A SENTIMENTAL JOURNEY TO CRIME: EFFECTS OF RESIDENTIAL HISTORY ON CRIME LOCATION CHOICE*

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

Many offenses take place close to where the offender lives. Anecdotal evidence suggests that offenders also might commit crimes near their former homes. Building on crime pattern theory and combining information from police records and other sources, this study confirms that offenders who commit robberies, residential burglaries, thefts from vehicles, and assaults are more likely to target their current and former residential areas than similar areas they never lived in. In support of the argument that spatial awareness mediates the effects of past and current residence, it also is shown that areas of past and present residence are more likely to be targeted if the offender lived in the area for a long time instead of briefly and if the offender has moved away from the area only recently rather than a long time ago. The theoretical implications of these findings and their use for investigative purposes are discussed, and suggestions for future inquiry are made.

Offenders still confuse us about where they go to commit crimes. It is well known that many crimes are local (Wiles and Costello, 2000). They take place in the streets where the offenders live, a few steps away from their doorsteps, and sometimes even inside their own homes. The victims are often neighborhood residents, neighbors, or family members. But

although many offend within a short range of where they live, a substantial proportion commit crimes away from their home environments. Why do offenders sometimes stay around their home base and sometimes go elsewhere to commit crime? When they travel away from their homes, where do they go and why? These questions continue to puzzle and intrigue many researchers.

On the question of *where* they go, this article demonstrates that when offenders do not offend near their present home, they often do it in the vicinity of a past home. On the question of *why*, it uses crime pattern theory (Brantingham and Brantingham, 2008) to argue that offending usually takes place within the awareness space of the offender and suggests that former homes continue to be part of offenders' awareness space for some time after they have moved.

The issues resolved in this article are of theoretical, empirical, and practical relevance. Theoretically, the key innovation is that the article introduces a temporal dimension in the concept of awareness space. Studies that address the spatial behavior of offenders typically assume that the offender's home is a stable anchor point. This article acknowledges that offenders move and that, when they move, their awareness of former home areas gradually decreases and is replaced by the awareness of new ones. From this perspective, novel predictions are made on the role of an offender's residential history in his spatial behavior and crime-location choice.

Empirically, this study is the only one that has analyzed the effect of past residence on current crime-location choice. The predictions derived have been examined empirically using data on the address histories of offenders and on the offenses they committed.

Practically, the findings might be useful in solving future crimes. In the investigation of a crime, former residents of the area where the crime took place might be given special attention in setting up a geographic offender profile (Rossmo, 2000).

Here is an outline of the five sections that follow. The first section reviews the literature on former residence as a criterion for criminal-location choice. The second section builds on crime pattern theory to develop a dynamic version of the concept of spatial awareness and formulates hypotheses. Subsequent sections address data and methods, findings, as well as conclusions and discussion, respectively.

RESIDENTIAL MOBILITY AND CRIME

The relation between residential mobility and crime has been studied from various perspectives. In studies of communities and crime, residential turnover has been viewed as a core indicator of social disorganization and

A SENTIMENTAL JOURNEY TO CRIME   391

accordingly has been associated with high rates of crime and delinquency in communities (Sampson, Raudenbush, and Earls, 1997). At the individual level, residential mobility has been studied both as a cause and as a consequence of offending (Tittle and Paternoster, 1988) and of victimization (Dugan, 1999; Xie and McDowall, 2008a, 2008b).

This study has examined a different issue. It has addressed the question of how an offender's individual residential history influences where he or she commits crimes. Thus, the focus has not been on *whether* but on *where* crimes are committed. More specifically, the objective of the study was to determine whether offenders offend near their past homes.

This simple question leads into barely explored territory because virtually no prior research has focused on this issue. The only research that systematically collected some information on the prior addresses of offenders—a study on the spatial behavior of stranger rapists (Rossmo, Davies, and Patrick, 2004)—only listed the average distances of current and of past homes to the crime scenes. All other evidence is informative but anecdotal.

In a list of serial murder case descriptions, Rossmo (2000) provided anecdotal evidence that offenders might return to offend in the proximity of their past residence. For example, Clifford Olson, who killed 11 children from 1980 to 1981 around Vancouver, British Columbia, Canada, had lived several times in the area where he picked up his victims (2000: 161). David Berkowitz, who killed 10 victims in New York from 1976 to 1977, grew up in the Bronx and continued to commit crimes there after he moved elsewhere (2000: 164).

The hypothesized proclivity of offenders to offend within areas encompassing prior residences is illustrated in greater detail by Curman's (2004: 111–34) analysis of the locations of the targets of a female arsonist in the Greater Vancouver region, whom the police held responsible for 26 fires set during a period of 10 years. During this period, the woman moved from one municipality to another and once again moved within the second municipality. Initially setting fires in the area surrounding her first residence, after moving to a neighboring municipality, she committed arson in places near her new residence as well as in places near her former residence (2004: 121–7).

In sum, the sparse literature on the issue is anecdotal and cannot be used to assess whether committing crimes in the proximity of past residences is a general and significant pattern in the offender population at large. Before this issue is subjected to a systematic empirical assessment, the next section develops a theoretical basis and derives testable hypotheses.

THEORY AND HYPOTHESES

Crime pattern theory (Brantingham and Brantingham, 2008) is a perspective well equipped to shed light on the issue of whether and why offenders choose the proximity of past residential addresses to commit crimes. A central premise of crime pattern theory is that offenders, like everybody else, learn about their environment in going about their normal legitimate everyday activities. An *activity node* is a place where you normally stop and perform activities for more than a trivial amount of time. For many people, activity nodes include a home, a workplace, a shopping area, places for structured leisure activities, and the homes of family and friends. *Paths* are the routes that people take from one node to the other. Nodes and paths together form an individual's *activity space*. The *awareness space* is the area normally within visual range of the activity space (Brantingham and Brantingham, 2008).

The terms "normal node" and "normal path" are used to emphasize that the daily behavior of individuals is characterized generally by repetition and habit formation. Thus, crime pattern theory emphasizes the *intrapersonal stability* of activity nodes and the repetitive character of activities along multiple dimensions; many people travel the same routes from the same origin to the same destination on the same weekdays around the same time of day using the same mode of travel (car, train, bus, bike, or a mixture thereof). Empirical evidence in transportation research generally demonstrates that activity patterns are governed by daily and weekly time cycles (Gärling and Axhausen, 2003; Hanson and Huff, 1988; Song et al., 2010). Schedules are governed by biological constraints, such as regular sleep and meals, and by social roles and institutions; our positions as student, spouse, parent, patient, or employee define where we are expected to be at what times (Hägerstrand, 1970; Ratcliffe, 2006), and these compulsory activities display a great deal of repetition across daily and weekly cycles. Noncompulsory leisure activities are often more flexible and are less predictable (Schlich et al., 2004).

ACTIVITY SPACE CHANGES

Crime pattern theory does not specify in any detail the causes or consequences of changes in activity space. Studies that measure daily travel patterns repeatedly during longer periods, such as months or years, have demonstrated much stability from week to week but also have found considerable variability from year to year (Mannering, Murakami, and Kim, 1994). Thus, even a predictable individual, whose actions are highly repetitive across days, weeks, and months, will someday change. No person's set of activity nodes is fixed forever. As Horton and Reynolds (1971: 38) noted:

A SENTIMENTAL JOURNEY TO CRIME   393

> An individual's action space and his perception of the urban environment cannot be viewed as being static, but rather as changing via a complex learning process.

Learning new spatial knowledge must go hand in hand with at least some depreciation. Changing our activities usually implies that we acquire new activity nodes at the expense of others, so these other activity nodes disappear from our lives. To incorporate change more explicitly in crime pattern theory and make it dynamic, the term *activity space* will be used here explicitly for an individual's set of *contemporaneous* activity nodes and the paths between them, whereas the term *awareness space* will be used for a potentially broader collection of nodes and paths, one that includes not only "the area normally within visual range of the activity space," which is the definition advocated in crime pattern theory (Brantingham and Brantingham, 2008: 84), but also the former nodes and the paths between these former nodes. The new definition of awareness space is as follows:

> *Definition*: Awareness space is a person's current activity space as well as his or her activity spaces in the recent past, including the area normally within visual range of these activity spaces.

Thus, awareness space is a concept that is more encompassing than activity space, both in a spatial and in a temporal sense. It includes areas around activity nodes and paths, and it includes nodes and paths that are no longer part of the individual's current activity space, although they have been in the recent past.

EFFECTS OF CHANGES IN ACTIVITY NODES ON AWARENESS SPACE

Life events that involve relocation or a switch of activity nodes—for example, a job switch—require a change of spatial routines. New nodes and paths are discovered, and prior nodes and paths are unlearned. Although changes in activity space might be abrupt, the effects on awareness space are delayed. If a particular place ceases to be an activity node, then the individual's memory image of it fades only gradually. At the same time, a new node and paths to it only are discovered little by little. In sum, it takes time to become familiar with new places and routes as well as to forget former ones.

Many life events cause changes in our activity nodes and paths. We change jobs, switch leisure activities, or meet new friends and visit their homes. Most people discover new places and new routes in their environment all the time, and their activity space is subject to continuous change. A change of residence, however, usually has a drastic effect on an individual's activity space. Moving will typically strongly affect all daily routines because our home is the central node of our activity space, the starting

394   BERNASCO

point of the paths to other nodes. It is the major anchor point where most daily routines start and end (Golledge and Stimson, 1997: 279).

Note that moving often involves not only the displacement of a person's main activity node, but it also sets in motion (or is set in motion by) other life events. Job change, marriage, and childbirth are examples of events that might motivate a change of residence. Conversely, moving might motivate a person to find another school for their children, another place to exercise, and another grocery store. All these changes give rise to the discovery of new activity nodes, paths, and spaces.

HYPOTHESIZED EFFECTS OF RESIDENTIAL HISTORY ON CRIME-LOCATION CHOICE

The proposition of crime pattern theory being examined in this article is that offenders commit offenses at places where their awareness space overlaps with attractive targets. Although the data discussed and analyzed later on in this article do not contain completely measured individual activity spaces of offenders, they are useful in approximating them because they include the addresses and periods of the offenders' current and former residences. Because a home is the central anchor point of a person's activity space, access to offenders' residential histories as well as to their criminal histories provides an excellent starting point for testing the role of awareness space in crime-location choices.

The first hypothesis to be tested in this study is coined the *home hypothesis*. It relates the residential history of an offender, including any past residences as well as the present residence, to his or her selection of a crime site.

Home Hypothesis: Offenders are more likely to commit an offense in an area where they live or have lived than in an otherwise comparable area.

Although "otherwise comparable" is essentially another way of framing the *ceteris paribus*, or "all other things being equal," condition that is usually implicitly added to a hypothesis, it deserves some explanation in this case. In particular, it should be emphasized that the hypothesis does not assert that an offender's current or former residential area is necessarily more likely to be targeted than another area. Instead, it asserts that if two areas are identical in terms of attributes that affect crime-location choices (e.g., demographic composition and the physical design of the area or the presence of attractive targets), except that the offender lives or has lived in one but not in the other, then the former is more likely to be the place where the offense is committed.

The next hypothesis is the *history hypothesis*, which suggests that a logical order of precedence exists among an area of current residence, of past residence, and of "never" residence. It is motivated by the assumption that

the awareness of a former residential area already has started to decay, whereas the awareness of the current residential area is maintained on a daily basis.

History Hypothesis: Offenders are more likely to commit an offense in an area where they currently live than in an otherwise comparable area where they formerly lived, and they are more likely to commit an offense in an area where they formerly lived than in an otherwise comparable area where they never lived.

Additional challenges for the theory are sought by formulating and examining three supplementary hypotheses that condition the role of current and former residential areas temporally and spatially. Two of these hypotheses add a temporal dimension to the role of the home neighborhood. They are based on the argument that the extent to which a former residential area is part of an offender's awareness space depends on how long the offender lived in the area and on how recently.

In general, the image of a previous activity node will be more accurate when the change of residence is more *recent* because the memory is still fresh and because the image itself is up-to-date. When time passes, not only memory will decay but the environment of the former residence also will be subject to objective changes as buildings are demolished and rebuilt, shops change owners, and new groups of residents move into the area. The first additional hypothesis is the *recency hypothesis*.

Recency Hypothesis: Offenders are more likely to commit an offense in a former area where they lived until recently than in an otherwise comparable area they left longer ago.

In addition to recency, *duration* could make a difference. The image of a former residential area will be more accurate if the individual lived in that area for a long time rather than briefly. If the individual only briefly lived in the past residence, then he or she will still be in a period of transition after a prior move, and the environment and the paths to other nodes have not yet become completely familiar, so the second additional hypothesis is the *duration hypothesis*.

Duration Hypothesis: Offenders are more likely to commit an offense in an area where they have lived for a long time than in an otherwise comparable area where they have lived only for a short period of time.

The third additional hypothesis is the *proximity hypothesis*. It extends the spatial dimension of the *home* and *history hypotheses* and is based on the assumption that areas nearby the present and nearby the former residential area are more likely to be part of an offender's awareness space than more distant areas because daily routines are more likely to bring people to nearby areas than to distant areas. Thus, because the offender is

expected to have activity nodes in areas nearby their present or former residence, these nearby areas have an increased chance of being selected.

Proximity Hypothesis: Offenders are more likely to commit an offense in an area that is nearby an area where they live or have lived than in an otherwise comparable area.

Because we cannot measure other activity nodes than the offender's residence, the *proximity hypothesis* effectively contains the following clauses: 1) the closer a location is to an offender's current or past home, the more likely it is to be or have been an activity node of the offender; and 2) if a place is or has been an activity node of the offender, then it is more likely that the location is chosen to commit an offense.

DATA AND METHODS

This section addresses the main data sources used in this study and the methods used to draw conclusions from these data. First, the data sources and the case-selection procedures are discussed. Subsequently, the analytical strategy and the application of discrete choice modeling to location choices are described.

POLICE RECORDS

The first data source is a police information system used by the Greater The Hague Police Force that was designed to support crime investigations. It contains detailed information on offenders and on the offenses they have been charged with. These records were used to establish which offenders were involved, where and when, and which offenses they committed. From the electronic system, a random sample was taken of 4,410 persons who had been arrested in 2004 or in 2005 for an offense that had been classified by the police as either a residential burglary, a theft from a vehicle, a robbery, or an assault. The sample was stratified by the type of offense offenders most recently were charged with, so 1,000 offenders were selected whose most recent offense was a residential burglary, 1,000 whose most recent offense was theft from a car, and so on. No other selection criteria were used. Therefore, each person involved in one of these offenses had the same likelihood of inclusion, independent of whether he or she was a first-time or a prolific offender. Subsequently, all offenses these persons had been involved in were used in the analysis, provided they had been classified as one of the previously mentioned four categories and had taken place between 2004 and 2005. The crime types, dates of the offenses, and addresses or locations of the offenses were used in the analysis, and sex, age, country of origin, and number of prior offenses were included for descriptive purposes.

NATIONWIDE CITIZEN INFORMATION SYSTEM

The second source of data is the population registration data, which are held in a nationwide information system (Dutch acronym GBA) used by Dutch municipalities and several other agencies, to keep track of birth, death, nationality, marriage, divorce, childbirth, and residential addresses of all Dutch citizens. In the Netherlands, no periodic census occurs like in the United States and elsewhere. Instead, the previously cited major status changes of citizens are monitored and updated by municipalities in this nationwide information system (for a more comprehensive description, see Blokland and Nieuwbeerta, 2005). The system also functions as an archive because all historical information, including all former addresses of a person, remain in the system and are not replaced with new information. People leaving the country semipermanently or permanently also are registered. This nationwide system allows us to reconstruct the residential careers of all offenders in the sample from 1994 onward because the system became operational in that year. The recorded residential history typically goes back farther in time because, in 1994, it was recorded at which date the individual started to reside at the 1994 address.

The availability of reliable records of previous addresses is a significant strength of the current study. In most other countries, research involving information on the past residences of offenders would have to rely on the recollection of offenders themselves and, thus, depend on their cognitive capability to remember the places and times of past residences and on their willingness to report them.

In this study, the current address and, at most, five prior addresses could be obtained per offender. Although this amount implied that for a small subgroup of offenders (approximately 3 percent), their residential histories only could be reconstructed for the last 2 years before the offense, the residential history of 85 percent of the sample could be tracked back more than 5 years and, for 50 percent, back more than 10 years. Note that any bias introduced by missing information on past home addresses will lead to conservative estimates of the effect of residential history on crime-location choice; missing addresses will make the role of residential history look smaller than it actually is.

A feature that is potentially relevant for the residential history of offender populations is that when people are detained for a period of more than 3 months, they are registered as residing in the penitentiary. Because detainees have no way of getting familiar with the local environment outside the prison walls, these periods were excluded from their residential history. The same applies to periods during which offenders lived abroad.

STATISTICS NETHERLANDS NATIONAL POSTAL CODE DATABASE

The third source is a national database of demographic, social, and economic information on all (four-digit) postal code areas in the Netherlands. There are approximately 4,000 postal code areas nationwide, with an average population size of 4,900 and an average number of households of 2,100. In terms of their size, shape, and topography, the postal code area is a useful approximation of the area one would expect people to be familiar with if they lived within it. First, postal code boundaries have been designed with post delivery services in mind. This design ensures that minimal physical restrictions on travel are in place within the postal code area and that the areas invite local travel by foot and bicycle (which is how post generally is delivered in the Netherlands). Both modes of travel are flexible and provide ample opportunities to learn about the environment. Second, the size of postal code areas is related inversely to the level of urbanization. Postal codes in urban areas usually cover less than half a square mile, whereas postal codes in more rural regions are larger (less than 2 square miles). This variation matches the variation in geographic coverage of residents because urban dwellers on average travel shorter distances for daily routine trips than residents in towns and villages. In sum, it is plausible that most people who live within a postal code area are familiar with the whole postal code area or at least with a substantial proportion of it. Throughout the remainder of this article, where "area of residence" is used to describe empirical findings, it means "postal code area of residence."

Statistics Netherlands provides census-like statistics of the postal code areas on a regular basis. Four variables were used as control variables because they have been shown repeatedly to be related strongly to the volume of various types of crime in postal code areas (Bernasco and Nieuwbeerta, 2005; Nieuwbeerta et al., 2008; Wilsem, Wittebrood, and de Graaf, 2006). These variables are population size, percentage of single-person households, poverty level (measured by the average value of residential property in the area), and level of urbanization (a score assigned by Statistics Netherlands to capture address density). They are included here because they might be confounded with the offender's residential history (because offenders tend to live in poor and densely populated areas), so failing to include these control variables might lead us to attribute erroneous effects to the offender's residential history, whereas in fact, the effects were because of other attraction factors.

A SENTIMENTAL JOURNEY TO CRIME   399

CASE-SELECTION PROCEDURES

Of the 4,410 individuals originally selected for inclusion in the analysis on the basis of their presence in the police records, 3,784 (86 percent) were used in the analysis. Four different reasons explain the exclusions, which were executed in the following order. The first reason for exclusion was because individuals in the police records could not be linked to the citizen information system because the arrested persons were not Dutch citizens but, for example, were tourists or irregular migrants. This situation applied to 16 cases (.4 percent). Another 449 individuals (10.2 percent) were excluded because the crimes they committed could not be geocoded. For 69 individuals (1.6 percent), the citizen information system address information covered only the period after the date of the crime(s), so essentially the offender's complete residential history before the crime is missing from the data. The last reason for exclusion was whether the offender was registered as living abroad at the time of the offense. This situation applied to 92 individuals (2.1 percent) in the sample, and they were excluded because no valid current residence could be established for them. Table 1 provides a description of the resulting sample of 3,784 individuals in terms of sex, age, country of origin, number of prior offenses, and frequency of moving. Except possibly for the frequency of moving, for which no reference data were available for this group, these percentages are representative of the arrested offender population in the Netherlands.

Because the length of the observed residential histories varied between offenders, table 1 reports the number of addresses actually observed in the data, divided by the length of the observation period, and multiplied by ten. Multiple addresses within the same postal code area were counted here as separate addresses. In the analyses described in the next section, they are treated as a single address because we assumed a person's awareness stays unchanged when he or she moves across a short distance.

DESCRIPTIVE ANALYSIS

During the years 2004 and 2005, these 3,784 offenders committed a total of 7,179 offenses that were classified as either residential burglary, theft from vehicle, robbery, or assault.

Table 2 provides an overview for all offenses as well as for each crime type separately, how many of these offenses are committed in the offender's current residential area, committed in the offender's former residential area, and committed elsewhere. These numbers and percentages, as well as the column totals, are printed in boldface. The first two categories are further subdivided according to duration and recency. For the categorization of both duration and recency, a threshold value of 2 years was chosen for two reasons. The first reason is that it seems reasonable to

Table 1. Characteristics of the Offender Sample (*N* = 3,784)

Variable	Count	%
Sex		
Male	3398	89.8
Female	386	10.2
Age (September 2007)		
12–18	681	18.0
19–22	866	22.9
23–30	838	22.2
31–40	703	19.6
41 or older	696	18.3
Country of birth		
The Netherlands	1,771	46.8
Surinam	308	8.1
The Netherlands Antilles or Aruba	197	5.2
Morocco	682	18.0
Turkey	292	7.7
Other	534	14.1
Prior offenses (December 2006)		
1–2	1,415	37.4
3–10	1,568	41.4
11 or more	801	21.2
Number of addresses per 10 years		
0–1.0	490	13.0
1.1–2.0	917	24.2
2.1–3.0	632	16.7
3.1–5.0	605	16.0
5.1–10.0	735	19.4
11 or more	405	10.7

Sources: Greater The Hague Police Force 2004–2006 and the Citizen Information System.

assume that, after having lived in a place for 2 years, it has become familiar and that, after having left a place 2 years ago, it has lost most of its familiarity. The second reason is that the 2-year period divides the sample under study into subgroups of roughly comparable sizes. Although throughout the remainder of this article we analyze the data using the 2-year threshold value, the use of thresholds of 1 year and of 3 years lead to the same substantive conclusions.

Table 2 provides a tentative answer to the general research question of the role of residential history in crime-location choice. On average, 22 percent of the offenses were committed in the offender's current neighborhood, 6 percent in a former neighborhood, and 71 percent elsewhere.

Table 2. Descriptive Analyses of Crime Location by Crime Type

Crime Location	Total (All Types)		Theft from Car		Robbery		Residential Burglary		Assault	
	Count	%	Count	%	Count	%	Count	%	Count	%
Current area of residence	**1,596**	**22.2**	**109**	**9.3**	**190**	**12.3**	**271**	**21.9**	**1,026**	**31.9**
Since < 2 years	207	2.9	15	1.3	12	.8	30	2.4	150	4.7
Since > 2 years	1,389	19.4	94	8.0	178	11.5	241	19.4	876	27.3
Former area of residence	**458**	**6.4**	**48**	**4.1**	**82**	**5.3**	**75**	**6.1**	**253**	**7.9**
Long (> 2 years) until recently (< 2 years)	120	1.7	11	.9	25	1.6	22	1.8	62	1.9
Short (< 2 years) until recently (< 2 years)	78	1.1	6	.5	10	.7	10	.8	52	1.6
Long (> 2 years) long ago (> 2 years)	162	2.3	15	1.3	28	1.8	22	1.8	97	3.0
Short (< 2 years) long ago (> 2 years)	98	1.4	16	1.4	19	1.2	21	1.7	42	1.3
Elsewhere	**5,125**	**71.4**	**1,019**	**86.7**	**1,277**	**82.4**	**894**	**72.1**	**1,935**	**60.2**
Total	7,179	100.0	1,176	100.0	1,549	100.0	1,240	100.0	3,214	100.0

Sources: Greater The Hague Police Force 2004–2006 and the Citizen Information System.

402   BERNASCO

Obviously, these percentages are only descriptive. To answer the research questions, the number and characteristics of alternative areas where the crime could have been committed should be taken into account because the offender's residential history might be confounded with these characteristics. For example, an offender might burgle in an area of past residence not because it is an area of past residence but for other reasons. Thus, the issue of whether offenders prefer to target areas of past residence should be framed and analyzed in a framework of location choice. The next section discusses the application of a discrete choice model to location choice.

DISCRETE CHOICE MODELS APPLIED TO LOCATION CHOICE

The purpose of a discrete choice model is to explain the outcome of a discrete choice situation, which is the situation in which an individual decision maker has to choose a single alternative from a limited number of distinct alternatives (Ben-Akiva and Bierlaire, 1999). When discrete choice models are applied to location choices, the alternatives that can be chosen are spatial entities. In recent applications of the model to crime-location choice in burglary (Bernasco, 2006; Bernasco and Nieuwbeerta, 2005; Clare, Fernandez, and Morgan, 2009) and in robbery (Bernasco and Block, 2009), the choice faced by the decision maker—the offender—is where to commit a crime.

Most discrete choice models are based on the decision rule that specifies utility maximization. According to the random utility maximization model (McFadden, 1973), the decision maker evaluates each available choice alternative in terms of its utility (net gain, profits, and satisfaction) and chooses the alternative that maximizes his or her utility if chosen. Thus, in crime-location choice, the point of departure is a motivated offender who chooses, from a set of potential target areas, the area that yields maximal gains.

To capture the structure of the model, consider a situation in which an offender is out to commit a crime in 1 of 4,000 mutually exclusive areas. Offender i evaluates the utility of committing an offense in an area j on the basis of the following criteria: the distance from his home (D_{ij}), the level of informal guardianship in the area (G_j), and a dichotomous variable indicating whether he or she ever has lived in the area before (P_{ij}). The utility derived by offender i from committing the offense in area j then is given by the following equation:

$$U_{ij} = \beta_1 D_{ij} + \beta_2 G_j + \beta_3 P_{ij} + \varepsilon_{ij} \qquad [1]$$

where the β symbols are parameters that indicate the "importance" of the associated choice criterion for the choice outcome and are to be estimated based on the data observed, and ε_{ij} is a random error term. If ε_{ij} follows a

type I extreme value distribution, then the parameters can be estimated with a multinomial logit model—also known as the conditional logit model (Ben-Akiva and Bierlaire, 1999). According to this model, the probability that an individual i chooses alternative area j, is given as follows:

$$P(Y_i = j) = \frac{e^{\beta_1 D_{ij} + \beta_2 G_j + \beta_3 P_{ij}}}{\sum\limits_{j=1}^{J} e^{\beta_1 D_{ij} + \beta_2 G_j + \beta_3 P_{ij}}} \qquad [2]$$

The hypothesis that offenders prefer short distances more than long distances can be assessed by testing whether β_1 is significantly negative (the further away from the offender's home, the less likely it is that the area is chosen). Assessing whether guardianship deters offenders boils down to testing whether $\beta_2 < 0$, and assessing whether offenders are attracted to areas of past residence is testing whether $\beta_3 > 0$.

Later on, when the model outcomes are discussed, the values of e^β (the exponent of β) are presented instead of the values of β because, in this case, e^β is much easier to interpret than β itself; if the independent variable increases by one unit, then the odds that the area is chosen increase by a factor e^β (the odds ratio). In the case of a dichotomous variable, for example a dummy variable indicating whether the area was part of the offender's residential history, an estimated parameter of two means that the odds that the area was chosen were twice as high as the odds that similar areas where the offender never lived were chosen. Note that odds ratios are always positive values; values between 0 and 1 imply that the odds decrease, and values above 1 imply that the odds increase as a function of the independent variables. All five hypotheses are formalized in terms of testing the direction and significance of model parameters or the difference between two parameters.

Practically, the estimation of a conditional logit model requires that we set up a large data matrix that has, for each of the 7,179 offenses analyzed, as many rows as choice alternatives (i.e., each of the 4,000 postal code areas in the data set is a choice alternative for each of the 7,179 offenses). The dependent variable is defined as a dichotomous variable that equals 1 for the particular area that was actually chosen and equals 0 for all other areas. The independent variables of theoretical interest vary across both offenses and potential target areas. They include the following variables measured at the time of the offense (measurement level in parentheses):

   1. Whether the offender lives in the area (dichotomous)

   2. Whether the offender ever has lived in the area before (but not currently) (dichotomous)

404   BERNASCO

    3. Whether the offender has lived in the area longer or shorter than 2 years (dichotomous)

    4. Whether the offender has moved out of the area shorter or longer than 2 years ago (dichotomous)

    5. The distance between the area and the offender's current area of residence (continuous)

    6. The shortest distance between the area and the nearest former area of residence (continuous)

Note that the 566 offenders who never moved within the observation period are included in the analysis because all hypotheses apply to the question of whether an offender's amount of residential experience with a potential target area (properly weighted by duration, recency, and proximity) is related systematically to his or her likelihood of offending in that area. Although offenders who did not move have no past residence, their current home, the period that they have lived in their current home, as well as the distance of all potential target areas to their current home do inform the overall model and provide statistical power to the test of the hypotheses. Including them also ensures that the findings can be generalized to the offender population at large and not be restricted to the subgroup that has moved.

FINDINGS

    Guided and structured by the five hypotheses formulated at the end of the theoretical elaboration, this section assesses the role of offenders' residential histories in their selection of crime locations. Initially the *home*, *history*, *recency*, *duration*, and *proximity* hypotheses are tested separately. The results of these separate tests are displayed in table 3. Taking into account that the hypotheses apply to interrelated aspects of residential histories, table 4 presents an integrated model that tests all aspects of residential history simultaneously. Table 5 explores similarities and differences among the four types of crime studied. Each column in tables 3 and 4 lists the estimated parameters of a conditional logit model. The parameters in table 5 all come from a single conditional logit model.

HOME HYPOTHESIS

    The first column in table 3 labeled "Home," tests the *home hypothesis*, which states that offenders are more likely to commit an offense in an area where they live or have lived than in an otherwise comparable area. The variable labeled "Current or former area" is a dichotomous variable that indicates whether the offender ever has lived in the focal area, either at present or in the past, regardless of duration or recency. The estimated odds ratio effect of 22.52 is highly significant. It implies that an area where

A SENTIMENTAL JOURNEY TO CRIME   405

the offender lives or has lived previously, is 22.52 times more likely to be selected for committing an offense than an area where he or she has never lived (the reference category). This finding strongly confirms the *home hypothesis*.

Note that the reported effect of 22.52 is a net effect, which compares areas that are identical in terms of their value on the control variables—population size, percentage single-person households, poverty, and urbanization. The estimated effects of these control variables are all positive, so areas with a large population, high percentages of single-person households, high levels of poverty, and a high level of urbanization attract crime. To save space and because they are peripheral to the main line of argument, these effects are not shown in table 3 nor in subsequent tables where the effects are also positive and significant.

HISTORY HYPOTHESIS

The next hypothesis to be tested is the *history hypothesis*. It specifically addresses the role of past residences, stating that offenders are more likely to commit an offense in an area where they currently live than in an area where they formerly lived and are more likely to commit an offense in an area where they formerly lived than in an area where they never lived.

To test this hypothesis, it is necessary to distinguish explicitly between the area that contains the offender's current home, areas that do contain (one of) the offenders' past home(s) but not his or her current home, and areas where the offender never lived. The column labeled "History" in table 3 displays the results—again, simple but revealing. The current home area of the offender is 36.72 times more likely to be chosen as the crime location than a similar area where the offender has never lived, whereas a former home area is 8.63 times more likely to be targeted than one where the offender never lived. Confirming the hypothesis, these two effects are statistically significant and differ significantly from each other ($p < .001$, one-sided).

RECENCY HYPOTHESIS

The previous findings confirm that offenders are attracted to their former residential environments and demonstrate that the current residential area pull is stronger than former residential areas; the effect of the current residential area is nearly four times as large as the effect of the former residential area. This latter finding suggests that the present residential location of the offender is more salient and influential than situations in the past. The *recency hypothesis* exploits this idea in greater detail. It asserts that offenders are more likely to commit an offense in a former

Table 3. Conditional Logit Model of Crime Location Choice Testing History, Proximity, Duration, and Recency Hypotheses

Crime Location Area	Home		History[a]		Recency[b]		Duration[c]		Proximity[d]	
	OR	Z	OR	Z	OR	Z	OR	Z	OR	Z
Current or former area	22.52	66.8*								
History										
Current area of residence			36.72*	77.7	36.72*	77.7				
Since < 2 years							19.53*	73.9		
Since > 2 years							41.93*	29.3		
Former area of residence			8.63*	30.0						
Recency										
Left area > 2 years ago					7.49*	21.1				
Left area < 2 years ago					10.63*	25.1				
Duration										
Lived in area < 2 years							5.79*	15.3		
Lived in area > 2 years							11.66*	29.3		
Area was never residence	—		—		—		—			
Proximity										
Distance to current area									.74*	−20.9
Distance to former area									.87*	−9.5
Pseudo R^2	.15		.16		.16		.16		.17	
N (# offenses)	7,179		7,179		7,179		7,179		5,994	
N (# offenders)	3,784		3,784		3,784		3,784		3,218	

Sources: Greater The Hague Police Force 2004–2006 and the Citizen Information System.
NOTES: Odds ratio (OR) coefficients and **z** values (robust standard error estimates). The estimated effects of four area control variables (population size, percentage single-person households, poverty, and urbanization level) are not shown. They were all positive and significant ($p < .001$ two-sided).
[a]Difference between "current area of residence" and "former area of residence" significant $p < .001$, one-sided.
[b]All differences among "current area of residence," "left area > 2 years ago," and "left area < 2 years ago" significant $p < .001$, one-sided.
[c]Difference between "since < 2 years" and "since > 2 years" as well as between "lived in area < 2 years" and "lived in area > 2 years" significant $p < .001$, one-sided.
[d]Differences between "distance current area" and "distance former area" significant $p < .001$, one-sided.
* $p < .001$, one-sided.

area where they lived until recently than in an otherwise comparable area they left longer ago.

This hypothesis is tested in a model with outcomes presented in the column labeled "Recency" in table 3. This model is nested in the previous model (*history hypothesis*) because the overall effect of a former residence area is divided into recent former residential areas (where the offender lived until up to 2 years ago) and ancient former residential areas (where the offender moved out of more than 2 years prior to the offense). The hypothesis is grounded in the idea that spatial knowledge of an area decays as time passes by. Again, confirming the hypothesis, the effect of a recent former residence (10.63) is larger than the effect of an ancient former residence (7.49). In other words, the pull of recent former residences is stronger than ancient former residences. Both effects as well as the size of the difference between them are statistically significant ($p < .001$, one-sided).

DURATION HYPOTHESIS

The passing of time is not only hypothesized to reduce the awareness of former activity nodes, it also is expected that time is required to acquire knowledge of a new area. The *duration hypothesis* formalizes this assumption by asserting that offenders are more likely to commit an offense in an area where they lived during a longer period of time than in one where they lived a shorter period of time. Note that the hypothesis applies not only to the duration of residence in former homes but also to the length of time offenders have lived in their present home. In other words, it claims that the tendency to offend near home depends on the length of residence.

The column labeled "Duration" in table 3 shows two pairs of odds ratio coefficients—one pair that contrasts brief and long residence in the current home and one pair that contrasts brief and long duration of former homes' residence. Clearly, both present and former areas where offenders have lived longer than 2 years are more than two times as likely to be selected for offending than identical areas where they have lived for less than 2 years (41.93 vs. 19.53 for current residence and 11.66 vs. 5.79 for former residences). Again, confirming the expectations, all effects and their differences are significant ($p < .001$, one-sided).

PROXIMITY HYPOTHESIS

The fifth hypothesis is the proximity hypothesis. It asserts that, in addition to being more likely to offend in areas where they live or lived, offenders also are more likely to offend *nearby* the current or former areas

408   BERNASCO

of residence. This behavior is expected because a person's home is gener-ally the center of their activity space, which often is larger than the direct environment of the home but extends spatially in various directions.

Testing this hypothesis is slightly more complex than testing the other hypotheses because it is impossible to define the distance to a former home if a person has always lived in the same place. For these people, their residential history is static because they never moved (in the period under discussion) before they committed the offense. This situation applied to 1,185 (16.5 percent) of the offenses and to 566 (15.0 percent) of the offenders (note that the absence of prior residential moves might apply to an offender during the first offense but not during a subsequent offense in the data). In contrast, the distance to the current home always can be calculated because everybody in this sample has a current home. Therefore, the proximity hypothesis was tested on a subset of offenders, namely those who had at least one other address prior to their current address. The model also was tested separately for the whole sample, with the variable "Distance to former area" excluded, and the results were the same as those presented here.

The test is also more complex because offenders often have multiple former addresses, and in that case, multiple distances to the focal area are present. Because from an optimal choice perspective the evaluation of an alternative does not depend on the presence of less attractive alternatives, the distance of a focal area to former areas of residence is defined here as the shortest of the distances to all former areas of residence (i.e., as the minimum rather than the mean or median of the set of distances to former areas of residence).

From the column labeled "Proximity" in table 3, it can be learned that as the distance of an area to the current address of the offender increases, the likelihood of the area to be chosen decreases, as hypothesized. The value .74 means that for every kilometer that an area is situated further away from the offender's home, the likelihood for the area to be chosen by this offender decreases by a factor of .74; this figure equals a 26 percent reduction. The effect of the shortest distance to any former residence is less strong (.87), which shows that the proximity to the present residence pull is stronger than the proximity to a former residence.

SIMULTANEOUS HYPOTHESES

As demonstrated, the separate testing of the five hypotheses strongly supports the overarching hypothesis that offenders' residential histories affect their choice of target areas. Another question is how all aspects of an offender's residential history together affect crime-location choice.

Table 4 presents an integrated model in which the five hypotheses are combined.

Table 4. Conditional Logit Model of Crime Location Choice Testing History, Proximity, Duration, and Recency Hypotheses Simultaneously, 5,994 Offenses Involving 3,218 Offenders

Crime Location Area	OR	Z
Current area of residence (duration)		
Long (> 2 years)	10.33*	36.6
Short (< 2 years)	6.01*	16.6
Former area of residence (duration and recency)		
Long (> 2 years) and until recently (< 2 years)	6.57*	15.4
Short (< 2 years) and until recently (< 2 years)	2.96*	7.3
Long (> 2 years) and long ago (> 2 years)	3.76*	11.5
Short (< 2 years) and long ago (> 2 years)	2.52*	5.4
Never residence		
Distance to current area of residence (km)	.83*	−17.0
Distance to former area of residence (km)	.91*	−8.8
Pseudo R^2		.23

Sources: Greater The Hague Police Force 2004–2006 and the Citizen Information System.
NOTES: Odds ratio (OR) coefficients and **z** values (robust standard error estimates). Control variables (population size, percentage single-person households, poverty, and urbanization level) not shown.
* $p < .001$, one-sided.

In table 4, the status of any area with reference to the offender's residential history is one of seven different categories; from "Current area of residence since more than 2 years" to "Never residence," which is the reference category to which the others are compared.

All else being equal, the results clearly show that the most likely area to be chosen for crime is the one where the offender currently lives and has lived for more than 2 years. This area is 10.33 times more likely to be chosen than one where the offender never lived.

Compared with areas where the offender has lived for more than 2 years, two other categories have a significantly smaller likelihood of being selected—a neighborhood where the offender currently lives but for less than 2 years (6.01) and a former neighborhood where the offender has lived for more than 2 years until recently (6.57). The difference between these two categories is not significant. Apparently, recency and duration are partly substitutes, so a relative lack of recency can be compensated by a longer duration.

410   BERNASCO

About half as likely are two other categories—former areas where the offender lived for a relatively short period until recently (2.96) and former areas where they lived for more than 2 years but a relatively long time ago (3.76). Again, because these two effects do not significantly differ in strength, these results suggest that recency and duration are substitutes.

As expected, because this category suggests that the offender's knowledge of the area is both limited and outdated, the least likely former area is one where the offender lived for less than 2 years and which was left more than 2 years ago. Still, this area is 2.52 times as likely to contain the crime location than a comparable area where the offender never has lived.

The effects of distance to current and former home areas apply to areas where the offender never has lived. The effect of distance to the current area of residence equals .83, so every kilometer further away from the offender's home reduces the likelihood of an area being chosen for a crime by a factor of .83 (i.e., by 17 percent). The effect of the shortest distance to any former neighborhood is less negative (.91), so every kilometer reduces the likelihood by 9 percent. Without exception, these findings confirm the dynamic interpretation of crime pattern theory put forward in this article.

COMPARISON BETWEEN CRIME TYPES

The model outcomes presented in tables 3 and 4 do not distinguish among the four types of crime analyzed, which technically means that the estimated coefficients are constrained to be the same for all four types of crime. To verify the consistency of the reported findings across various crime types, the *home*, *history*, and *proximity* hypotheses were tested simultaneously, allowing the estimated coefficients of "Current area of residence," "Former area of residence," "Distance to current area of residence," and "Distance to former area of residence" to differ among the four crime types.

The results are displayed in table 5. Similar findings were obtained when the effects of "Current area of residence" and "Former area of residence" were partitioned to differentiate between recency and duration, like in table 4. The results in table 5 show that the attraction to current and previous residential areas is present and statistically significant for all four types of crime, which confirms that the hypotheses are supported across a range of offense types. However, the effect of former areas of residence is exceptionally strong for offenders committing assaults. A possible reason for this finding might be that assaults often represent the escalation of an ongoing relational conflict. Thus, assaults tend to be targeted toward a specific person that is known to the offender. Burglaries, thefts, and robberies are more likely to be targeted toward anonymous victims because the target is not the victim but is his or her property. Thus, those who

Table 5. Conditional Logit Model of Crime Location Choice for Four Different Types of Crime, 5,994 Offenses Involving 3,218 Offenders

Crime Location Area	Assault		Robbery		Residential Burglary		Theft from Car	
	OR	Z	OR	Z	OR	Z	OR	Z
Current area of residence	15.72*	34.2	4.10*	10.9	7.91*	14.7	3.92*	8.6
Former area of residence	5.21*	16.9	2.99*	5.4	3.18*	6.9	1.65*	2.5
Distance to current area of residence	.82*	−15.8	.80*	−10.8	.84*	−7.3	.89*	−5.3
Distance to former area of residence	.91*	−7.3	.92*	−3.9	.88*	−5.1	.87*	−5.6
Never residential area	—		—		—		—	

Sources: Greater The Hague Police Force 2004–2006 and the Citizen Information System.
NOTES: Odds ratio (OR) coefficients and *z* values (robust standard error estimates). Control variables (population size, percentage single-person households, poverty, and urbanization level) not shown. Pseudo R^2 = .23
* $p < .001$, one-sided.

412   BERNASCO

commit thefts from cars, burglaries, or robberies can go to many places to commit the offense, but many of those who commit assaults only have one specific victim and that victim is likely to live in an area where the offender currently lives or has lived. A prototypical example of an offender returning to an area of prior residence could be a former husband who returns to the place where he lived with his family to abuse his former wife.

CONCLUSION AND DISCUSSION

The research presented here has addressed an issue that has never been studied systematically—the relative roles of current and former residence in crime-location choice. The findings have demonstrated, as hypothesized, the following:

> 1. Offenders are more likely to commit an offense in an area where they live or have lived than in an otherwise comparable area.
> 2. Offenders are more likely to commit an offense in the area where they currently live than in an area where they used to live and are more likely to commit it in the latter than in an area where they never lived.
> 3. Offenders are more likely to commit an offense in an area where they once lived if they lived in the area for a long time than if they only lived there for a short period of time.
> 4. Offenders are more likely to commit an offense in an area where they lived until recently than in an area they left long ago.
> 5. Offenders are more likely to commit an offense near an area where they live or used to live than in areas further away from their present or former residences.

The confirmation of all hypotheses supports the framework of crime pattern theory, a theory that asserts that a crime takes place where a motivated offender's awareness space intersects with suitable targets. From a more general point of view, the theoretical arguments and their empirical support allow us a better understanding of the anomalies in the spatial decision making of offenders and to generalize prior insights on the role of the location of the offender's home as an anchor point. For example, it was shown that if offenders move out of their own territories to offend elsewhere, then their journey to crime, in many cases, is not a journey into unfamiliar areas but often a "sentimental journey to crime"—a journey to a place that is part of their awareness space because they used to live there. Another generalization that has become apparent is that the well-known and often replicated tendency to offend nearby the current residence is conditional on the amount of experience the offender has in the

current area of residence. Offenders who recently moved to live in a certain area are less likely to offend locally and are more likely to offend elsewhere than those who have lived in their current area of residence for years.

The knowledge that offenders commit crimes in areas of past residence might be put into practical use in solving crimes. Geographic offender profiling (for a recent review, see Harries and LeBeau, 2007), is an investigative activity aimed at prioritizing the search area for an offender's residence based on where he or she commits offenses. The main finding to take home from the present findings is that when offenders move away from their home areas to commit crime, they often travel to the areas of past residence. These offenders make a "sentimental journey to crime" while currently living outside the area where they offend and are difficult to profile because they violate the distance decay principle on which profiling is based (Paulsen, 2007). As a consequence, the reported findings indicate that former residents of the area where the crime took place might be likely candidates on a list of potential suspects.

A crucial aspect of the theoretical interpretation introduced in this article is that a former residential area is part of a person's awareness space even if it is not a part of their contemporaneous activity space. An issue that unfortunately could not be addressed here empirically is whether offenders' areas of past residence are indeed still part of their ongoing daily routines even though they do not live there anymore. After all, a past residence still can be a regularly frequented node in a person's current activity space. For example, parents or other relatives still might live in the residence that the offender has left, so he or she is likely to visit the area on a regular basis. More generally, this research was based only on recorded crime locations and recorded home locations of the offenders. Without any doubt, the prediction of where offenders commit crime could be improved greatly if, in addition, we could know the locations of their schools, workplaces, friends' homes, favorite restaurants, hangout places, and other anchor points.

More complete accounts of the activity patterns of individuals can be obtained through the study of the space–time budget (Wikström et al., 2010; Wikström and Sampson, 2003). In these studies, subjects are asked about their activities in terms of what they were doing, when they were doing it, at what type of place and at what geographic location they were doing it, and with whom. Especially in prospective longitudinal research, the collection of space–time budget data allows the analyst to develop an empirical estimate of the changing activity space of an individual that is much more refined than the sequence of residential addresses used in the research reported here. For example, it likely will identify other major activity nodes of the individual and register activity space pattern changes

414   BERNASCO

throughout time. With this information at hand, we someday might find that sentimental journeys to crime not only lead to former homes but also to former schools, former workplaces, and other former anchor points that have remained present in the offender's awareness space.

REFERENCES

Ben-Akiva, Moshe, and Michel Bierlaire. 1999. Discrete choice methods and their applications to short term travel decisions. In *Handbook of Transportation Science*, ed. Randolph W. Hall. Norwell, MA: Kluwer.

Bernasco, Wim. 2006. Co-offending and the choice of target areas in burglary. *Journal of Investigative Psychology and Offender Profiling* 3:139–55.

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, 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.

Blokland, Arjan A. J., and Paul Nieuwbeerta. 2005. The effects of life circumstances on longitudinal trajectories of offending. *Criminology* 43:1203–40.

Brantingham, Paul J., and Patricia L. Brantingham. 2008. Crime pattern theory. In *Environmental Criminology and Crime Analysis*, eds. Richard Wortley and Lorraine Mazerolle. Devon, U.K.: Willan.

Clare, Joe, 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* 42:139–58.

Curman, Andrea Suzanne. 2004. Spatial-statistical analysis of arson activity in the Greater Vancouver region of British Columbia. Masters Thesis. School of Criminology, Simon Fraser University, Vancouver, Canada.

Dugan, Laura. 1999. The effect of criminal victimization on a household's moving decision. *Criminology* 37:903–30.

Gärling, Tommy, and Kay Axhausen. 2003. Introduction: Habitual travel choice. *Transportation* 30:1–11.

A SENTIMENTAL JOURNEY TO CRIME   415

Golledge, Reginald G., and Robert J. Stimson. 1997. *Spatial Behavior*. New York: The Guilford Press.

Hägerstrand, Torsten. 1970. What about people in regional science? *Papers of the Regional Science Association* 24:7–21.

Hanson, Susan, and O. James Huff. 1988. Systematic variability in repetitious travel. *Transportation* 15:111–35.

Harries, Keith, and James LeBeau. 2007. Issues in the geographic profiling of crime: Review and commentary. *Police Practice and Research* 8:321–33.

Horton, Frank E., and David R. Reynolds. 1971. Effects of urban spatial structure on individual behavior. *Economic Geography* 47:36–48.

Mannering, Fred, Elaine Murakami, and Soon-Gwan Kim. 1994. Temporal stability of travelers' activity choice and home-stay duration: Some empirical evidence. *Transportation* 21:371–92.

McFadden, Daniel. 1973. Conditional logit analysis of qualitative choice behavior. In *Frontiers in Econometrics*, ed. Paul Zarembka. New York: Academic Press.

Nieuwbeerta, Paul, Patricia L. McCall, Henk Elffers, and Karin Wittebrood. 2008. Neighborhood characteristics and individual homicide risks: Effects of social cohesion, confidence in the police, and socioeconomic disadvantage. *Homicide Studies* 12:90–116.

Paulsen, Derek. 2007. Improving geographic profiling through commuter/marauder prediction. *Police Practice and Research* 8:347–57.

Ratcliffe, Jerry H. 2006. A temporal constraint theory to explain opportunity-based spatial offending patterns. *Journal of Research in Crime and Delinquency* 43:261–91.

Rossmo, D. Kim. 2000. *Geographic Profiling*. Boca Raton, FL: CRC Press.

Rossmo, D. Kim, Anne Davies, and Mark Patrick. 2004. *Exploring the Geo-demographic and Distance Relationships Between Stranger Rapists and Their Offences*. London, U.K.: Research, Development and Statistics Directorate, Home Office.

Sampson, Robert J., Stephen W. Raudenbush, and Felton Earls. 1997. Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science* 277:918–24.

416   BERNASCO

Schlich, Robert, Stefan Schönfelder, Susan Hanson, and Kay W. Axhausen. 2004. Structures of leisure travel: Temporal and spatial variability. *Transport Reviews* 24:219–37.

Song, Chaoming, Zehui Qu, Nicholas Blumm, and Albert-Laszlo Barabasi. 2010. Limits of predictability in human mobility. *Science* 327:1018–21.

Tittle, Charles R., and Raymond Paternoster. 1988. Geographic mobility and criminal behavior. *Journal of Research in Crime and Delinquency* 25:301–43.

Wikström, Per-Olof, Vania Ceccato, Beth Hardie, and Kyle Treiber. Activity fields and the dynamics of crime. *Journal of Quantitative Criminology* 26:55–87.

Wikström, Per-Olof H., and Robert J. Sampson. 2003. Social mechanisms of community influences on crime and pathways in criminality. In *Causes of Conduct Disorder and Juvenile Delinquency*, eds. Benjamin B. Lahey, Terrie E. Moffitt, and Avshalom Caspi. New York: Guilford Press.

Wiles, Paul, and Andrew Costello. 2000. *The "Road to Nowhere": The Evidence for Traveling Criminals*. London, U.K.: Home Office, Research, Development and Statistics Directorate.

Wilsem, Johan van, Karin Wittebrood, and Nan Dirk de Graaf. 2006. Socioeconomic dynamics of neighborhoods and the risk of crime victimization: A multilevel study of improving, declining, and stable areas in the Netherlands. *Social Problems* 53:226–47.

Xie, Min, and David McDowall. 2008a. The effects of residential turnover on household victimization. *Criminology* 46:539–75.

Xie, Min, and David McDowall. 2008b. Escaping crime: The effects of direct and indirect victimization on moving. *Criminology* 46:809–40.

Wim Bernasco is a senior researcher at the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR). His current research includes studies of criminal target choice, crime displacement, geographic offender profiling, and repeat and near-repeat victimization.