Ethnicity, Ethnic Segregation, and Crime

Are Offenders Ethnically Biased When Choosing Target Areas?

Wim Bernasco (wbernasco@nscr.nl)

Netherlands Institute for the Study of Crime and Law Enforcement (NSCR) &

Department of Spatial Economics, VU University Amsterdam

Abstract

Criminal activities are not necessarily restricted to the offenders' own neighborhoods of residence. This raises interesting questions about where they offend, and about which factors determine their criminal location choices. This chapter extends discussions about traditional criteria such as travel cost and target attractiveness, as it addresses the role of ethnicity in criminal location choice. How does the ethnic composition of areas affect spatial target choices of offenders? Does the ethnic composition of the offender's home area play a role, or the ethnic background of the offender himself of herself? These questions are answered by reviewing and interpreting findings from the literature on the role of ethnicity on location choices of offenders, in particular four studies conducted with crime data from Chicago —one of the most segregated cities in the USA — and from The Hague, The Netherlands —a city much less segregated. Independent of jurisdiction, study design, analytical methods employed, and spatial resolution, the results demonstrate a preference amongst offenders to offend in areas that are similar to their area of residence in terms of ethnic composition, and in areas where the majority of the population has the same ethnic background as the offenders themselves.

Ethnicity, Ethnic Segregation and Crime

Are Offenders Ethnically Biased When Choosing Target Areas?

INTRODUCTION

Recent literature on cultural diversity in neighborhoods, in cities and in firms suggests that cultural diversity positively influences economic activity, productivity and consumption (e.g., Bakens, Mulder, and Nijkamp 2013; Ottaviano and Peri 2006). The sociological and criminological literature, however, is not as positive about the effects of cultural diversity. It points to potential disadvantages, and suggests that cultural diversity is associated with a variety of social problems, including increased levels of violent and of property crime. According to social disorganization theory (Bursik and Grasmick 1993; Kornhauser 1978; Sampson 2012; Shaw and McKay 1942) cultural or ethnic diversity —alone, or in combination with economic deprivation and high population turnover—creates religious, language and other cultural barriers to interaction, which in turn reduces the willingness of residents to execute social control, i.e. their willingness to contribute to the local public good of community safety.

A shortcoming in the social disorganization literature is the conceptual confusion between *crime* and *criminals*. For example, whether cultural diversity affects the number of community residents who become offenders, is another question than whether cultural diversity affects the number of crimes committed in the community. The answers are not necessarily the same, because local residents are not restricted to commit crimes in their own neighborhood (they may commit crimes elsewhere) and because offenders who reside elsewhere may commit crimes in the local community.

This conceptual confusion has more serious implications today than it did many decades ago. When the first empirical studies on urban crime began to appear (Shaw and McKay 1942), they were restricted to juveniles. Juvenile offending in the 1930s and 1940s in the USA was probably to a considerable restricted geographically to their own residential community, but adult offenders may have been more mobile. Today, 70 years later, we can be pretty sure that both juvenile and adult offenders are more mobile and more likely to offend away from their own residential communities.

These observations raise interesting questions about the journey to crime, or the 'criminal commute'. What makes offenders perpetrate crimes in some places but not others? With respect to cultural or ethnic diversity, it raises questions about where offenders from different races and ethnicities or cultural groups live and where they go to commit crimes. Do they offend in their own communities? And when they go elsewhere, do they commit crimes in communities that are similar to own community or in communities that are different? The literature that addresses these questions is scarce and anecdotal.

Studies that relate the residential location of offenders to the locations where they perpetrate crimes is often referred to as 'journey-to-crime research'. With a few exceptions that will be discussed elsewhere in this chapter, such research has analytically focused on the *distance* between the offender's residence and the location of the crime (e.g., LeBeau 1987; Morselli and Royer 2008; Wiles and Costello 2000). Without exception they replicate a distance decay effect, which means the frequency of crimes decreases with the distance from home, the majority of offenses being committed within 2 miles from the offender's home. As has been argued elsewhere (Bernasco and Nieuwbeerta 2005), a more interesting question is how offenders decide on where to perpetrate crime, and which factors are paramount to the outcome of such decisions. This approach views the offender as a decision maker, the choice of a crime target as a location choice problem, and the distance between the offender's home and the potential crime target as only one amongst a number of other choice criteria (utility arguments). Other criteria include the presence of criminal opportunities and the expected risk of apprehension.

The existence of racial and ethnic dissimilarities between the places where offenders live and the places where they could commit crimes, might be another criterion that influences the spatial decision making of offenders: when offenders select crime targets, do they take into account the racial and ethnic composition of the residential population in the target area? If they do, how does the racial and ethnic composition influence their crime location choices?

In the empirical research reviewed here, two related hypotheses are distinguished. The first is labeled the 'aggregate' hypothesis because it applies to the ethnic composition of the offender's area of residence. It states that offenders are attracted to areas that are racially and ethnically similar to their own area of residence. The second hypothesis does not apply to the offender's area of residence, but to the offender's own race and ethnic background. For this reason it is labeled the 'individual' hypothesis here. It states that offenders are attracted to areas where residents of the offender's own race or ethnic background are a majority. The present chapter addresses both the aggregate and the individual hypothesis by reviewing four studies in which the relation between the ethnic background of offenders and/or the ethnic composition of their areas of residence is related to the ethnic composition of the areas where they commit crime.

Issues of the role of ethnicity in criminal mobility is not completely unexplored territory. For example, Pettiway (1982; 1985) studied the mobility of burglars and robbers in Milwaukee.

He distinguished three types of areas on the basis of the racial composition of the population: the black ghetto area, the white non-ghetto area, and an interstitial area around the ghetto (where the composition was more racially mixed). Those who lived in the black ghetto would overwhelmingly offend there, whereas those who did not offended outside the ghetto.

Like most people, offenders tend to stay within the boundaries of places that are part of their awareness space. Carter and Hill (1979) showed that the mental images that juvenile offenders have of their city are not only incomplete but also strongly influenced by their racial background. These limitations to the awareness space are amplified in the case of offending. For individuals who participate in legal activities, moving into unknown terrain may be an unpleasant experience, but for individuals who plan illegal activities, it may be outright dangerous. Strangers “stand out” more easily in unknown territory, that is, in places where they do not know the customs and rules of the street and possibly dress and behave in ways that attract the attention of the local residents. This concept is most obvious in the case of race and ethnicity. In segregated cities, those who cross racial or ethnic boundaries cannot blend in easily and are likely to be recognized as strangers in the community and be subjected to the “social eyes” of the local population. For this reason, street robbers may avoid neighborhoods that have a different racial/ethnic composition than their own neighborhoods. As one of the armed robbers interviewed in St. Louis, Missouri, by (Wright and Decker 1997: 75) notes,

> “[I]can go in a black neighborhood, [an] all-black neighborhood, and I don’t stand out, as opposed to me going out there to [a shopping center in the county] where I might stand out.”

Although observations like these confirm that at least offenders do consider issues of race and ethnicity in their location choices, a less anecdotal and more systematic approach is required to answer the questions addressed in this chapter.

The four studies reviewed in this chapter share a concern with quantitatively estimating the effects of ethnic segregation on criminal location choices, although the assessment of ethnic barriers was the main purpose only in the first study (Reynald, Averdijk, Elffers, and Bernasco 2008). In the other three, the ethnic aspects where analyzed as part of broader research questions that involved a variety of influences on criminal location choice. Table 1 summarizes the main features of the four studies. They vary in terms of where they were conducted, the number and size of the spatial units that were distinguished, the numbers and types of offences analyzed, the statistical models utilized, and the hypotheses that were tested.

INSERT TABLE 1 ABOUT HERE

STUDY 1: FLOWS OF CRIME IN THE CITY

The purpose of the first study reviewed here (Reynald, Averdijk, Elffers, and Bernasco 2008) was to establish whether ethnic and economic differences between neighborhoods reduce the number of crime trips made between these neighborhoods. To answer the question, the authors estimated spatial interaction models using police recorded data on detected crimes in the period 1996-2004 in The Hague, the Netherlands.

The authors used data on all 62,871 offences from 1996 to 2004 that were registered and cleared by the police, and that were committed in the city of The Hague by offenders living in The Hague at the time of the offence. These included not only property offences (37 per cent) but also traffic offences (23 per cent), violent crime (17 percent), public order (7 percent), vandalism (5 percent), drug related offences (4 percent) and other crimes (7 per cent).

For each offense, information was available on the neighborhood of residence of the offender and on the neighborhood where the offense was perpetrated. Crimes were aggregated over both origin and destination neighborhoods, resulting in 94×94 = 8836 origin-destination combinations, of which 94 are cases where origin and destination are the same neighborhood. If crime trips occur in these 94 cases, they are ‘internal’ crime trips, i.e. offenders committing offences in their own neighborhoods.

The physical distance between neighborhood pairs was defined as the Euclidian distance between the neighborhood centroids. An adjustment was made to the resulting zero distances of internal crime trips: for internal crime trips, the distance was defined as half the square root of the neighborhood surface. This is approximately the average distance between two random points in a circle with the same surface size as the neighborhood (Ghosh 1951).

Spatial interaction models (Haynes and Fotheringham 1984) have been used since long to explain the quantities of goods, money, information, or people that move between locations. They can be used to analyze all types of movement flows that have an origin (starting point) and a destination (ending point). They have been used to study travel (Zipf 1946), migration (Stouffer 1960; Wadycki 1975) and phone calls (Guldmann 1999) between cities and international trade (Bergstrand 1985). Spatial interaction models (also known as *gravity models*) are regression models in which the flow between two areas is modeled as a function of ‘push’ and ‘pull’ factors that indicate the extent to which the origins generate outflow and the destinations generate inflow, and as a function of the impedance or friction between both areas. Typically, this is the distance between the two locations, but it could also be measured in travel time or cost.

In the application to criminal movement in urban areas, the number of crime trips from one neighborhood to another neighborhood is modeled as a function of ‘push’ and ‘pull’ factors that indicate the extent to which neighborhoods ‘produce’ criminals and ‘attract’ crime respectively, and of the distance between the two neighborhoods. Thus, these models use aggregated journey-to-crime data, analyzing as the dependent variable the number of crime trips between pairs of neighborhoods. Therefore they can only be used to test aggregate hypotheses. The approach had previously been applied to the location choice of offenders in general (Elffers, Reynald, Averdijk, Bernasco, and Block 2008; Smith 1976) and of residential burglars in particular (Kleemans 1996; Peeters 2007; Rengert 1981), bot none of these studies did consider ethnic bias in location choices.

Reynald et al. (2008) defined an ‘ethnic barrier’ between two neighborhoods using an original measure, coined the ‘dissimilarity index of neighborhood ethnicity’ (DINE). The new measure extends the well-known Herfindahl index (also known as the index of qualitative variation) that is normally used to measure heterogeneity in qualitative variables in a single social entity like a group, class, network or market (for an application to neighborhood ethnic heterogeneity, see Bernasco and Luykx 2003)

The Herfindahl index of the ethnic composition in a neighborhood can be defined as the probability that when two random members of the neighborhood population are matched, they are of a different ethnic group. For example, the Herfindahl index of a neighborhood *A* consisting of 500 native Dutch residents (*DA*), 300 Turkish residents (*TA*) and 200 Moroccan residents (*MA*) is:

$$HI_A = 1 - \frac{D_A(D_A - 1) + T_A(T_A - 1) + M_A(M_A - 1)}{(D_A + T_A + M_A)(D_A + T_A + M_A - 1)} \approx 1 - \frac{D_A^{\;2} + T_A^{\;2} + M_A^{\;2}}{(D_A + T_A + M_A)^2} = 0.62$$

The DINE for a pair of neighborhoods is the probability that when a random member of one neighborhood is matched with a random member of the other neighborhood, they are of a different ethnic group. For example, if neighborhood B consists of 800 native Dutch residents, 100 Turkish residents and 100 Moroccan residents, the ethnic distance between neighborhoods A and B is

$$DINE_{AB} = 1 - \frac{D_A D_B + T_A T_B + M_A M_B}{(D_A + T_A + M_A)(D_B + T_B + M_B)} = 1 - \frac{500 \times 800 + 300 \times 100 + 200 \times 100}{1000 \times 1000} = 0.55$$

Note that $DINE_{AA} = HI_A$, and that it thus generally not equals zero. The measure captures dissimilarity both within and between neighborhoods.

The income difference was defined, much more simply, as the absolute difference between the average annual *per capita* income of residents in the two neighborhoods. For two neighborhoods no income data were available, making this variable unavailable for 372 neighborhood pairs, and restricting the final analysis to 8,464 neighborhood pairs.

Reynald et al. (2008) used a doubly constrained model whereby all 'push' factors are implicitly estimated in aggregated 'outflow' term (i.e., the number of crime trips originating from a neighborhood because the offender lived there) and all 'pull' factors in an aggregated 'inflow' term (i.e., the number of crimes committed in a neighborhood). The rationale of including the outflow term is that it makes the estimates of the number of crime trips conditional on crime producing factors in the origin. The rationale of including the inflow term is that it is a proxy for all other (unmeasured) attributes that make the destination neighborhood attractive to offenders. The authors estimate only the parameters of three explicit distance factors: physical distance, ethnic distance and economic distance:

$$\ln(T_{od}) = \beta_1 \ln(I_d) + \beta_2 \ln(O_o) + \beta_3 D_{od} + \beta_4 DINE_{od} + \beta_5 AID_{od}$$

where T_{od} is the number of crime trips from origin *o* to destination *d*, I_d is the total number of crime trips that end in destination *d*, O_o is the total number of crime trips that start from origin *o*, D_{od} is the distance between origin *o* and destination *d*, $DINE_{od}$ is the distance index of neighborhood ethnicity between origin *o* and destination *d*, and AID_{od} = absolute mean income difference between origin *o* and destination *d*.

INSERT TABLE 2 ABOUT HERE

Table 2, adapted from Reynald et al. (2008), demonstrates the main results of a two models, a model in which distance is the only impedance variable and a model in which the ethnic and socio-economic barriers are also included. The estimates of the latter model demonstrate that all three distance variables significantly reduce the crime flow between origin and destination. The standardized effect of physical distance (-.27) is by far the strongest, followed by the effect of income difference (-.14) and ethnic distance (-.06). With respect to the role of ethnic neighborhood compositions in criminal spatial target selection, the message to take home from this study is that ethnic differences between neighborhoods reduce the crime flow between them, and thus support the aggregate hypothesis, but that other impedance factors, in particular distance, seem more important.

STUDY 2: INDIVIDUAL BURGLARY TRIPS

In the second study, Bernasco and Nieuwbeerta (2005) introduced the discrete choice method in geographic criminology as an improvement over prior approaches, including spatial interaction modeling. The approach has subsequently been applied in other studies on criminal location choices (Baudains, Braithwaite, and Johnson 2013; Bernasco 2006; Bernasco 2010a; Bernasco 2010b; Bernasco and Kooistra 2010; Clare, Fernandez, and Morgan 2009). The advantage of the discrete choice model is that it is a disaggregated model, based on a micro-economic theory of random utility maximization (McFadden 1973).

Because the discrete choice model is able to utilize data at the individual level, it allows tests of both the aggregate and the individual hypothesis in addressing the role of ethnic composition in criminal location choices. Whereas the aggregated spatial interaction model can only relate the ethnic composition of potential target areas to the ethnic composition of an offender's home area (i.e. test the aggregate hypothesis) , the discrete choice model can relate the ethnic composition of potential target areas to the offender's own ethnic background (the individual hypothesis).

The authors had access to police recorded data on detected residential burglaries and on the burglars that were suspected of committing them, including the offender's neighborhood of residence and the neighborhood where the residential burglary was committed. In order to simplify the offender decision problem analyzed, only single-offender burglaries were selected, and burglaries committed by pairs or larger groups of offenders were thus excluded.

Combining prior burglary research findings with a random utility maximization model of burglary target location choice, the authors formulated a list of hypotheses on the location preferences of burglars, including a distance effect and effects of residential mobility, residential real estate value, percentage of single family dwellings, number of residential units, ethnic heterogeneity and distance to the city center of all potential target neighborhoods.

Ethnic heterogeneity was measured with the Herfindahl index discussed above, in which six ethnic groups were distinguished. The first is a group of (native) Dutch, West-Europeans and North-Americans. Four other ethnic groups had their origins in Surinam, in the Dutch Antilles, in Turkey, and in Morocco respectively. These four ethnic groups are relatively large ethnic minority groups in the Netherlands. The sixth group had its origins in another non-industrialized country

One of the hypotheses the authors aimed to test was formulated as follows: “The effect of a neighborhood’s ethnic heterogeneity is stronger for a burglar who is a non-native than for a burglar who is a native.” (Bernasco and Nieuwbeerta 2005: 300).

Two aspects of this hypothesis require specific attention. First, the hypothesis is an individual hypothesis because it links the ethnic background (native or non-native) of the individual to the ethnic composition of a potential target neighborhood, whereas in Reynald et al.(2008) the ethnic composition of the origin and destination neighborhoods were related, i.e. they tested the aggregate hypothesis. Second, the distinction between natives and non-natives is rather rough. The dichotomy native–non-native suggests that non-natives together form a homogenous group together. However, the measure of ethnic heterogeneity itself distinguished six different ethnic groups.

Summarizing the estimated model in a single utility equation,

$$U_{ij} = \beta_V V_j + \beta_S S_j + \beta_M R_j + \beta_C C_j + \beta_T T_j + \\ \beta_{FE} F_i E_j + \beta_{NE} N_i E_j + \beta_{AP} A_i P_{ij} + \beta_{MP} M_i P_{ij} + \varepsilon_{ij}$$

where the β are parameters to be estimated, and V_j is the neighborhood’s average value of residential real estate, S_j is the neighborhood’s percentage of single family dwellings, R_j is its residential mobility, C_j is its distance to the city center of The Hague, T_j is the number of target (dwellings) in the neighborhood, E_j is its ethnic heterogeneity, and P_{ij} is the distance between the neighborhood and the burglars neighborhood of residence. M_i is a variable with value 1 if the burglar is a minor (age range 12–17) and 0 if he or she is adult, A_i is an inversely coded variable with value 1 if the burglar is a adult and with value 0 if he or she is a minor, N_i is a variable with value 1 if the burglar is native and the value 0 is he or she is native, and F_i is its inversely coded equivalent (the *F* is for ‘foreign’).

Note that the effect of ethnic heterogeneity equals β_{NE} for natives and β_{FE} for non-natives, so that the test of the hypothesis that the effect of ethnic heterogeneity is stronger for non-natives than for natives boils down to $\beta_{FE} > \beta_{NE}$.

INSERT TABLE 3 ABOUT HERE

In the results displayed in table 3, the effect of ethnic heterogeneity is positive for both natives and non-natives, and is larger for non-natives (1.20) than for natives (1.10). Because the difference is statistically significant (one-sided Wald test of $\beta_{FE} > \beta_{NE}$, $p < 0.05$), it was concluded that ethnic heterogeneity is a more important choice criterion for non-natives than for natives. Non-native burglars thus have a stronger preference to commit burglaries in ethnically mixed neighborhoods than native burglars have, and this effect of ethnic composition is independent of affluence, distance to the target neighborhood and the other variables in the location choice equation. These findings support the individual hypothesis.

A limitation of research on the consequences of ethnic segregation in The Hague is, that although The Hague is one of the most segregated cities of the Netherlands, the level of segregation is quite low in comparison to most cities in the USA. As a consequence, measures of neighborhood ethnic heterogeneity in The Netherlands are very strongly correlated with the proportion of non-native residents in the neighborhood. In the Hague during the period covered, this correlation was .95 (Bernasco and Luykx 2003, p. 989) so that the established preference for ethnically heterogeneous neighborhoods cannot empirically be distinguished form a preference for neighborhoods with a relatively large share of non-native residents. This is very different from the city of Chicago, the locus of the next two studies reviewed here, where ethnic segregation is much stronger than in The Hague.

STUDY 3: STREET ROBBERY IN CHICAGO

Whereas study 1 (Reynald, Averdijk, Elffers, and Bernasco 2008) tested the aggrerate ethnic barrier hypothesis with aggregated data and the neighborhood dissimilarity measure DINE, and study 2 (Bernasco and Nieuwbeerta 2005) used an individual ethnicity indicator to test the individual hypothesis, a Chicago-based study (Bernasco and Block 2009) did both. In addition, it incorporated a specific tests of individual ethnic preferences for offenders with White, African-American and Hispanic ethnic backgrounds respectively.

The study dealt with street robbery and was much more comprehensive in terms of the data used, both with respect to the number of crimes (6,000) and the number of geographic areas (786 census tracts) included in the analysis. Three ethnic backgrounds were distinguished among robbers and among the population of Chicago: African-Americans, Whites, and Hispanics.

To help explain where street robbers attack, the study drew on a wide variety of theories. Two specific hypotheses are relevant to the issues discussed here, and are quote literally (Bernasco and Block p. 105):

- The more similar the racial and ethnic composition of a potential area is to the racial and ethnic composition of the area where the offender lives, the more likely is the offender to select it for robbery.
- Offenders prefer to rob in areas where people of their own racial or ethnic background are majorities. Thus, independently of where they live themselves, African-American offenders prefer to rob in African-American majority areas, non-Hispanic white robbers prefer to rob in white-majority areas, and Hispanic offenders prefer to rob in Hispanic-majority areas.

Although phrased in terms of individual choice, the first of these two hypotheses is similar to the aggregate hypothesis tested in The Hague by Reynald et al. (2008), because the statement does not refer to the ethnic background of the individual offenders but only to the composition of the offender’s home neighborhood. The second is a example of the individual hypothesis, however, as it specifically applies to the racial / ethnic background of the offender.

Bernasco & Block (2009) used 786 Chicago census tracts as the spatial units of analysis. Census tract characteristics hypothesized to affect attractiveness to streets robbers included population size, presence of illegal markets (drugs, prostitution, gambling), high schools, retail activities and collective efficacy (for details about this concept, see Sampson, Raudenbush, and Earls 1997). Their sample of 6000 street robbers included 79.5 percent African American, 14.6 percent Hispanic and 5.9 percent (non-Hispanic) white offenders.

INSERT TABLE 4 ABOUT HERE

To test the aggregate hypothesis, the authors utilized the ethnic dissimilarity measure used by Reynald et al. (2008) that included the proportions of African American, Hispanic and white census tract populations and a small rest category in the denominator. The results of the model that incorporates this test are presented in Table 4. The estimated odds ratio coefficient of the ethnic dissimilarity measure is highly significant and indicates that the odds of committing a street robbery decreases by a factor .42 (58 percent) if the origin and destination neighborhood are completely ethnically dissimilar, as compared to when they are completely ethnically similar. This finding confirms that the racial and ethnic segregation of communities is reflected in the travel patterns of offenders: robbers prefer to offend in census tracts that are racially and ethnically similar to the tracts they live in themselves.

INSERT TABLE 5 ABOUT HERE

Table 5 presents the results of the individual hypothesis, which is more specific regarding the role of the ethnic background of the offenders. It asserts that that offenders prefer to rob in places where most residents match the racial or ethnic background of the offenders themselves. Although based on a model with all variables included, in order to save space only those coefficients are presented in table 5 that relate to the role of ethnic segregation in robbery location choice.

To test the individual hypothesis, the model presented in table 6 allows the effect of the racial and ethnic composition of destination tracts to vary between African-American, non-Hispanic white, and Hispanic offenders. The ethnic composition of the robbery destination is thus compared with the racial and ethnic background of the offender, instead of with the ethnic composition of the tract where the offender lives. Therefore, in this model, the interaction effect replaces the racial and ethnic dissimilarity measure at census tract level.

On the basis of their population, all census tracts were classified as either tracts with an African-American majority (75+%), tracts with a Hispanic majority (75+%), tracts with a White majority (75+%) and mixed tracts without an racial or ethnic majority larger than 75 percent.

For African-American and Hispanic offenders, the outcomes strongly support the hypothesis, whereas moderate support is found for non-Hispanic whites. More specifically, offenders of African-American origin strongly prefer tracts where African-American residents form a majority. The odds of selecting such tracts are 1.38 times the odds of a mixed tract being chosen. African-American robbers are less likely to select a tract that has a Hispanic or a white majority, however, than to select a mixed tract (odds ratios are .56 and .68, respectively). In sum, when applying controls for other relevant choice criteria, the picking order of African-American offenders is African-American majority tracts, mixed tracts, non-Hispanic white majority tracts, and Hispanic majority tracts.

For Hispanic offenders the pattern is similar with the racial and ethnic categories shifted. Thus, offenders of Hispanic origin prefer Hispanic majority tracts (odds ratio 1.24), then mixed tracts, then non-Hispanic white majority tracts (.47), and finally African-American majority tracts (.14).

The results on white offenders, which comprise only 5.9 percent of the sample point in the same direction, although they are not all significant. Thus, white offenders do not significantly more often choose white majority tracts than mixed tracts, but the odds of them choosing an African-American majority tract or a Hispanic majority tract are significantly lower than the odds of choosing a tract with mixed racial and ethnic composition.

Overall, these results support the hypothesis that offenders prefer to perpetrate crimes in areas where their own ethnic group is a majority. In addition, the estimates are more specific than the more general "racial and ethnic dissimilarity" (DINE) measure defined at the aggregate level, because they also show that African American and Hispanic offenders avoid areas where other groups are a majority, and thus also prefer ethnically mixed areas over such areas.

STUDY 4: SCALING DOWN TO BLOCKS

The most recent of the four studies (Bernasco, Block, and Ruiter 2013) used crime data from the same source as the third study (Bernasco and Block 2009) but used census blocks instead of census tracts as the spatial unit of analysis, thereby reducing the average size of the spatial unit of analysis by approximately a factor 30, and increasing the number of elements in the spatial choice set by the same factor. The authors argued that a census tract is a large and possibly also heterogeneous spatial unit when it comes to making decisions on where to attack a robbery victim, whereas a census block is much smaller and probably much more homogeneous. In addition to analyzing the data at a more detailed spatial resolution, the authors collected more detailed variables on the presence of specific cash economies (such as restaurants, gas stations, grocery shops and other retail businesses with less than 10 employees), and included an exploration of spatial spillover effects.

The use of census blocks instead of census tracts not only shifts the resolution of the analysis to the micro level, it also adds an interesting contrast to the analysis of the role of residential ethnic segregation. Whereas neighborhoods in The Hague and census tracts in Chicago have populations of several thousand residents on average, Chicago blocks have 118 residents on average, and 23 percent of the blocks has a residential population below 20. Many of these have only non-residential land uses such as parks, commercial business, hotels, sports facilities, or public transportation. Although these blocks have no residential population, they are potential hunting grounds for street robbers and can also be compared to blocks that are otherwise similar but do have a residential population (with an ethnic composition that could affect robbers' location choices). In their analysis, the authors used these 'no-population' blocks as the reference category, the other categories being blocks with a African-American majority (75+%), blocks with a Hispanic majority (75+%), blocks with a White majority (75+%) and mixed blocks without a majority larger than 75 percent.

INSERT TABLE 6 ABOUT HERE

In table 6, which again only shows the estimated parameters related to ethnicity, the distinction between offender location choice preferences of the three racial and ethnic categories reveals an interesting pattern that is generally in line with the hypothesis on racial and ethnic segregation functioning as a barrier against criminal mobility. Independently of the other variables (including distance) in the model, African-American robbers are 1.98 times more likely to target a block with a majority (475%) African-American population than to target a block with no population. They are 1.34 times more likely to target a mixed population (without any majority) block than to target a no-population block. The estimated effects of White or Hispanic majorities (1.15 and 1.06, respectively) are not significantly different from unity.

For Hispanic robbers, the pattern is similar, even more extreme, and with one exception. They are 3.82 times more likely to target a block with a Hispanic majority and 2.25 times more likely to target a mixed population block, than to target a block with no population. They are equally likely to offend in a White majority block as in a zero population block, but they are much less likely to offend in a block with an African-American majority population (the value of .241 is a negative effect equally strong as a positive effect of 1/0.241=4.149).

White robbers are more likely to choose a block with a White majority, a Hispanic majority or a mixed population, than a block with no population or a block with a African-American majority population. Only the effect of a mixed population block (2.02) is statistically significant, the other two are not. Again, these findings generally provide support for the individual hypothsis.

DISCUSSION

Although the sociological and criminal literature has extensively studied the role of ethnic composition and heterogeneity in producing crime, the large majority of the empirical work has merely related the ethnic composition of areas to their rate of offending (e.g. percentage of offenders in the neighborhood) or their crime rates (e.g. annual number of crimes per 1000 residents). In other words, it has been concerned with the production of criminal motivations. The present chapter explored an aspect of ethnic segregation that has not been studied widely in the literature: the question of how, for a motivated offender, the choice of a criminal target area depends on the ethnic compositions of the origin area and of the potential destination areas, and on the ethnic background of the offenders themselves. The question was answered by reviewing and interpreting findings from four studies conducted with crime data from Chicago and from The Hague, The Netherlands. As summarized in table 1, the four studies varied in a number of dimensions, including jurisdiction (Chicago versus The Hague, The Netherlands), level of aggregation (individual crime trips versus aggregated crime flows), type of criminal activity (all crime, burglary, robbery), analytical methods employed (spatial interaction OLS regression, discrete choice multinomial logit), spatial resolution (neighborhood, census tract, census block) and whether aggregate or individual (or both) hypotheses were tested .

Independent of jurisdiction, aggregation, crime type, analytical methods and resolution, the results demonstrate a preference amongst offenders to offend in areas that are similar to their own area of residence in terms of ethnic composition (confirming the aggregate hypothesis), and in areas where the majority of the population has the same ethnic background as the offenders themselves have (confirming the individual hypothesis). This finding survives in models that contain comprehensive sets of control variables that are relevant criminal location choices (studies 2-4), such as proximity to the offenders' homes and the presence of various types of attractive targets for burglary and street robbery.

Two theoretical frameworks may help interpret the finding that offenders behave similarly even in extremely different settings and with respect to quite different types of crime. The first is rational choice theory, i.e. the micro-economic theory of utility maximization. This framework, represented in criminology by Cornish and Clarke (1986), suggests that offender behavior is purposeful and calculated, and that a preference for target areas of specific ethnic composition must be based on either greater expected benefits or lower expected costs. Greater expected benefits are not very plausible, although it might be argued that offenders have better knowledge of behavior patterns in areas that are similar to the areas they live in. For example, they would have better understanding of the daily routine activities of their potential victims. Lower costs might be a more plausible explanation, and has been suggested by pointing out that offenders who are visibly different from the majority of the population in an area stand out, and are therefore more closely monitored by the resident population (Bernasco and Nieuwbeerta 2005). A group of white teenagers in a black neighborhood is unlikely to go unnoticed, as is a group of black teenagers in a white neighborhood. Note that whereas both the benefit and the cost argument apply equally to the ethnic composition of the target area, the former (benefit) argument applies to the ethnic composition of the offender's home area, whereas the latter (cost) argument applies only to the visual aspects (e.g. skin color, hair color and style, clothing) of the ethnic origin of the offenders themselves.

An alternative framework views criminal activity as an activity that may be premeditated, but is often more opportunistic. According to this view, offenders generally commit crimes during legal daily routines, and only when they are seduced to do so by specific opportunities. This 'routine activity' framework suggests that the preference for areas that are ethnically similar to the offender or to the offender's own area of residence, is not based on criminal calculations but on other unspecified reasons that have very little to do with criminal activities. This observation opens the door to new questions and new travel research on ethnic bias in a variety of other location choice domains, such as migration, commuting and travel motivated by other legal activities.

REFERENCES

Bakens, Jessie, Peter Mulder, and Peter Nijkamp. 2013. "Economic Impacts of Cultural Diversity in the Netherlands: Productivity, Utility, and Sorting." *Journal of Regional Science* 53:8–36.

Baudains, Peter, Alex Braithwaite, and Shane D. Johnson. 2013. "Target Choice During Extreme Events: A Discrete Spatial Choice Model of the 2011 London Riots." *Criminology*:n/a-n/a.

Bergstrand, Jeffrey H. 1985. "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence " *The Review of Economics and Statistics* 67:474-481.

Bernasco, Wim. 2006. "Co-Offending and the Choice of Target Areas in Burglary." *Journal of Investigative Psychology and Offender Profiling* 3:139-155.

—. 2010a. "Modeling Micro-Level Crime Location Choice: Application of the Discrete Choice Framework to Crime at Places." *Journal of Quantitative Criminology* 26:113-138.

—. 2010b. "A Sentimental Journey to Crime; Effects of Residential History on Crime Location Choice." *Criminology* 48:389-416.

Bernasco, Wim and Richard Block. 2009. "Where Offenders Choose to Attack: A Discrete Choice Model of Robberies in Chicago." *Criminology* 47:93-130.

Bernasco, Wim, Richard Block, and Stijn Ruiter. 2013. "Go where the money is: modeling street robbers' location choices." *Journal of Economic Geography* 13:119-143.

Bernasco, Wim and Thessa Kooistra. 2010. "Effects of Residential History on Commercial Robbers' Crime Location Choices." *European Journal of Criminology* 7:251-265.

Bernasco, Wim and Floor Luykx. 2003. "Effects of Attractiveness, Opportunity and Accessibility to Burglars on Residential Burglary Rates of Urban Neighborhoods." *Criminology* 41:981-1001.

Bernasco, Wim and Paul Nieuwbeerta. 2005. "How Do Residential Burglars Select Target Areas? A New Approach to the Analysis of Criminal Location Choice." *British Journal of Criminology* 45:296-315.

Bursik, Robert J., Jr. and Harold G. Grasmick. 1993. *Neighborhoods and Crime: The Dimensions of Effective Community Control*. New York: Lexington Books.

Carter, Ronald L. and Kim Quaile Hill. 1979. *The Criminal's Image of the City*. New York: Pergamon.

Clare, Joseph, John Fernandez, and Frank Morgan. 2009. "Formal Evaluation of the Impact of Barriers and Connectors on Residential Burglars' Macro-Level Offending Location Choices." *Australian and New Zealand Journal of Criminology* 42:139-158.

Cornish, Derek B. and Ronald V. Clarke. 1986. "The Reasoning Criminal: Rational Choice Perspectives on Offending." *Research in criminology*. New York: Springer.

Elffers, Henk, Danielle Reynald, Margit Averdijk, Wim Bernasco, and Richard Block. 2008. "Modelling Crime Flow between Neighbourhoods in Terms of Distance and of Intervening Opportunities." *Crime Prevention & Community Safety* 10:85-96.

Ghosh, Birendranath. 1951. "Random Distances Within a Rectangle and Between Two Rectangles." *Bulletin of Calcutta Mathematical Society* 43:17-24.

Guldmann, Jean-Michel. 1999. "Competing destinations and intervening opportunities interaction models of inter-city telecommunication." *Papers in Regional Science* 78:179-194.

Haynes, Kingsley A. and A. Stewart Fotheringham. 1984. *Gravity and Spatial Interaction Models*, Edited by G. I. Thrall. Beverly Hills, CA: Sage.

Kleemans, Edward R. 1996. *Strategische misdaadanalyse en stedelijke criminaliteit. Een toepassing van de rationele keuzebenadering op stedelijke criminaliteitspatronen en het gedrag van daders, toegespitst op het delict woninginbraak.* Enschede: Universiteit Twente, IPIT.

Kornhauser, Ruth Rosner. 1978. *Social Sources of Delinquency*. Chicago: University of Chicago Press.

LeBeau, James L. 1987. "The Journey to Rape: Geographical Distance and the Rapist's Method of Approaching the Victim." *Journal of Political Science and Administration* 15:129-136.

McFadden, Daniel. 1973. "Conditional Logit Analysis of Qualitative Choice Behavior." Pp. 105-142 in *Frontiers in Econometrics*, edited by P. Zarembka. New York: Academic Press.

Morselli, Carlo and Marie-Noele Royer. 2008. "Criminal Mobility and Criminal Achievement." *Journal of Research in Crime and Delinquency* 45:4-21.

Ottaviano, Gianmarco I.P. and Giovanni Peri. 2006. "The economic value of cultural diversity: evidence from US cities." *Journal of Economic Geography* 6:9-44.

Peeters, Marlijn. 2007. "The influence of physical barriers on the journey-to-crime of offenders." Faculty of Law. Department of Criminal Law and Criminology, Leiden University, Leiden.

Pettiway, Leon E. 1982. "Mobility of Robbery and Burglary Offenders: Ghetto and Nonghetto Spaces." *Urban Affairs Review* 18:255-270.

—. 1985. "The Internal Structure of the Ghetto and the Criminal Commute." *Journal of Black Studies* 16:189-211.

Rengert, George F. 1981. "Burglary in Philadelphia: A Critique of an Opportunity Structure Model." Pp. 189-202 in *Environmental Criminology*, edited by P. J. Brantingham and P. L. Brantingham. Beverly Hills, CA: Sage.

Reynald, Danielle M. , Margit Averdijk, Henk Elffers, and Wim Bernasco. 2008. "Do Social Barriers Affect Urban Crime Trips? The Effects of Ethnic and Economic Neighbourhood Compositions on the Flow of Crime in The Hague, The Netherlands." *Built Environment* 34:21-31.

Sampson, Robert J. 2012. *Great American City: Chicago and the Enduring Neighborhood Effect*. Chicago: University of Chicago Press.

Sampson, Robert J., Stephen W. Raudenbush, and Felton Earls. 1997. "Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy." *Science* 277:918-924.

Shaw, Clifford R. and Henry D. McKay. 1942. *Juvenile Delinquency and Urban Areas*. Chicago: University of Chicago Press.

Smith, Thomas Spence. 1976. "Inverse Distance Variations for the Flow of Crime in Urban Areas." *Social Forces* 54:802-815.

Stouffer, Samuel A. 1960. "Intervening opportunities and competing migrants." *Journal of Regional Science* 2:1-26.

Wadycki, W. 1975. "Stouffer's Model of Migration: A Comparison of Interstate and Metropolitan Flows." *Demography* 12:121-128.

Wiles, Paul and Andrew Costello. 2000. "The 'road to nowhere': the evidence for traveling criminals." Home Office, Research, Development and Statistics Directorate, London.

Wright, Richard T. and Scott H. Decker. 1997. *Armed Robbers in Action*. Boston: Northeastern University Press.

Zipf, George Kingsley. 1946. "The P1P2/D Hypothesis: On the Intercity Movement of Persons." *American Sociological Review* 11:677-686.

Ethnicity, Ethnic Segregation, and Crime

Are Offenders Ethnically Biased When Choosing Target Areas?

Tables

Table 1: Overview of four studies on role of ethnic segregation in crime location choice

	Location	Crime type	Spatial units	Offences	Statistical model	Hypotheses
1	The Hague	all	94 neighborhoods	62,871	spatial interaction	aggregate
2	The Hague	burglary	89 neighborhoods	786	conditional logit	individual
3	Chicago	street robbery	786 census tracts	5,847	conditional logit	individual & aggregate
4	Chicago	street robbery	24,594 census blocks	6,000	conditional logit	individual

Table 2: Standardized coefficients in spatial interaction regression models of crime flow in The Hague (source: Reynald et al., 2008).

	baseline + distance	baseline + distance + social distance
CONTROLS		
ln(inflow)	0.33	0.34
ln(outflow)	0.60	0.61
DISTANCES		
geographic distance	-0.29	-0.27
ethnic distance (DINE)		-0.06
socio-economic distance		-0.14
R^2	0.62	0.65
N	8464	8464

Note: all coefficients significant p < .001 two-sided

Table 3: Conditional logit model of burglary location choice. N=548 Burglaries (290 Burglars) in 89 neighborhoods in The Hague (source: Bernasco & Nieuwbeerta, 2005).

Symbol	Variables (unit)		odds ratio (e^{β})	S.E.
β_V	Real estate value (· € 100.000)		1.05	(0.13)
β_S	Single-family dwellings (10 %)		1.13*	(0.07)
β_R	Residential mobility (10 %)		0.98	(0.07)
β_C	Proximity to city centre (kilometers)		0.92	(0.07)
β_T	Residential units (· 1000)		1.36**	(0.05)
β_{NE}	Ethnic heterogeneity (· 10)	*natives*	1.10*	(0.06)
β_{FE}	Ethnic heterogeneity (· 10)	*non-natives*	1.20**	(0.07)
β_{AP}	Proximity (kilometers)	*adults*	1.63**	(0.15)
β_{MP}	Proximity (kilometers)	*minors*	2.22**	(0.55)

** p < 0.01 for one-sided test of $\beta > 1$

* p < 0.05 for one-sided test of $\beta > 1$

Table 4. Conditional logit model of street robbery location choice. N=5847 robberies in 786 Chicago census tracts. (source: Bernasco & Block, 2009).

	odds ratio (e^{β})	z-value
DISTANCE AND POPULATION		
log distance (kilometers)	0.21**	-98.69
not home tract (0/1)	0.67**	-8.77
population (× 1000)	1.17**	30.48
SOCIAL BARRIERS		
racial and ethnic dissimilarity (0-1)	0.42**	-12.35
gang territory dissimilarity (0-1)	0.50**	-7.80
ATTRACTIONS		
annual drug arrests (× 100)	1.15**	6.94
annual prostitution arrests (× 100)	1.14**	2.54
high school in tract (0/1)	1.15**	3.56
retail employment (× 100)	1.44**	12.43
GUARDIANSHIP		
collective efficacy	0.84*	-1.78

** p < .01 one-sided

* p < .05 one sided

Table 5. Conditional Logit Model of Choice of Robbery Destination Tract. Test Sample: *N* = 5847 robbery incidents 1996-1998, *n* = 786 Chicago Census Tracts. (source: Bernasco & Block, 2009).

	odds ratio	z-value
DISTANCE AND POPULATION		
Adults		
log distance (kilometers)	0.23**	-86.81
not home tract (0/1)	0.64**	-8.24
Juveniles		
log distance (kilometers)	0.17**	-58.78
not home tract (0/1)	0.82*	-2.24
population (× 1000)	1.17**	29.37
SOCIAL BARRIERS		
African-American offender		
African-American majority tract (0/1)	1.38**	6.53
Hispanic majority tract (0/1)	0.56**	-5.92
non-Hispanic White majority tract (0/1)	0.68**	-3.60
mixed tract (reference)	1.00	–
non-Hispanic White offender		
African-American majority tract (0/1)	0.25**	-5.09

Hispanic majority tract (0/1)	0.67*	-1.99
White majority tract (0/1)	1.03	0.16
mixed tract (reference)	1.00	–
Hispanic offender		
African-American majority tract (0/1)	0.14**	-8.97
Hispanic majority tract (0/1)	1.24**	2.38
White majority tract (0/1)	0.47**	-3.80
mixed tract (reference)	1.00	–
gang territory dissimilarity (0-1)	0.47**	-8.76
ATTRACTIONS		
annual drug arrests (× 100)	1.18**	8.28
annual prostitution arrests (× 100)	1.13**	2.39
high school in tract (0/1)	1.16**	3.71
retail employment (× 100)	1.39**	11.30
GUARDIANSHIP		
collective efficacy	0.81*	-2.19

** $p < .01$ one-sided

* $p < .05$ one-sided

Table 6: Discrete choice models of robbery target choice in Chicago, 6000 robberies with random sampling of 4000 from 24,594 blocks. Selected ‘ethnicity’ estimates (source: from Bernasco, Block & Ruiter, 2013)

Variables	β	se(β)	odds ratio (e^{β})
(All other parameters hidden)			
African-American robbers			
African-American majority	0.619*	(0.081)	1.856
White majority	-0.055	(0.127)	0.946
Hispanic majority	-0.099	(0.122)	0.906
Mixed racial / ethnic	0.138	(0.100)	1.148
Hispanic robbers			
African-American majority	-1.633*	(0.366)	0.195
White majority	-0.022	(0.254)	0.978
Hispanic majority	1.060*	(0.162)	2.886
Mixed racial / ethnic	0.534*	(0.177)	1.705
White robbers			
African-American majority	-0.695	(0.413)	0.499
White majority	0.629	(0.293)	1.877
Hispanic majority	0.426	(0.321)	1.531
Mixed racial / ethnic	0.551	(0.287)	1.736

* $p < .01$ one-sided