to in-mobility or out-mobility is a multilevel question in which crime in a neighborhood possibly affects the household mobility decisions of people living in the neighborhood, as well as those considering *moving into the neighborhood*. Understanding this neighborhood process requires exploring whether crime changes the racial/ethnic composition of an area due to differential ability to leave the neighborhood based on race/ethnicity, or differential likelihood of entering the neighborhood. Recent scholarship has suggested that the crime experienced by the four nearest neighbors can differentially affect in-mobility by race/ethnicity (Xie and McDowall 2010), and that residents' *perceptions* of crime in the micro-neighborhood can differentially affect in-mobility and out-mobility for different racial/ethnic groups (Hipp 2010b). We extend this literature by using official violent crime rates within the broader neighborhood as measured by the census tract.

The current study exploits a unique study design to explore four key questions: (1) do higher rates of crime (as measured by official rates reported to the police) affect mobility decisions; (2) does crime affect mobility decisions differentially based on the race/ethnicity of the household; (3) do higher rates of crime affect the relative likelihood of whites and racial/ethnic minorities of moving *into* a housing unit; and (4) does the *change* in crime over the previous four years have a similar effect on these processes? We test these processes on a random sample of households nested in the census tracts of 13 cities over various selected years. The cities and years are not random, but rather selected based on crime data availability. We thus explore the interplay between the macro characteristic of neighborhood crime affecting the micro process of residential mobility decisions, which then impacts the macro structural characteristic of neighborhood racial/ethnic composition.

Residential Transition

Does Racial/Ethnic Composition Affect the Crime Rate?

Studies have frequently explored the cross-sectional relationship between the number of racial/ethnic minorities and the amount of crime in a city (Baumer et al. 1998; Chamlin and Cochran 1997; Miethe, Hughes, and McDowall 1991), or in a neighborhood (Hipp 2007b;

Krivo and Peterson 1996; McNulty 2001; Ouimet 2000; Roncek 1981; Roncek and Maier 1991). Various theoretical explanations are offered for this relationship. One culture of violence perspective posits a subculture in which African Americans do not negatively sanction violent behavior as strongly as does mainstream culture, resulting in more violent behavior (Wolfgang and Ferracuti 1967). The strain argument posits that the disadvantaged economic position of racial/ethnic minorities results in a diminished ability to achieve mainstream goals, and therefore pushes them into criminal behavior with subsequent consequences for neighborhoods dominated by minorities (Agnew 1999; Defronzo 1997). A structural explanation posits that the impediments to employment that are disproportionately present in minority-dominant neighborhoods lead to more crime in part because they increase economic dislocation but also because they reduce the provision of social control due to the subsequent increase in broken households (Sampson 1987). A structural cultural theory (Sampson and Wilson 1995) posits that the culture in minority-dominated neighborhoods is shaped by the larger structural system that brings about economic dislocation in these neighborhoods, limiting the presence of role models who would increase neighborhood youths' desire to embrace middle class values (Wilson 1987). Regardless of the mechanism, a common assumption of these studies is that the presence of more nonwhite residents in the particular geographic unit gives rise to higher levels of crime and disorder.

Differential Ability to Exit High Crime Neighborhoods

Countering this dominant paradigm positing that the presence of more nonwhites brings about more crime is a small but growing literature suggesting that at least some of this relationship might occur because crime indirectly pushes minority residents into such neighborhoods. This insight builds on recent research suggesting that crime in a neighborhood might induce residential mobility in general.

The hypothesis that neighborhood crime might induce residential mobility has face validity, as it is plausible that most households would wish to avoid neighborhoods with higher levels of crime. Indeed, scholars have occasionally posited this in recent years (Bursik 1986; Schuerman and Kobrin 1986; South and Messner 2000; Xie and McDowall 2008), and there is some supportive evidence for this conjecture. For example, a study using the National Crime Victimization Survey found that *experiencing* a crime event increased the likelihood of exiting a neighborhood (Dugan 1999). A recent study with the same data source found some evidence for a micro contextual effect, as the awareness of victimization experienced by one's nearest four neighbors also increased residential mobility (Xie and McDowall 2008). A study of 40 neighborhoods found that crime rates caused dissatisfaction and a *desire* to move (Skogan 1990). Studies using data aggregated to census tracts have also found supportive evidence: one study in Los Angeles found that census tracts with higher levels of violent or property crime in one year experienced a higher volume of home sales the following year (Hipp, Tita, and Greenbaum 2009), a study in Chicago found that higher rates of homicide led to a general population decline ten years later (Morenoff and Sampson 1997), and a study of multiple cities found that higher violent and property crime rates resulted in a nonlinear increase in residential instability and vacant units ten years later (Hipp 2010a). Studies using data aggregated to cities have found that cities with more crime experienced greater population loss over time (Cullen and Levitt 1999; Sampson and Wooldredge 1986), and that higher rates of violent crime in central cities relative to suburbs inhibited suburb-to-city moves and spurred city-to-suburb mobility (South and Crowder 1997b).

If crime is undesirable and therefore causes a desire to leave the neighborhood, why don't all residents leave? One answer is that exiting the neighborhood requires economic resources. A household that is unhappy with the neighborhood, but constrained in their mobility options due to limited economic resources, will not be able to leave and therefore be resigned to accepting the level of crime in the neighborhood. Indeed, studies have frequently found that households

with higher levels of income are more likely to exit the neighborhood (Crowder 2001; Dugan 1999; Myers 1999; Myers 2000; South and Crowder 1998). If economic resources are important for exiting a neighborhood, and racial/ethnic minorities have fewer economic resources in general, the implication is that they will be disproportionately unlikely to leave such neighborhoods (Massey and Denton 1985). If this is the case, over time a high crime neighborhood will experience an increase in the number of low-income residents and an increase in the number of low-income nonwhites. If this process is indeed driven solely by economic resources, we would observe no difference in the race/ethnicity of those who leave in response to higher crime once accounting for the economic resources of neighborhood residents.

There are also structural reasons why nonwhites may be constrained in their ability to leave undesirable neighborhoods, beyond their limited economic resources. The place stratification theory argues that racial/ethnic minority residents cannot simply move to better neighborhoods when their economic resources improve—as the classic assimilation model posits—but instead face constraints that limit the range of neighborhoods they can enter (Alba, Logan, and Bellair 1994; Alba, Logan, and Stults 2000; Logan, Alba, and Leung 1996). As a consequence, racial/ethnic minorities are more likely to live in segregated neighborhoods (Frey and Farley 1996; Massey, Gross, and Shibuya 1994; Massey and Hajnal 1995); given their relatively smaller numbers, they will have far fewer options than whites when choosing where to relocate. In fact, there is some evidence that although racial/ethnic minorities express an equal desire to leave neighborhoods as whites (Lee, Oropesa, and Kanan 1994), they in fact are less likely to do so (Boehm, Herzog, and Schlottmann 1991; Deane 1990).

There are several possible mechanisms that might explain the constrained options of racial/ethnic minorities. Studies have suggested that discriminatory behavior and steering are common, and that gatekeepers (such as real estate agents) play an important role. For example, studies have shown that gatekeepers are an important source of segregation as they often show racial/ethnic minority home buyers fewer neighborhoods, and disproportionately show them neighborhoods with sizable racial/ethnic minority populations (La Gory and Pipkin 1981; Turner et al. 2000). Audit studies have consistently shown that racial/ethnic minorities experience discriminatory behavior by potential landlords and property management companies and therefore are turned down from housing options despite identical credentials to white candidates (Turner et al. 2000). Such bias has also been documented in over-the-phone audits, as speaking in a black vernacular yielded fewer offered residences (Fischer and Massey 2004).

The implication of these limited mobility options is that a racial/ethnic minority household residing in a neighborhood in which crime suddenly begins to increase may search for an alternative neighborhood, but if their search is constrained by the above mechanisms they will be less likely to find a suitable alternative. They will therefore be less likely to leave the neighborhood than a white household.

Nonetheless, we have limited empirical evidence testing whether there are racial/ethnic differences in the ability to leave high crime neighborhoods. Two studies utilizing city-level longitudinal data indeed found that higher levels of crime resulted in a greater concentration of nonwhite population in such cities over time, consistent with this hypothesis (Liska and Bellair 1995; Liska et al. 1998). On the other hand, another study of city-level crime rates found that African Americans in the central city were more likely than whites to move to a different tract in response to a higher ratio of city to suburb violent crime (South and Crowder 1997b). Although these studies provide important findings, particularly regarding the more macro mobility flow between cities, they are unable to assess whether such change is primarily driven by disproportionate in-mobility or out-mobility.

Some studies have focused on this process at the neighborhood level. Although one study of census tracts in Chicago did find that the delinquency rate in 1960 increased the number of nonwhites in 1970 (Bursik 1986), a more recent study found that higher homicide counts in census tracts led to a general population loss of *both* whites and African Americans (Morenoff and Sampson 1997). This finding does not support the notion of disproportionate

mobility when measured aggregated to census tracts. One study provided suggestive evidence of disproportionate out-mobility using information on the *perceptions* of crime among residents living within a micro-neighborhood of the nearest 11 housing units (Hipp 2010b). Whereas white households perceiving more crime were more likely to move within four years, black and Latino households showed no such tendency (Hipp 2010b). Furthermore, whites living in micro-neighborhoods with a general perception of more crime were also more likely to leave the unit, whereas Latino and black households again showed no such tendency. This evidence of the importance of perceptions of crime within a small micro-environment is important, but it cannot assess whether such perceptions accurately capture the crime environment of the micro-area, nor whether the crime environment of the broader neighborhood is also important. The present study addresses these limitations.

Differential Likelihood of Entering High Crime Neighborhoods

Although it is clear why a household might want to leave a neighborhood with a high crime rate, it is less clear why another household would be willing to *enter* such a neighborhood. We argue that no household in fact wishes to enter such neighborhoods, but rather that such mobility is driven in part by an economic process. If low crime neighborhoods are indeed more desirable, they will have higher rents and higher home values, implying an economic process in which only households with the greatest economic resources can afford to reside in such neighborhoods. Should an increase in crime occur, this will decrease the desirability of the neighborhood, resulting in lower rents and home values. Supporting this conjecture are cross-sectional studies finding that neighborhoods with higher rates of crime have lower home values (e.g., Buck and Hakim 1989; Schwartz, Susin, and Voicu 2003; Thaler 1978), and longitudinal studies finding that increasing neighborhood crime decreases home values (Hipp et al. 2009; Tita, Petras, and Greenbaum 2006).

Extending the earlier discussion regarding out-mobility, we can consider whether racial/ethnic minorities may not only be less likely to leave a high crime neighborhood, but whether they are also more likely *to enter* a high crime neighborhood. The logic is similar to the process we described earlier regarding residential mobility out of the neighborhood, in that racial/ethnic minorities' more constrained options may increase their likelihood of entering neighborhoods with higher levels of crime. This also may occur due to preference for residence in neighborhoods with fellow co-ethnics (Schelling 1978). Regardless of the mechanism, there is considerable evidence that racial/ethnic minorities are more likely to enter neighborhoods dominated by members of their same race/ethnicity (Logan et al. 1996; Massey and Mullan 1984; Rosenbaum 1994; Rosenbaum and Argeros 2005; South and Crowder 1997b). An implication is that nonwhites may be more likely than whites to move into neighborhoods with more crime.

It is an empirical question which of these two processes of out-mobility and in-movement is at work, or if in fact both are operating. Either one alone can change the neighborhood's racial/ethnic composition. For example, if racial/ethnic minorities are less likely to leave a high crime neighborhood—but there is no difference in the racial/ethnic composition of the entering households—a neighborhood will undergo racial/ethnic transition. Alternatively, if racial/ethnic minorities are no more likely to leave a high crime neighborhood than whites but racial/ethnic minorities are more likely *to enter* the neighborhood, the neighborhood will undergo racial/ethnic transition. If both of these processes are at work—that is, racial/ethnic minorities are less likely to leave a high crime neighborhood and more likely to enter it—this will lead to the most rapid transformation of the neighborhood's racial/ethnic composition. An analogous question was explored in studies testing and finding that the racial/ethnic composition of a neighborhood's *business owners* changed in response to the transformation of the racial/ethnic composition of the *residents* through the diminished willingness of white business owners to *enter* such neighborhoods (Aldrich and Reiss 1976; Aldrich, Zimmer, and McEvoy 1989).

Assessing whether racial/ethnic transition occurs because of disproportionate mobility out by racial/ethnic minorities or because of disproportionate mobility in by racial/ethnic minorities requires very specific types of data. Studies that only view the change in the racial/ethnic composition of a neighborhood over time cannot determine which of these two processes is at work. Likewise, studies focusing on the residential mobility of specific households over time cannot document racial/ethnic transition in particular neighborhoods. What is needed is information on the types of households living in the specific housing units within a neighborhood, and how they change over time in response to the amount of crime, as we employ here. Two recent studies have provided suggestive evidence. Min Xie and David McDowall (2010) used information on the victimization experiences of a household's four nearest neighbors, and concluded that such vicarious victimization increased the likelihood of black households entering such units compared to white households. Also focusing on the micro-environment, Hipp (2010c) concluded that the *perception* of crime among residents of the micro-neighborhood *decreased* the likelihood of white residents entering such units and *increased* the likelihood of black and Latino residents of entering such units. Although such studies provide key evidence on the importance of the local micro-neighborhood context, they do not address whether the broader neighborhood context is also important. Furthermore, although showing that residents' perceptions of crime disproportionately affect the in-mobility of households based on race/ethnicity is important, it is uncertain whether such perceptions accurately capture the crime environment of the area or whether they simply capture unrelated perceptions.

Short-Term Changes in Crime Rates

When considering the effect of short-term changes in crime rates on mobility, there are competing perspectives. One perspective is that residents will respond to short-term changes just as they respond to the typical level of crime in a neighborhood. In this view, a short-run increase in the crime rate will cause white residents to leave such neighborhoods and to avoid moving into housing units located in such neighborhoods. Likewise, black and Latino households would be more likely to enter such neighborhoods and have less ability to leave them. A second perspective is that such changing crime rates will be more apparent to current residents and less apparent to newcomers. In this view, there would be differential out-mobility by race/ethnicity from such neighborhoods, but no difference in in-mobility. A third perspective is that whereas blacks are more likely to leave high crime central city neighborhoods (and less likely to enter them), they will be more likely to enter neighborhoods on the periphery of the ghetto that are experiencing increasing crime rates (Morenoff and Sampson 1997). A fourth perspective is that short-term crime change will only be apparent to potential new residents who are able to obtain up-to-date information on neighborhoods. To the extent that Latinos, especially those who are recent immigrants, may have limited information on recent changes in neighborhoods, they may be more likely to enter neighborhoods with increasing crime rates. On the other hand, white and black residents may be well aware of such changes, though blacks' limited mobility options may prevent them from avoiding such neighborhoods. There is limited evidence regarding the effect of changing crime rates on residential mobility. Whereas one study found an effect of changing crime rates over ten years on the change in black and white populations, this study was unable to determine whether disproportionate in-mobility or out-mobility drove the results (Morenoff and Sampson 1997).

Summary

The present study asks whether higher levels of crime lead to a transformation in the racial/ethnic composition of the neighborhood. This study provides three important contributions to the literature: (1) by focusing on housing units, it is able to avoid the challenges inherent in aggregating residential mobility measures to larger geographic units such as census tracts, given that

such change must occur at the level of the housing unit; (2) the study design following housing units over time allows assessing the degree to which any change occurs due to the disproportionate likelihood of whites leaving such neighborhoods or the disproportionate likelihood of racial/ethnic minorities entering such neighborhoods; (3) by measuring crime based on official reports to the police it is able to assess whether the general level of crime in the neighborhood affects residential mobility, rather than focusing on victimization experiences of residents.

Data and Methodology

Data

We use selected years of the metropolitan version of the American Housing Survey (AHS) (Hadden and Leger 1995) to address these research questions, place these households into tracts, and merge these data with U.S. Census (U.S. Bureau of the Census 1993a) data and crime data collected from several cities. The metropolitan areas in the AHS are surveyed approximately every four years. This data set has *housing units* nested within census tracts as the units of analysis, allowing testing whether the structural characteristics of tracts affect residential housing transition. In the AHS, *housing units* are followed over time. Thus, information from one year is used to predict the likelihood of residential mobility four years later. The same information is used to predict the characteristics of the new household in the unit four years later. We were able to place these households into their respective census tracts (based on 1980 geography) using special access to data at a Census Research Data Center.¹

We use cities for which we have violent crime data. The cities and their related AHS waves are Baltimore (1976–79, 1979–83, 1983–87, 1987–91, 1991–95), Berkeley (1991–95, 1995–99), Buffalo (1995–99), Cleveland (1987–91, 1991–95, 1995–99), Denver (1991–95, 1995–99), Indianapolis (1991–95, 1995–99), Los Angeles (1991–95, 1995–99), Milwaukee (1995–99), Sacramento (1995–99), St. Louis (1976–79, 1979–83, 1983–87), San Diego (1995–99), Seattle (1979–83, 1995–99), and Washington, DC (1983–87, 1987–91, 1991–95).² These years represent the year of the AHS survey: for example, we have information on Seattle residents and crime rates in 1979 and are able to assess whether the household moved by 1983, and who moved in that year (even though we do not have crime data for 1983). Likewise, we have information on Seattle residents and crime rates in 1995, and can assess mobility outcomes that occur between then and the 1999 survey.

For all models, we capture the context of the local tract by linking information from the most proximal U.S. Census for years near decades, and with linear interpolation for decade midpoints. We first placed all U.S. Census data into 1980 tract boundaries by assuming homogeneity within tracts in apportioning these data for tracts that either split into multiple tracts over time, or those that collapsed into single tracts over time. Then, for mobility periods that begin near a decadal point we use the appropriate Census data (e.g., if the first wave occurs

1. Given that the geographic information on the AHS respondents placed them into 1980 census tracts, the merged crime data were apportioned to 1980 tract boundaries based on population by using information from the MABLE/GEOCORR Web site at the University of Missouri (Missouri Census Data Center 2006).

2. The crime data for cities was collected in the following fashion. The following were downloaded from the city's police Web sites: Berkeley, Sacramento, Seattle (1995 data). The following were obtained directly from the police departments: Buffalo, Los Angeles, Milwaukee, San Diego. The 1995 Cleveland data come from the CANDO Web site (CANDO 2006). The older Cleveland and Washington, DC data come from the "Anticipating and Combating Community Decay and Crime in Washington, DC, and Cleveland, Ohio, 1980–1990" study housed at ICPSR (Harrell and Gouvis 1994). The Denver data were downloaded from the Piton Foundation Web site (Piton Foundation 2006). The Indianapolis data come from the Polis Center Web site (Polis Center 2006). The older Seattle data comes from the "Testing Theories of Criminality and Victimization in Seattle, 1960–1990" study from ICPSR (Miethe 1998). The St. Louis data come from the "Arrests As Communications to Criminals in St. Louis, 1970, 1972–1982" study housed at ICPSR (Kohfeld and Sprague 1992). The Baltimore crime data comes from the "Crime Changes in Baltimore, 1970–1994" (CCIB) study.

from 1988 to 1992, we utilize 1990 Census data). For mobility periods that begin during the middle of the decade we use a linear interpolation of the Census data (e.g., if the first wave occurs from 1984 or 1986, we linearly interpolated between the 1980 and 1990 Censuses when creating our measures). It is important to acknowledge that the Census collected race/ethnicity data differently in the 1970 Census, particularly for Latinos (who were assessed based on surname). However, only two city waves were affected by this (Baltimore and St. Louis in 1976). We assessed whether this affected our results by estimating ancillary models without these two city waves and the results were extremely similar to those presented in our main models.

Outcome Measures. We have a series of dichotomous outcome measures. The first outcome measure is an indicator of whether a new household resided in the unit four years later (*residential mobility*). A new household is defined as one with a new household head: it is not considered mobility if only submembers of the household leave between the two waves. The other three outcome measures capture the race/ethnicity of the household head of the new household residing in a residence four years later: whether or not the new household is white, African American, or Latino.

It is important to assess whether the new residents are indeed entering the neighborhood, or simply moving from another housing unit in the same tract. To the extent residents are simply moving within the tract, we would not be capturing racial/ethnic change in the neighborhood, but rather a measure of the extent to which residents of different race/ethnicities move about within the tract. To address this, we had information on the 1980 boundaries of the census tract in which the household resides and the zip code of their previous residence. Although these provide geographic “containers” of the origin and destination of the most recent move for each respondent in the AHS, there are challenges. Given that boundaries of zip codes change frequently over time with minimal documentation, as a best approximation of the zip code boundaries over the time period of our study we used zip code boundaries from 1991.³

To address the challenge that zip codes and tracts only partially overlap, we geographically overlaid the 1991 zip code boundaries with the 1980 tract boundaries. The challenge then is determining whether mobility occurred within the same tract. If there is no overlap of the zip code and tract boundaries, then we know the household moved *into* the tract. However, if there is some overlap (but only partial) we cannot be certain if mobility occurred within the same tract. Given this uncertainty, we adopted two approaches. First, if there was any overlap at all between the zip code boundary and the tract boundary (no matter how small) we coded the resident as moving within the same neighborhood. This is clearly an upper bound estimate of the percentage of households moving within the same tract. Our second approach assumed that a person from a zip code that partially overlaps with the current tract of residence has a uniform random chance of having previously lived in any geographic part of the zip code. Thus, if 20 percent of the previous zip code overlapped with the current tract, we assumed that the household had a 20 percent chance of moving from the portion of the zip code contained within the tract (and an 80 percent chance of having moved from a different tract). To the extent that there is in fact a distance decay effect of residential moves, this uniform distribution assumption would likely lead to a slight underestimate of the probability of moving within the same tract. Nonetheless, these two approaches give us a bound on the percentage of households moving within the same neighborhood.

Employing AHS data from between 22 to 23 metropolitan areas at each of three waves (1987–91, 1991–95, and 1995–99) (the mobility data for 1999–2003 was not available for most of the cases), our two estimates for 81,198 households indicated that somewhere between 14.4 percent and 19 percent of residents move within the same tract. The 19 percent is an absolute upper bound based on our data, whereas the lower figure is arguably closer to

3. These were obtained from the MABLE/Geocorr Web site located at the Missouri Census Data Center (Missouri Census Data Center 2006).

the true value. Thus, it appears that somewhere between 81 percent and 85 percent of the households are moving from a different tract.⁴ We revisit this issue in the conclusion.

Crime in the Environment. We measure crime in the environment with official reports of crime to the police department, aggregated to the census tract. We created a measure of violent crime per 100,000 persons by summing the number of homicides, robberies, and aggravated assaults and dividing by the tract population (and multiplying by 100,000). We also created a measure of property crime per 100,000 persons by summing the number of burglaries, motor vehicle thefts, and larcenies, and dividing by the tract population (and multiplying by 100,000). We log transformed each of these measures as this more accurately captured the relationship with the mobility outcomes. The models estimated with the property crime measure showed weaker effects, so we focus only on the results using the violent crime measure. For cities in which we had crime data at two consecutive points, we also computed the change in the crime rate based on the difference in the logged violent crime rate during the four-year period.⁵

Household and Tract-Level Predictors. In the models predicting the race/ethnicity of the new residents, we took into account the race/ethnicity of the household at the previous time point by creating indicators of whether the household was white, African American, Latino, or other race. We accounted for the racial/ethnic composition of the tract by creating measures of the percent white, African American, Latino, Asian, and other race from the U.S. Census. While one approach would test an attraction principle (e.g., does the presence of a white household increase the odds that the new household will be white), such an approach would implicitly assume that all nonwhites have an equal effect. We therefore adopted an approach testing a “resistance” effect by taking into account the presence of the other racial/ethnic groups to test whether they equally reduce the odds that the new household, in this example, is white. We measured racial/ethnic heterogeneity (EH) in a tract k with a Herfindahl index (Gibbs and Martin 1962:670) of five racial/ethnic groupings (white, African American, Latino, Asian, and other race), as follows:

$$EH_k = 1 - \sum_{j=1}^{j=J} G_j^2 \quad (1)$$

where G represents the proportion of the population of ethnic group j out of J ethnic groups.

We also took into account several characteristics of the tract using U.S. Census data. We created an index of concentrated disadvantage by conducting a factor analysis of six measures: (1) the average family income; (2) the percent with at least a bachelor's degree; (3) the percent not in the labor force; (4) the percent with income at or below 125 percent of the poverty rate; (5) the percent unemployed teens; and (6) the percent single parent households. We created an index of residential stability with a factor analysis of two measures: (1) the average length of residence in the tract; and (2) the percent owners. Given that restaurants indicate a vibrant neighborhood that is likely desirable, we included the number of restaurant employees who work in the tract per 10,000 population in the tract, taken from the U.S. economic census (U.S. Bureau of the Census 1993b, 1995).^{6,7}

4. We computed an even more conservative estimate, in which we assumed that the probability of coming from the same tract is equal to the proportion of their previous zipcode that is constituted by the current tract. This appears to be a particularly low value, as it concludes that just 2 percent of households moved within the same tract.

5. These cities were Baltimore, Berkeley, Cleveland, Denver, Indianapolis, Los Angeles, St. Louis, and Washington, DC.

6. We used the number of employees who work in these establishments in the tract rather than the number of establishments, as establishments with more patrons will generally have a greater number of employees. This measure therefore likely provides a more accurate depiction of the impact such businesses have on the neighborhood.

7. This economic census data is reported for zip codes, therefore we used the Master Area Reference File (Census of Population and Housing 1980) to apportion it into constituent 1980 census tracts based on the proportion of the zip code population contained within a given tract.

In the models predicting residential mobility out of the housing unit, we included several additional tract-level measures. Because a lack of jobs may be particularly undesirable in a neighborhood, we included the unemployment rate. To measure family characteristics, we included the percentage of households with children. To capture the undesirability of vacant units, we included the percentage of occupied housing units. We captured overcrowding with the average number of persons per room, log transformed. Finally, we included the average age of residents in the tract as neighborhoods with older residents may reduce mobility.

We also included several household- and individual-level measures (based on the characteristics of the household head) that are likely important predictors of mobility.⁸ We accounted for stage of the life course with a measure of the age of the respondent, measures of the number of children aged 0 to 5, aged 6 to 12, or aged 13 to 18 in the home, and a dichotomous indicator of whether or not the household is married. We measured community investment with an indicator of whether the respondent owned their residence and a measure of the length of time in the residence (log transformed). To account for mismatch with the housing unit, we included a measure of the persons per room to capture overcrowding. We captured SES effects with measures of household income (logged) and household head years of education.

The summary statistics for the variables used in the analyses are shown in Table 1. We tested for and found no evidence of collinearity problems in our estimated models (all variance inflation values were below 4).

Methods

Given that the outcome variables are dichotomous, we estimated logistic models with fixed effects for city waves. We corrected the standard errors for both tract-level and over-time clustering with robust standard errors. Thus, the household residential mobility models were estimated as:

$$y_{ik(t+1)} = \beta_{ck} C_{k(t)} + \Gamma_{xik} X_{ik(t)} + \Gamma_{xk} X_{k(t)} + \Gamma_M M \quad (2)$$

where $y_{ik(t+1)}$ is the probability that the household will move of the i -th respondent of I respondents in the k -th tract, $C_{k(t)}$ is the violent crime rate in the tract at time t which has β_{ck} effect on the outcome, X_{ik} is a matrix of independent variables with values for each household i in tract k , Γ_{xik} shows the effect of these predictors on the probability of moving, X_k is a matrix of tract-level independent variables for tract k , Γ_{xk} shows the effect of these predictors on the probability of moving, M is a matrix of dummy variables that indicate which city and wave the observation comes from and Γ_M is a vector of their effects on the outcome. Thus, we are only comparing the mobility choices of households in the same city in the same year.

We also estimated fixed effect logistic models when testing the characteristics of the household moving into the unit. The equation predicting that the new household is, for instance, white is:

$$y_{ik(t+1)} = \beta_{y_{ik(t)}} + \beta_{ck} C_{k(t)} + \Gamma_{xik} X_{ik(t)} + \Gamma_{xk} X_{k(t)} + \Gamma_M M \quad (3)$$

8. Note that whereas there are theoretical reasons why these measures would likely affect mobility out of a unit, there is less reason to expect them to explain differential mobility *into* a unit based on race/ethnicity. For this reason, these measures are not included in the in-mobility models. For example, whereas longer residence in a unit has a strong negative effect on the likelihood of moving, there is little reason to expect it to differentially affect the race/ethnicity of the new residents. Likewise, whereas the presence of children will affect the decision to leave a unit, there is little reason to expect it to affect the race/ethnicity of the new residents. Nonetheless, we assessed this by estimating ancillary in-mobility models that also included these household measures, and they indeed showed the expected null effects.

Table 1 • Summary Statistics for Individual- and Tract-Level Variables Used in Analyses

	Mean	Std. Dev.
Household-level measures		
Moved by next time period	42.5%	
African American	38.9%	
White	55.4%	
Latino	1.4%	
Other race	1.5%	
Education (years)	11.71	3.57
Family income (logged)	1.91	2.12
Length of residence (years)	11.39	11.74
Owner	43.1%	
Married	41.0%	
Children less than 6 years of age	.17	.50
Children 6 to 12 years of age	.23	.60
Children 13 to 18 years of age	.23	.63
Persons per room (logged)	.53	.31
Age	46.97	18.74
Tract-level measures		
Violent crime rate (logged)	6.61	1.62
Concentrated disadvantage index	.00	1.00
Residential stability index	.00	1.00
Eating employees per 10,000 population	5.48	1.01
Percent occupied units	92.65	8.61
Racial/ethnic heterogeneity ($\times 100$)	30.45	19.43
Percent households with children	48.99	13.96
Persons per room (logged)	.45	.21
Unemployment rate	8.50	6.42
Percent African American	25.55	34.76
Percent white	55.62	34.57
Percent Latino	13.42	19.54
Percent Asian	5.06	7.89
Percent other race	1.62	2.13

N = 13,613 households, 1,272 tract years

where all terms are defined as before except that $y_{ik(t+1)}$ is now the probability the new household in the unit is white of the i -th respondent of I respondents who are new in the k -th tract, $y_{ik(t)}$ is a matrix showing the race/ethnicity of the prior residents in the unit and has a vector of β effects on the outcome.^{9,10}

9. To allow inferences to the entire sample we could account for nonmovers by estimating a selection model in which the outcome is whether or not the household moved during the four-year period. In ancillary models, we estimated this probit selection model and included the inverse Mills ratio from this selection model in these in-mobility models. The results were very similar to those presented here. A limitation of these Heckman selection models is that it is often difficult to posit variables that might affect the selection process but not the outcome of interest. If this is the case, identification is quite weak, and the resulting multicollinearity makes the estimates quite unstable (Stolzenberg and Relles 1997). This led Stolzenberg and Relles to conclude that unless the selection effect is quite strong, the model ignoring selection will perform better due to greater efficiency.

10. We combined these cities and years into a single model in part due to concerns of disclosure. That is, the U.S. Census is cautious in reporting models to ensure that the individual identity of households is not disclosed. Estimating models on single cities for such dichotomous outcomes with various dichotomous predictors in the model can be cause for concern. Combining these cities and years into a single model alleviates this concern. Nonetheless, because this model assumes that the coefficients are the same over different cities in different years, we tested this assumption by performing a Chow test and estimating an additional model including interactions between the variables and each of the city/wave

We accounted for missing data with a multiple imputation strategy (Rubin 1987).¹¹ This approach requires the less stringent assumption of missing at random (MAR) rather than the missing completely at random (MCAR) assumption of listwise deletion. By imputing five data sets, we are able to combine the results with appropriate standard errors based on the standard formulas to take into account the variability both within and across imputed data sets (Rubin 1987; Schafer 1997).

Results

Residential Mobility

We begin by focusing on the models predicting mobility out of the neighborhood. In this initial model, we do not differentiate the effect of crime on mobility based on the race/ethnicity of the household in the unit. Model 1 in Table 2 shows that households living in tracts with higher violent crime rates are somewhat more likely to move out of the unit within the next four years. A one standard deviation increase in the violent crime rate increases the odds of moving 7.2 percent ($\exp(.043 \times 1.62) = 1.072$), though this effect is only significant at $p < .05$ for a one-tail test. In this same model there are rather modest effects for our other neighborhood contextual measures. We do see that neighborhoods with more residential stability and fewer vacant units reduce the likelihood of residential mobility, as do neighborhoods with higher levels of concentrated disadvantage and older residents.

We next estimated a model including interactions between the race/ethnicity of the household and the violent crime rate to parse apart the effects by race/ethnicity. Thus, in this model the main effect for violent crime shows the effect of violent crime on mobility by *white* residents, whereas the interactions show the difference in the effect of violent crime on mobility for the specific group compared to white residents. For example, summing the main effect for violent crime and the interaction of Latinos and violent crime yields the average effect of violent crime on Latinos. The main effect for violent crime in Model 2 in Table 2 shows that white residents respond to higher violent crime rates with increased residential mobility. A one standard deviation increase in the violent crime rate increases the odds of white residents moving 9.4 percent. This effect is now significant at $p < .05$ for a two-tail test. The interaction between an African American household and the violent crime rate shows that African Americans are significantly less likely than white residents to move out of a neighborhood with higher levels of violent crime. Summing the main effect and this interaction coefficient, we see no evidence that African Americans are more likely to leave such neighborhoods, as their odds of leaving actually fall 7.2 percent with a one standard deviation increase in the violent crime rate. There is little reason to suppose that African Americans do not dislike crime,

indicator variables. There was no evidence that these additional models improved the model fit, as judged by a likelihood ratio test. There is therefore little evidence that these processes work differently over the tracts in the different cities and time points.

11. We used the Proc MI procedure in SAS to perform the imputations. We included in the imputation model all variables contained in our substantive models, as well as several other possibly important measures to get more precise estimates of the missing values. Thus, the imputation model included measures of the presence of: undesirable odors, abandoned buildings, litter and trash, undesirable noise, street noise, unkept roads, undesirable persons, bothersome crime, nonresidential activities, undesirable nonresidential users, streets in need of repair, streetlights in need of repair, bothersome traffic, poor city services, public transportation, satisfactory police, shopping, quality schools, and recreation activities. It included measures of satisfaction with the house and the neighborhood, home value, and square footage of unit. It also included the following demographic variables: female, age, age squared, Asian, African American, Latino, other race, years of education, household income, length of residence, new resident in last year, married, divorced, widowed, presence of children, homeowner, persons per room. We constrained all imputed values to fall within the range of values in the original measure, and did not round values to integers given Monte Carlo simulation evidence that such a strategy has poor properties (Allison 2005).

Table 2 • Predicting Residential Out-Mobility with Violent Crime Rates and Other Neighborhood Structural Characteristics

	(1)		(2)	
	Coef (t-value)	Odds ratio (1)	Coef (t-value)	Odds ratio (1)
Tract-level measures				
Violent crime rate	.043 (1.93)	1.072 [†]	.056 (2.31)	1.094*
Black × violent crime rate			−.102 (−2.00)	.849*
Latino × violent crime rate			−.002 (−.04)	.996
Other race × violent crime rate			−.090 (−.50)	.864
Racial/ethnic heterogeneity	.003 (1.92)	1.051 [†]	.002 (1.52)	1.041
Concentrated disadvantage index	−.171 (−2.97)	.843**	−.168 (−2.90)	.846**
Residential stability index	−.099 (−3.34)	.906**	−.099 (−3.34)	.906**
Unemployment rate	.015 (1.77)	1.098 [†]	.015 (1.80)	1.100 [†]
Percent households with children	−.008 (−1.88)	.899 [†]	−.008 (−1.85)	.900 [†]
Percent occupied units	−.018 (−3.53)	.853**	−.020 (−3.74)	.844**
Persons per room (logged)	−.127 (−.55)	.974	−.149 (−.64)	.969
Eating employees per 10,000 population	−.012 (−.47)	.988	−.002 (−.04)	.998
Average age	−.026 (−2.75)	.974**	−.026 (−2.77)	.974**
Household-level measures				
African American	−.342 (−5.76)	.710**	.385 (1.05)	1.470
Latino	−.005 (−.05)	.995	−.003 (−.01)	.997
Other race	.094 (.45)	1.098	.715 (.56)	2.044
Education	.011 (1.38)	1.038	.010 (1.34)	1.037
Family income (logged)	−.121 (−2.42)	.775*	−.122 (−2.44)	.772*
Length of residence (logged)	−.303 (−12.47)	.738**	−.303 (−12.46)	.739**
Owner	−1.096 (−20.44)	.334**	−1.092 (−20.35)	.335**
Married	−.184 (−3.56)	.832**	−.184 (−3.55)	.832**
Children less than 6 years of age	.483 (7.85)	1.621**	.480 (7.80)	1.616**
Children 6 to 12 years of age	.135 (2.20)	1.144*	.131 (2.15)	1.140*

(continued)

Table 2 • (Continued)

	(1)		(2)	
	<i>Coef</i> (<i>t-value</i>)	<i>Odds ratio</i> (1)	<i>Coef</i> (<i>t-value</i>)	<i>Odds ratio</i> (1)
Children 13 to 18 years of age	-.069 (-1.18)	.933	-.073 (-1.25)	.930
Persons per room (logged)	-.160 (-2.02)	.952*	-.154 (-1.95)	.954 [†]
Age	-.007 (-4.27)	.882**	-.007 (-4.28)	.882**
Intercept	5.854 (1.35)		5.923 (1.36)	

Notes: *T*-values in parentheses. *N* = 13,613 households, 1,272 tract years. There are 7,543 white households, 5,298 black households, and 192 Latino households. Logit models with standard errors corrected for tract-level clustering.

(1) Odds ratios are based on a one standard deviation change for the tract measures and a one unit change for the household measures with the following exceptions: education, family income, length of residence, persons per room, and age are based on a one standard deviation change. The interaction variables (for example, Latino × crime) capture a one standard deviation change in crime in the neighborhood for a, for example, Latino resident compared to a white resident.

p* < .05 (two-tailed test) *p* < .01 (two-tailed test) [†]*p* < .05 (one-tailed test)

so these findings likely reflect a limited ability to actually exit from such undesirable neighborhoods. There is no evidence that Latinos are similarly constrained in their ability to leave high violent crime neighborhoods, as the nearly zero interaction term shows that Latinos have essentially the same probability as whites of leaving such a neighborhood. These combined results explain why the coefficient for crime in Model 1 was relatively weak, as it combined the negative effect of African Americans with the positive effects for whites and Latinos.

We briefly note that the household-level control variables in these models showed results consistent with prior literature. Residents who own their residence and those who have lived longer in the residence are much less likely to move. Those who are older, married, or with higher income, are less likely to move. The presence of young children (less than 6 years of age) increases the likelihood of residential mobility, quite possibly in response to the need for quality schools. Consistent with prior literature, African Americans are less likely to move in general, perhaps due to their more limited residential location options.¹²

To assess whether the other neighborhood characteristics in addition to violent crime have differential effects depending on the race/ethnicity of the previous residents, we estimated ancillary models separately by the race/ethnicity of the previous residents. These models showed very similar effects for violent crime as our presented models: a one standard deviation increase in the violent crime rate had a very similar effect on white residents in this separate model (an 8.4 percent increase in the odds of mobility for a one standard deviation increase in the violent crime rate), and for Latino residents (also an 8.4 percent increase). We again saw no evidence that African Americans are more likely to leave, although the coefficient in this ancillary model was essentially zero (as opposed to the negative coefficient in our main model).

In-Mobility Models

We next turn to the in-mobility models. In Model 1 in Table 3, predicting whether the new household in the unit four years later is white, we see strong evidence that tracts with higher rates of violent crime significantly reduce the likelihood that the new residents will be

12. We also tested models including the change in violent crime in the previous four years: this variable did not show a significant effect on mobility out of the unit.

Table 3 • Predicting Residential In-Mobility by Race/Ethnicity with Violent Crime Rates and Other Neighborhood Structural Characteristics

	New Household is White			New Household is Black			New Household is Latino		
	(1)	(2)		(3)	(4)		(5)	(6)	
	Coef (t-value)	Odds ratio (1)	Coef (t-value)	Odds ratio	Coef (t-value)	Odds ratio	Coef (t-value)	Odds ratio	
Tract-level characteristics									
Violent crime rate	-.086 -(2.09)	.870* (.21)	.105 (1.31)	1.184 (2.30)	.360 (2.30)	1.788* (2.30)	.107 (1.94)	1.189+ (.23)	
Change in violent crime rate		.966+ -(1.71)			-.100 -(.42)	.990 (.91)		1.060* (1.97)	
Percent white			-.051 -(20.22)	.364** (-12.72)	-.045 -(12.72)	.407** (-12.72)	-.048 -(11.22)	.383** (-7.99)	
Percent African American	-.047 -(20.65)	.389** -(12.66)					-.051 -(7.99)	.359** (-9.98)	
Percent Latino	-.043 -(11.81)	.425** -(7.61)	-.058 -(14.02)	.312** (-17.32)	-.045 -(7.71)	.407** (-17.32)	-.058 -(9.98)	.311** (-9.98)	
Percent other race	-.001 -(.03)	.976 (.92)	-.226 -(4.40)	.011** (-2.33)	-.252 -(2.33)	.007* (-2.33)	.089 (2.07)	5.903* (1.01)	
Percent Asian	-.047 -(6.14)	.390** -(3.72)	-.037 -(4.05)	.476** (-2.62)	-.031 -(2.62)	.540** (-2.62)	-.079 -(8.92)	.206** (-6.93)	
Racial/ethnic heterogeneity	.000 -(0.01)	1.000 (2.04)	.011 (3.48)	1.242** (-2.1)	-.001 -(.21)	0.982 (.951)	.012 (2.93)	1.259** (2.37)	
Concentrated disadvantage index	-.146 -(2.37)	.864* -(1.48)	.018 (.25)	1.018 (.47)	-.051 (-1.9)	.951 (.91)	.122 (1.29)	1.129 (.91)	
Residential stability index	-.140 -(2.92)	.869** (.49)	.030 (.47)	1.030 (.19)	.020 (.19)	1.020 (.19)	.268 (3.88)	1.307** (.91)	
Eating employees per 10,000 population	.072 (1.53)	1.075 (1.10)	-.197 -(3.27)	.820** (-2.53)	-.234 -(2.53)	.789* (-2.53)	-.193 -(2.86)	.823** (-1.75)	

white instead of nonwhite. A one standard deviation increase in the violent crime rate reduces the odds that the new residents will be white 13 percent. In Model 2, we tested a dynamic specification by including the change in violent crime over the previous four years as a predictor. In this model, it appears that whites are particularly unlikely to enter neighborhoods that are experiencing an increasing violent crime rate. Although we are only confident at $p < .10$ of the significance of this effect for the change in violent crime, it appears that increasing the violent crime rate 10 percent in the last four years reduces the odds that the new residents will be white about 3.4 percent. The relative uncertainty of our estimate is likely due to limited statistical power given the very short time period, as violent crime likely does not change appreciably over such a short period.

This effect for violent crime is observed even when controlling for the race/ethnicity of the prior residents and the racial/ethnic composition of the neighborhood. The racial/ethnic composition of the tract strongly affects the likelihood that the new residents will be white: a one percentage point increase in Asians, African Americans, or Latinos decreases the odds that the new residents will be white between 4.4 and 4.7 percent. We also see the expected strong stasis effects for the race/ethnicity of the housing unit, as housing units that were occupied by nonwhite residents at time one are far less likely to have white residents move in four years later. The coefficients for the different race/ethnicities suggest differing effects by race: the presence of an African American household at the previous time point has the strongest negative effect, reducing the odds that the new household will be white 65 percent, whereas the presence of a Latino household at the prior time point reduced these odds nearly 50 percent.

We next ask whether similar factors determine the likelihood that the new residents will be African American. There is no evidence in Model 3 that African Americans are less likely to move into tracts with higher violent crime rates than nonblacks: in fact, the coefficient is positive (though not significant). Furthermore, in a dynamic specification in Model 4, including the measure of the change in violent crime, the effect for current levels of violent crime become significantly positive on the odds that the new residents will be African American ($p < .05$). Thus, African Americans are more likely to enter high violent crime neighborhoods as long as it is not experiencing an increase in the violent crime rate. Again, this can hardly be characterized as a desirable choice on the part of such households.

There are again strong race/ethnicity effects in which black households are less likely to move into tracts with a higher proportion of members of other racial/ethnic groups, and more likely to move into tracts with higher levels of racial/ethnic mixing. Additionally, blacks are much less likely to move into a unit that had a white or Latino household at the previous time point: these odds are reduced 66 percent and 73 percent, respectively. Thus, the effect of crime on black in-mobility is overcoming these strong racial stasis effects.

Turning to Model 5, predicting that the new residents will be Latino, we again see a positive effect for violent crime. This suggests that the higher the rate of violent crime in a neighborhood, the more likely Latinos are to enter the neighborhood. The size of this effect is similar to that for African Americans, as a one standard deviation increase in the violent crime rate increases the odds that the new residents will be Latino 18.9 percent.¹³ When we specify a dynamic model including the change in violent crime over the previous four years in Model 6, we see that the change in violent crime is driving the results. Latinos are significantly more likely to enter a tract in which the violent crime rate has been increasing over the previous four years compared to other tracts. Thus, it appears that Latinos are entering tracts that are in the process of worsening. This is hardly a desirable outcome for Latinos.

We see evidence that the racial/ethnic composition of the tract also strongly affects the odds that the new residents will be Latino. Latinos are more likely to move into tracts with

13. Although this result is only significant at $p < .05$ for a one-tail test, we point out that the fact that such a small percentage of our sample is Latino (just 192, or less than 2 percent), we have quite limited statistical power to detect this effect. The substantive size of the coefficient suggests that this is indeed a nontrivial effect.

higher proportions of Latinos and more racial/ethnic mixing. We also see an additional effect in which the race/ethnicity of the previous residents in the specific unit affects the likelihood that the new residents will be Latino, as the odds that the new residents will be Latino are decreased about 50 percent if the previous residents were white or African American.

We point out that these effects for violent crime in all of these models is observed even when controlling for other important characteristics of the neighborhood. For example, whites are less likely to move into neighborhoods with higher levels of concentrated disadvantage or residential stability. In contrast, Latinos are more likely to move into more residentially stable neighborhoods. And both Latinos and African Americans are less likely to move into neighborhoods with more restaurants, suggesting that this particular amenity is less of a pull factor for them.

Finally, whereas the partial correlations of our main models are trying to get at something approximating a causal effect of the violent crime rate on the race/ethnicity of the new household, it is useful to also know the degree of this relationship when not accounting for other neighborhood characteristics. To assess this, we estimated ancillary models of both out-mobility and in-mobility that included all individual/household measures and only the violent crime rate as a neighborhood measure. For the residential mobility models, we still saw no evidence that African Americans are more likely to leave a neighborhood with higher violent crime rates, even when not controlling for other neighborhood characteristics. However, the effects were even stronger for the other two groups, as a one standard deviation increase in the violent crime rate increases the odds of a white household leaving 16.4 percent and the odds of a Latino household leaving 12 percent. For the in-mobility models, the effects for violent crime are all dramatically increased when not accounting for other neighborhood covariates (thus, only accounting for the race/ethnicity of the prior residents). A one standard deviation increase in the violent crime rate decreases the odds that a white resident will move in 67.4 percent, and increases the odds that a Latino household will move in 173 percent and the odds that a black household will move in 360 percent. The effects of the *change* in the violent crime rate on the mobility odds for the different race/ethnicities are essentially the same as in our main models.

Conclusion

The present study provides an important corrective to the large volume of prior research finding a positive relationship between the size of racial/ethnic minority groups in a neighborhood and the rate of crime at one point in time and assuming that the causal direction runs from the presence of such minorities to higher rates of crime. We have proposed here that at least some of this relationship may occur because crime actually increases the percentage of minorities in a neighborhood. This hypothesis was based on the voluminous segregation literature and the evidence of discriminatory behavior towards racial/ethnic minorities regarding access to some neighborhoods (Farley and Frey 1994; Fischer et al. 2004; Massey and Denton 1987, 1993; Van Valey, Roof, and Wilcox 1977). Our use of a unique data set allowed us to focus on housing units within tracts to assess the extent to which there is disproportionate mobility in and out of tracts based on the race/ethnicity of residents. Our findings suggest that the amount of crime in the neighborhood (as measured by the census tract) may play an important role in how the racial/ethnic composition changes over time. A key implication of our results is that prior work testing a cross-sectional relationship between the racial/ethnic composition of a neighborhood and the crime rate and assuming that the presence of minorities increases the crime rate may have the causal explanation, at least in part, reversed.

Our findings were able to distinguish between disproportionate out-mobility and in-mobility by race/ethnicity. We were thus able to determine that white residents appear more able to escape neighborhoods with more violent crime, and also to avoid moving into neighborhoods with more violent crime. White residents who live in tracts with more violent crime are more likely to move out of the housing unit than African American residents. Furthermore,

we found that white residents are less likely than Latinos or African Americans to move into housing units in tracts with a higher violent crime rate, and that they are particularly unlikely to enter units in tracts with increasing violent crime rates. It appears that white residents behave in the economically expected fashion towards high rates of violent crime in neighborhoods by avoiding them as much as possible.

Regarding the two minority groups we studied—Latinos and African Americans—we found somewhat different results. On the one hand, African Americans appear particularly disadvantaged, as they are less likely than whites and Latinos to leave neighborhoods with higher violent crime rates, and are also less able than whites to avoid neighborhoods with high levels of violent crime. Thus, the limited residential mobility options of African Americans appear to affect them both coming and going. We argued that this does not occur because they are indifferent to crime, but rather is a consequence of their more constrained mobility options. Latinos occupy a middle ground: on the one hand, they are no less likely to leave a neighborhood with a high violent crime rate than are whites. On the other hand, they are more likely than whites to enter housing units in tracts with higher rates of violent crime, especially if the tract is experiencing an increase in the violent crime rate.

Another important contribution of this study was testing the effect of short-term changes in violent crime rates on residential in- and out-mobility. Our results showed that it is not just current residents who are aware of recent changes in violent crime rates: in fact, there was no disproportionate exit by race/ethnicity for households in neighborhoods experiencing a recent increase in violent crime. Instead, we saw evidence that white residents respond even more strongly to recent spikes in violent crime than they do to long-term crime rates by avoiding entering such neighborhoods. Whereas blacks enter neighborhoods with higher violent crime rates, there was no evidence that they enter neighborhoods experiencing an increase in violent crime. These findings contradict the hypothesis of Jeffrey Morenoff and Robert Sampson (1997) that black households are pushed into neighborhoods on the periphery of the ghetto that are experiencing an increase in the crime rate. On the other hand, Latinos were particularly likely to enter neighborhoods that are undergoing an increase in the violent crime rate. Latinos may lack fine-grained information about recent changes in neighborhoods compared to other households, and this might especially occur for households who are migrating to this country and therefore have limited detailed information about the quality of neighborhoods. Although clearly speculative, this suggests a direction for future research.

The findings here complement and extend recent research suggesting that crime may lead to residential mobility, and that this response may differ based on households' race/ethnicity. Studies have explored both disproportionate out- and in-mobility, using various measures of crime. For example, Laura Dugan (1999) found that being victimized increased mobility and Xie and McDowall (2008) found that even having nearby neighbors experience a victimization led to greater out-mobility. Hipp (2010c) extended this literature by showing that *perceptions* of crime matter more for out-mobility among white residents compared to Latino and black residents. Xie and McDowall (2010) showed that victimization rates within a very small micro-environment (four households) increased in-mobility by black households and decreased it for white households. Hipp (2010c) showed that perceptions of crime in the micro-neighborhood of a block decreased in-mobility by whites, and increased in-mobility by both blacks and Latinos. We have extended this literature by using data on officially reported violent crime rates to police in neighborhoods (as measured by the census tract), and our results suggest that the overall level of violent crime in the neighborhood affects the residential out- and in-mobility of white residents. We also showed that black and Latino in-mobility is higher for tracts with higher rates of violent crime. The fact that the overall level of property crime did not significantly affect such mobility decisions in ancillary models highlights the importance of violent crime to the perceptions and fears of residents (results not shown). This builds on the arguments of scholars that violent crime is particularly salient to residents for inducing fear of crime (Zimring 1997) and perceptions of crime (Hipp forthcoming), and therefore possibly mobility.

Although this study has provided important new insights for understanding the relationship between the presence of racial/ethnic minority groups and crime, certain limitations should be acknowledged. First, it is well-known that official reports of crime miss a nontrivial number of criminal events that are not reported to the police (MacDonald 2001; Mosher, Miethe, and Philips 2002). Fortunately, there is some evidence that this underreporting is not systematically related to the racial/ethnic composition and economic disadvantage of the neighborhood (Baumer 2002). Although this is reassuring, future research will need to test this process with other measures of crime. Second, although we measured our contextual effects—including violent crime—at the tract level, it may be that a different level of geographic aggregation is appropriate (Grannis 1998; Hipp 2007a). We were unable to assess this given the limitations of our data. Future studies should assess this using other levels of aggregation, such as block groups or various spatial smoothing approaches. Third, although our findings are informative, it is still the case that they are constrained to a certain set of cities at certain time points. Although we tested for differences over the years of our study and found no significant differences in the size of the effect for violent crime on these residential mobility patterns, future studies will need to test in more recent periods the extent to which racial/ethnic minorities remain constrained in their access to other neighborhoods, and the extent to which that affects their ability to either exit high crime neighborhoods or avoid entering them. Fourth, given that we measured residential mobility based on the household composition four years apart, it is possible that multiple moves occurred within that four-year window. Thus, it is possible that in the in-mobility models, a different type of household resided in the unit between the households observed at the two time points. If the intervening household was of the same race/ethnicity as the new household observed, our results would be unchanged; if the intervening household(s) was of a different race/ethnicity our results could change. Of course, the fact that the intervening household did not stay long in the household suggests that missing them may not be a serious limitation to the design. The present study also misses a household that moved out and then moved back in, which again is of limited theoretical interest. A final caution is that at least some of the mobility we observed was within the same tract. Our estimate is that about 15 percent of households move within the same tract. For this to bias our results would require a systematic process in which crime differentially affects mobility within the same tract, but not from outside the tract. We know of no such systematic process.

We emphasize the important takeaway point that racial/ethnic minorities are both less likely than whites to leave housing units in census tracts with higher rates of violent crime and more likely to enter housing units located in such neighborhoods. The consequences are important for understanding how neighborhoods evolve over time. The assumption that the positive relationship between the size of racial/ethnic minority groups and crime is one directional clearly needs reconsideration. We find that at least some of this relationship may be due to the role of violent crime in changing the racial/ethnic composition of such neighborhoods. It appears that these constrained housing choices reduce the ability of African Americans to exit more dangerous neighborhoods, and increases the likelihood of African Americans and Latinos entering such neighborhoods.

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