Individual Differences in Distance Travelled by Serial Burglars

BRENT SNOOK*

Department of Psychology, University of New Brunswick, Saint John, Canada

Abstract

This paper uses police data on a sample of 41 serial burglars committed in the city of St John's, Canada and surrounding areas, to examine individual differences in distances travelled. In accord with findings from studies in other locations, results show that serial burglary is a localised activity. Differences between serial burglars in distances they travel are related to the burglars' age, method of transportation and value of property stolen. These results are discussed in terms of existing explanations of distances that serial burglars travel to select targets and implications for police decision-making. Copyright © 2004 John Wiley & Sons, Ltd.

Key words: journey-to-crime; serial burglary; individual differences; geographic profiling

INTRODUCTION

Research on offender spatial behaviour has typically shown that offenders do not travel *far* from home to offend (Boggs, 1965; Erlanson, 1946; Georges-Abeyie & Harries, 1980; White, 1932). Some research has also shown that there are consistent differences between criminals in the distance they travel (Baldwin & Bottoms, 1976; Nichols, 1980; Phillips, 1980). Such regularities of offender spatial behaviour is of particular relevance to research on the decision strategies that are used to predict the home location of serial offenders (e.g. Canter, Coffey, Huntley & Missen, 2000; House, 1997; Rossmo, 2000; Snook, Taylor & Bennell, in press). Indeed, the accuracy of these strategies depends upon consistent trends in offenders' journey to crime. The present study therefore seeks to determine if the reported regularities are also obtained for a sample of serial burglars in St John's, Newfoundland, and if the differences between offenders' journey to crime distances carry any implications for geographic profiling strategies or the more general understanding of criminal spatial behaviour.

*Correspondence to: Brent Snook, Department of Psychology, The University of New Brunswick, St John, P.O. Box 5050, Canada, E2L 4L5. E-mail: bsnook@unbsj.ca

INDIVIDUAL DIFFERENCES AND DISTANCE TRAVELLED

A variety of characteristics of offenders have been proposed, or found, to relate to differences in the distances they cover when carrying out crimes.

Age differences

The most consistent finding from studies of the relationship between age and distance travelled has been that younger offenders select targets that are located closer to their home than older ones. This finding has been demonstrated in different countries such as Canada (Gabor & Gottheil, 1984), England (Baldwin & Bottoms 1976; Costello & Wiles, 2001), the Netherlands (Van Koppen & Jansen, 1998), and the United States (Nichols, 1980; Repetto, 1974; Warren *et al*., 1998), and for different types of crime such as burglary (Baldwin & Bottoms, 1976; Costello & Wiles, 2001; Gabor & Gottheil, 1984), rape (Canter & Larkin, 1993; Warren *et al*., 1998), arson (Fritzon, 1998), robbery (Van Koppen & Jansen, 1998) and murder (Bullock, 1955). Although there do not appear to be any conclusive answers as to why age differences in criminal mobility exist, it appears that age summarises a wide range of aspects related to differences in criminal spatial development such as the size of their cognitive maps, levels of restriction on mobility (e.g. the amount of parental control), and access to the resources (e.g. vehicle) that are all needed to travel large distances (Brantingham & Brantingham, 1981; Costello & Wiles, 2001).

Differences in experiencez

One aspect which is likely to relate to age, but is worthy of consideration in its own right is the experience the individual has as a criminal. Such criminal experience can be assessed in a number of ways such as the number of previous convictions, number of crimes in a series and/or duration of a series. Research and popular anecdotes suggests that there should be a positive relationship between criminal experience and distance travelled (Canter, 1994; Rossmo, 2000). For example, Baldwin and Bottoms (1976) showed that the average journey-to-crime for criminals with previous convictions were longer than for those without them. In a study of offenders in Ottawa, Gabor and Gottheil (1984) also showed that criminals with a previous arrest history were substantially more likely to travel larger distances than were those not possessing such a record.

Several studies have explored the notion that an offender's first crime location is a psychologically important anchor point that allows offenders to gain familiarity and develop the confidence to move outward in search of targets. Some studies have supported this premise by showing that serial offenders live closer to their first crime than subsequent offences (Canter & Larkin, 1993; Warren, Reboussin, & Hazelwood, 1995). For example, Rossmo's (2000) reported that the first murder was committed closest to a serial murderer's home in 41% of the cases he examined. However, other research has not found evidence for this principle. For example, Warren *et al*. (1998) showed that the first rape in a series was committed closest to home in only 18% of the 108 cases they examined. In the UK, Davies and Dale (1995) showed no significant difference in journey-to-first and journey-to-last crime. Van Koppen and Jansen (1998) also showed that 15% of robbers in the Netherlands selected targets that were located roughly the same distance from home as that of the first target, with 42% being closer and 43% of first crimes being further away from home.

Although empirical research is lacking, there is some anecdotal evidence that implies that there should be a positive relationship between duration of a series of crimes and dis-

tance travelled. For example, Canter's (1994) account of the *Railway Rapist* showed that the offender started committing rapes in his neighbourhood and then began to travel further from his home as the series developed over a 6-year period. Similarly, Rossmo (2000) provides a story about a map found in David Berkowitz's apartment and how it suggested to the police that the serial killer was planning to increase his criminal activity space. Although these cases may not be representative of all crimes they do raise the issue of whether series duration, as one index of criminal experience, relates to criminals' travel decisions.

Another potential indicator of criminal experience is the number of crimes committed in a series. As criminals commit an increasing number of crimes, they presumably gain experience and awareness of an area. Such increasing awareness may result in targets being sought further from home than when there is less experience and environmental awareness. Of course, there is also a counter argument that repeated success may lead an offender to travel back to the same location if successful and/or comfortable offending in a particular area. Although no tests of this relationship exist, it remains an important question to explore.

Group offending

Differences in distances travelled to offend may also be subject to group effects. For instance, it might be hypothesised that two or more offenders are more likely to have a combined awareness space that is larger than a single offender, and that this difference would be reflected in the co-offending team travelling further to offend than a lone offender (i.e. having a larger activity space). However research to date has not supported this hypothesis (Baldwin & Bottoms, 1976; Costello & Wiles, 2001; Gabor & Gottheil, 1984; Van Koppen & Jansen, 1998).

Economic differences

Studies have found that the amount of monetary reward from criminal activity is positively related to the distance travelled (Capone & Nichols, 1975; Pyle, 1974; Repetto, 1974). For instance, Baldwin and Bottoms (1976) showed that offenders that travelled further distances obtained larger rewards. Specifically, the largest difference in distance was found between those stealing less than £100 and those stealing more than £100. They also found that property robberies with higher payoffs were committed further from home than crimes where lower valued items were taken. Similarly, Gabor and Gottheil (1984) showed that offenders who stole more than $200 travelled further to offend than those who stole less than that amount. These empirical findings suggest that offenders are willing to extend the costs associated with traversing larger distances to obtain larger gains.

Method of transportation

Whether or not an offender has access to a vehicle is also likely to be related to an offender's journey-to-crime. The only published study found (Van Koppen & Jansen, 1998) shows that offenders (i.e. robbers) who use vehicles tend to select targets that are located further from their home than those offenders that use other methods of transportation. Although it seems obvious that offenders who use a vehicle to commit crimes will travel further to offend, it is important to study because it reflects differences in criminals' ability to gain access to the resources needed to travel further distances.

Target selection choices

No published studies could be found that examined the difference in offender spatial mobility in relation to the type of target chosen. There seems to be no literature on any difference in travel behaviour between burglars that target commercial and those that decide to break and enter another person's home. One hypothesis is that the differences may be more a function of the land use in the area in which the offender lives than any personal characteristics. For example, an offender that is determined to commit a burglary against a commercial target, and lives near the commercial sector in the city, will likely not have to travel far to find a suitable target. Similarly, an offender that lives in the commercial sector of a city but wishes to commit a residential burglary may have to travel some distance before finding a suitable target. This is an important hypothesis to test to determine if the decision to offend against a particular type of target influences the travel distance.

THE CURRENT STUDY

The current study tests eight hypotheses derived from the existing literature. Where the data allows, both quasi-experimental (*Ha*) and correlational (*Hb*) hypotheses are stated:

H1a: Younger serial burglars will select targets closer to home than comparatively older burglars.

H1b: There will be a positive relationship between age and journey to crime.

H2a: Serial burglars with previous convictions will travel further to offend than those without them.

H2b: There will be a positive relationship between the number of previous convictions and journey to crime.

H3:   The distance travelled to the first crime will be significantly shorter than the distance travelled to other crimes in that series.

H4a: Serial burglars that have 'longer' series will travel further to offend than those that have 'shorter' series.

H4b: There will be a positive relationship between the length of a series and the journey to crime.

H5a: Burglars that have committed 'many' burglaries will live further from their crimes than those that have committed 'few' burglaries.

H5b: There will be a positive relationship between the number of previous crimes committed and journey to crime.

H6:   Burglars who have co-offenders will travel further to offend than lone burglars.

H7a: There will be differences in the distance travelled between those that steal 'high' and 'low' values of property.

H7b: There will be a positive relationship between the value of the property stolen and the journey to crime.

H8a: Serial burglars who use private vehicles will travel further to offend than those that use other methods of transportation.

H8b: There will be a relationship between method of transportation and the journey to crime.

THE STUDY AREA

Data on a sample of serial burglars was collected from the Royal Newfoundland Constabulary (RNC). The burglaries were was committed in The City of St John's and the 12 surrounding areas. The City of St John's covers a land size of 446.04 km^2 and has a population of 99 182 in 42 500 private households, and a population density of 222 people per km^2. The second most populated city in the St John's metropolitan area is Mount Pearl, which has an estimated population of 25 000 covering a land size of 15.74 km^2. The remaining communities (Bauline, Bay Bulls, Conception Bay South, Flatrock, Logy Bay-Middle Cove-Outer Cove, Paradise, Petty Harbour-Maddox Cove, Portugal Cove-St Phillips, Pouch Cove Torbay, and Witless Bay) in the metropolitan area cover a land size of 340 km^2 and are populated by roughly 50 000 inhabitants.

METHODS

Data collection and analysis

Provincial court records, available to the general public, were accessed to identify burglars that were arrested and went to trial. The resulting list, which contained all individuals that appeared in court for burglary from 1989 to 1999, was used to obtain corresponding police files.

RNC data on criminals are stored as paper files and located in the central record section of their headquarters. Police files generally contained a standard court brief that contained basic information on the type of crime, the offender's name, date of birth, home address, crime address and some particulars of the offence. Also contained in a typical police file were transcripts of interviews with the offenders', criminal record checks and a judicial decision report. The file sometimes contained an incident form, which is a checklist of 18 items relating to the environmental aspects of the offence. An example of an option on the checklist included 'street address', 'type of street', with sub-options for 'dead-end', 'side', 'thoroughfare' and 'other'. A standard file also contained a written account of the crime by the arresting officer(s).

All the extracted files were checked for relevant information. Files with sufficient information were recorded in a standard spreadsheet to identify those instances where an offender emerged multiple times. Only files that appeared to contain sufficient information and were part of a series were kept for coding. After the police files were made anonymous, the relevant information was entered in an MS Excel spreadsheet. Eighty-one per cent of the extracted burglaries were committed in the city of St John's, 6.9% in Mt Pearl, 6.4% in Paradise, 2% in St Phillips, 1.5% in Torbay, 1% in Portugal Cove, and 0.5% in Bauline and Logy Bay-Middle Cove-Outer Cove.

To obtain coordinates for crime and home addresses located in St John's, the MapInfo Geographic Information System (GIS) was used. Standard paper maps were used to identify and plot the home and crime locations that were located in the surrounding areas. Cases where the location could not be found (i.e. offence locations were not recorded in police files and no mapping technique was available to turn the home and burglary addresses into quantitative form) were deleted. The co-ordinates of each of the home and crime locations were then analysed using a computer program developed to measure the distance between all locations.

The sample

An initial sample of 51 burglary series between 1989 and 1999 was collected. This sample included 149 offenders responsible for 263 burglaries. Two adjustments, however, had to be made to the data. First, it was discovered that some burglars committed several burglaries with different offenders. Rather than attribute each burglar to all burglaries in the series (after only being involved in one crime), only the burglar(s) involved in all the burglaries in a series were included in the final sample. For example, if a burglar committed three burglaries, each with a different accomplice then only that burglar's home address was included in the sample. Second, some of the burglars had multiple homes. Since the police files did not indicate which home the burglar was residing at during a particular burglary in the series, it was not possible to calculate the distance between the crime and the home location that the offender was living in at the time of the burglary. Rather than eliminate the burglar from the study, each home was treated as a separate case. For example, a burglar who committed five crimes and had two homes would have two burglary series in the sample (i.e. one for each home). Although this approach may distort the results to some extent, in terms of application to police investigations, the crucial point is to gain assistance in locating an offender's home.

Since 38 of the burglars had one home, 10 had two homes, one had three homes and two burglars had four homes, the final sample consisted of 41 series committed by 51 burglars (i.e. 69 home locations) totalling 347 burglaries.

RESULTS

All burglars, with the exception of one, were male. The average age of the burglars at the time of the first offence was 20.4 years (SD = 5.3 years, range: 13–36 years) and 22.1 years (SD = 5.7 years, range: 13–39 years) at the time of the last burglary in their series. Roughly 73% had previous convictions. The most frequent number of burglaries in a series was four, with 32 (78%) of the 41 series consisting of five burglaries or less. The median number of days that a series lasted was 355 (M = 597.93 days, SD = 663 days). There were 155 (76%) residential, 45 (22%) commercial (e.g. gas stations and pharmacies) and five (2%) public burglaries (e.g. schools or public sheds). Information on the method of transportation used to commit the offences was only available in about 40% of cases. A total of 142 (41%) of the 347 police files contained information on the method of transportation used in the commission of the crime. Of those, 85 (60%) of the serial burglars walked, 47 (33%) used a private vehicle, three (2%) used a bicycle, two (1.4%) used an all terrain vehicle, and five (3.5%) walked/rode a bicycle. The value of property stolen ranged from $0 to $12 950. Including the cases where there was nothing stolen or no value provided, a median a value of $80 (M = 882.99, SD = 1663.79) was estimated to have been stolen from the victims. Excluding those cases where nothing was stolen or $0 was reported stolen, the median value of property stolen was $900 (M = 1674.31, SD = 1982.51).

The journey to burglary

The median distance that serial burglars selected targets from their homes was 1.7 km (M = 2.7 km, SD = 3.1 km). Figure 1 shows that there are many more short distances that long
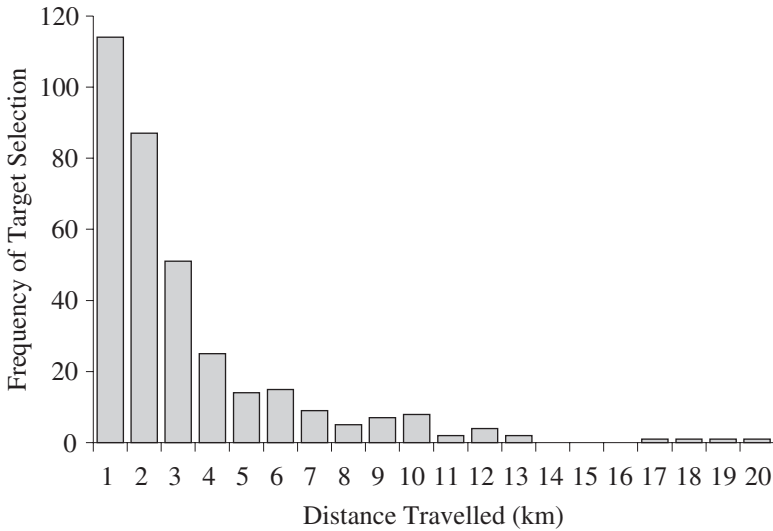
Figure 1. Relationship between the distance travelled and frequency of target selection.

ones. More specifically, 114 (33%) of the targets were selected less than 1 km from the burglars' homes and a total of 87 targets were selected between 1 and 2 km from the burglars' home. Fifty-one of the targets that were selected were located between 2 and 3 km from the burglars' homes. Moreover, 291 (84%) of the selected targets were selected within the first quartile of distances (i.e. 0–5 km) from burglars' homes, 44 (13%) between 5 and 10 km and 12 (3%) targets were selected further than 10 km from burglar's homes.

Table 1 contains the descriptive statistics of the distance travelled in relation to individual differences. Both quasi-experimental (aggregate) and correlational (individual-level) results are discussed in subsequent sections.

Age differences

Table 1 contains data on the distance travelled in relation to age. The burglars were arbitrarily divided according to whether they were younger than or older than 20 years of age at the time of the first and the last burglary. Results show that older burglars travel, on average, about 1.2 km further to select targets than their younger counterparts. A Mann-Whitney U-test revealed a significant difference [U = 378, $N = 69$, $p < 0.05$ (two-tailed)] between younger and older serial burglars at the time of the first burglary. In contrast, no statistically significant difference was found in the distance travelled to the last burglary [U = 472, $N = 69$, $p > 0.05$ (two-tailed)] between younger and older burglars when the sample was divided according to the age at time of last burglary.

A Kendall's Tau correlation revealed that there was no significant relationship between age at the time of the first burglary and distance travelled to the first burglary ($N = 69$, $\tau = 0.164$, $p > 0.025$ (one-tailed)). Burglars that were 15 years old or younger tended, on average, to select targets that were located less than 1 km away from their home. In contrast, burglars older than 30 years of age selected targets that were located, on average, further than 2 km from their home; the correlation was non-significant [$N = 69$, $\tau = 0.147$, $p > 0.025$ (one-tailed)].

Table 1. Descriptive statistics for individual differences in the journey-to-crime (km)

Individual differences	*N*	Mdn	M	SD
Age at first burglary				
≤20 years	46[a]	1.8	2.0	1.8
>20 years	23	3.0	3.8	3.8
Age at last burglary				
≤20 years	25[a]	1.3	1.9	1.5
>20 years	44	1.7	2.8	1.7
Previous convictions				
Yes	55[a]	1.7	2.3	1.6
No	10	1.7	3.3	3.5
Sequence				
First burglary	62[a]	2.0	2.7	2.8
Second burglary	62	1.7	2.2	2.1
Third burglary	62	1.9	3.2	3.5
Series duration				
≤1 year	35[a]	1.7	2.7	2.3
>1 year	34	1.8	2.5	1.5
Number of burglaries				
≤4	41[a]	1.9	2.3	1.3
>4	28	1.5	2.7	2.6
Joint-offended				
Yes	26[a]	1.9	2.4	1.4
No	43	1.7	2.5	2.2
Value of property stolen				
$1–$500	49[a]	1.0	1.9	2.3
$500–$1000	47	1.6	3.4	4.0
More than $1000	87	2.1	3.5	3.7
Method of transportation				
Walked	85[b]	1.2	1.9	1.9
Vehicle	47	5.5	6.3	5.0
Bicycle	3	2.7	2.6	0.3
Other	2	4.6	4.6	0.2
Walk and bike	5	3.2	2.6	0.7
Type of target				
Residential	253[b]	1.7	2.9	3.5
Commercial	82	1.8	2.1	1.6
Public	12	0.9	1.4	0.8

[a]Calculations based on distances from 69 home locations.
[b]Calculation carried out for the 347 distances.

Differences in experience

Previous convictions

Examining the relationship between the number of previous convictions and the journey-to-crime shows that both those with and without previous convictions tend to travel around 1.7 km to select targets. A Mann-Whitney U-test revealed that there was no significant difference in the median journey [U = 253, *N* = 65, *p* > 0.05 (two-tailed)] between burglars with and without previous convictions, suggesting that the distance travelled by serial burglars in this sample is not related to criminal experiences as assessed here.

A correlation also indicates that the distance travelled to offend is not related to the degree of criminal antecedents. The value of the Spearman's Rho correlation was 0.179, which is not statistically significant at the 2.5% level (one-tailed) with a sample of 55 burglars.

Sequential order

The notion that the first burglary location is likely to be psychologically meaningful and hence be located closer to the burglars' homes than subsequent offences was assessed using the first three burglaries. Using the 62 serial burglars that committed at least three burglaries, it was found that the first target was located closest to home in 39% of the cases, the second target was closest in 40% of the cases and the third target was closest to home in only 26% of the cases. A Friedman test for three related samples did not reveal any significant temporal pattern ($\chi^2 = 1.419$, df = 2, $p > 0.025$ (one-tailed)). The results from the test revealed that the first burglary location was not located significantly closer to offenders' homes than subsequent burglary locations, thus, suggesting that burglars do not use the first offence as an anchor in which to move outward to commit other crimes.

Series duration

Using the median series duration to split the sample, it can be seen that the distance travelled by burglars whose series last longer than one year is very similar to those series that occur within one year. Indeed, no significant difference was found [U = 568.5, $N = 69$, $p > 0.05$] between the distance that serial burglars travel if their series lasts less than or longer than one year. A Kendall's Tau correlation also suggests that there is non-significant relationship [$N = 69$, $\tau = 0.003$, $p > 0.025$ (one-tailed)].

Number of crimes

The median number of crimes (four; see Table 1) was used to divide the sample. Although the median distance travelled was 0.4 km between the two groups, it was found that the median journey-to-crime was not significantly smaller [U = 486.5, $N = 69$, $p > 0.05$ (two-tailed)] for serial burglars with less than four burglaries and those with more than four burglaries in a series. Further correlational analysis confirmed that there was no significant relationship between the number of crimes in a series and the median journey-to-crime for that series [$N = 69$, $\tau = 0.087$, $p > 0.025$ (one-tailed)].

Group offending

Results contained in Table 1 indicate that burglars offending alone travelled slightly less, on average, to select targets than those offending in groups (i.e. two or more burglars). A Mann-Whitney U-test of the difference in distance travelled by lone and groups of burglars did not reveal any significant difference [U = 519, $N = 69$, $p > 0.05$ (two-tailed)]. Similarly, the correlational analysis also did not reveal any significant relationship as the Kendall's Tau correlation coefficient was 0.049, which is not statistically significant at the 2.5% level (one-tailed) for a sample of 69 burglars.

Economic differences

To conduct the quasi-experimental analysis of the distance that burglars travelled in relation to the value of property stolen, the three categories of 'less than $500', 'between $500

and $1000' and 'more than $1000' stolen were arbitrarily chosen. Results show that the journey-to-crime for the 87 burglaries where more than $1000 was stolen were located roughly 1 km further than for the 49 burglaries where less than $500 was stolen, and 0.5 km further for the 47 burglaries where between $500 and $1000 was stolen. A Kruskal-Wallis test revealed that there was a significant difference in the distance travelled ($\chi^2 =$ 9.474, df = 2, $p < 0.025$) in relation to the value of property stolen, thus, suggesting that serial burglars who travelled further to offend obtained greater rewards.

A correlational analysis also found that as the value of the stolen property increases with increasing distance travelled. The Spearman's Rho correlation coefficient was 0.251, which was significant at the 2.5% level (one-tailed) for a sample of 183, suggesting that burglars that travelled further to offend had a larger total value of stolen property than those that remained close to their homes.

Method of transportation

Results in Table 1 suggest that there is a difference in distance travelled in relation to the method of transportation used. Unsurprisingly, results show that burglars that use a vehicle travel, on average, 4.3 km further than those that walk and 2.8 km further than those that use a bicycle. Results also show that there is greater range in the distance travelled between those burglars that walk and those that use a private vehicle. The range of operation for burglars that walk (0–8 km) is smaller than the serial burglars that use a private vehicle (0–20 km). A Kruskal-Wallis test confirmed that a significant difference in the distance that serial burglars travelled depending upon their choice of transportation [$\chi^2 = 35.74$, df = 4, $p < 0.025$ (one-tailed)].

Further correlation analysis revealed a significant relationship between the journey-to-crime and the method of transportation. The Kendall's Tau correlation coefficient was 0.369, which was significant at the 2.5% level (one-tailed) for a sample of 142. The current results indicate that the method of transportation is related to variations in the distance that serial burglars travel to select targets, such that those using private vehicles tend to select targets that are further from home than those that walk, ride a bicycle, or use other methods of transportation.

Target selection choice

Results show that residential burglars have a broader range of operation than burglars who select public (sheds, schools) or commercial targets, yet the median distances travelled were very similar. A Kruskal-Wallis test revealed that there was no significant difference in distance travelled [$\chi^2 = 1.409$, df = 2, $p > 0.025$ (one-tailed)] between burglars that choose residential, commercial or public targets. This finding suggests that serial burglars are travelling similar sorts of distances regardless of whether they choose to target someone's home, shed, or business.

Individual-level analysis also indicates that there is no relationship between the journey-to-crime and the type of target selected. The Kendalls' Tau correlation coefficient was −0.019, which is not statistically significant at the 2.5% level (one-tailed) with a sample size of 347. This finding indicates that the choice of target does not relate to differences in the distance that serial burglars travel to offend.

DISCUSSION

This paper examined individual differences in distance travelled by serial burglars. Results suggest that serial burglary in St John's and surrounding areas is a localised type of activity and variations in the distance travelled by serial burglars was significantly related to the burglar's age, method of transportation and value of property stolen. These finding suggest that there are two broad types of offenders: older burglars with access to a vehicle who travel away from their home to select targets that will result in a quantity of material of high value, and younger serial burglars that break into homes in their neighbourhood to obtain smaller rewards. However more detailed multivariate analysis, requiring larger data sets than that available here would be needed to test the prevalence of these two types.

As in much earlier research, younger serial burglars were found to select targets that were located closer to home than comparatively older offenders (Baldwin & Bottoms, 1976; Costello & Wiles, 2001; Gabor & Gottheil, 1984). This finding suggests that younger serial burglars might have more limited cognitive maps. Further, as Canter and Larkin (1993) pointed out, age also relates to access to other resources such as a vehicle and a driver's licence. Another potential reason for the variation is that young offenders will have less cognitive familiarity with a larger area of a city and will have less freedom to move about, which will cause them to be more restricted than their older counterparts.

The second individual difference in serial burglars' spatial behaviour was the method of transportation. Serial burglars that had access to a vehicle tended to travel further than those that walked or rode a bicycle. Related to this is the finding that all of the serial burglars older than 31 years of age used a vehicle during the commission of their crimes, which resulted in them selecting targets that were located further away from where they lived than those that did not have access to a vehicle. The fact that the younger burglars were not old enough to drive or even have access to a vehicle seems to play a major role in where they decided to select targets. It is important to note that there were two series that made up a large portion of incidents involving the use of a vehicle and that a subset of offenders that used a vehicle did not travel far from home to offend, at least not farther than burglars that walk.

The fact that the value of the property stolen was significantly related to distance travelled suggests that these offenders have access to the resources that are needed to travel. The finding suggests that the higher value of property stolen means that there is more material to remove which equal the need to use a vehicle and to be older (i.e. older than 17 years to have a driving licence). This is certainly likely to be the case if burglars are stealing large televisions or other large appliances. Once again, more detailed study of cases than was possible with the data here would be needed to test this possibility thoroughly.

Although there were a number of individual differences that were not related to serial burglars spatial behaviour, they still have important applied implications for investigations. For instance, the prediction that burglars with more previous criminal convictions would tend to be more experienced and would select targets that were located further away from home than those without or with less criminal antecedents was not supported. Somewhat surprising was that both burglars with and without criminal histories selected targets over similar range of distances from their homes. For those with previous convictions there was no influence in the degree of previous history on their travel distances. In other words, very criminally experienced burglars did not select targets that were located far from their home when compared with those that have not had previous contact with law enforce-

ment. This may be a function of the layout and patterns of land use in Newfoundland. Future comparative research across different types of area is needed to unravel these possibilities.

The finding that neither the first, second or third targets were located closer to serial burglars' homes than other crimes raises questions about the generality of the psychological significance of the early offences in a series and about the impact of police data collection on the sorts of results obtained in such studies. Canter and Larkin (1993), for example, were dealing with serial rape where most of the crimes in the series are likely to have been identified. In the present study, however, the police recorded 'first' target might actually be the 10th or 100th burglary. Alternatively, as many of the serial burglars were found to have previous convictions, the 'first' offence that a serial burglar commits may not be the first ever offence.

It was found that serial residential and commercial burglars in the St John's metropolitan area selected targets distances that were not significantly different form one another. One explanation for this non-significant finding is that many of the serial burglars lived in the downtown section where the distance to locate residential and commercial targets is similar.

Turning to the influence of co-offending, it was discovered that burglaries that involved more than one burglar did not result in targets being selected further from their homes than those that offend alone. This finding might be due to the fact that many co-burglars live quite close and share similar cognitive maps. Agreement upon the likely locations to offend, particularly in the older residential part of the city near the downtown, by burglars living or hanging out in the same neighbourhood would likely explain this finding. However, if joint-burglars live further apart they might be drawing upon two cognitive maps that would tend to be larger than a lone individual, thus, they might have some common meeting point that would draw them further from their local neighbourhood. Future study therefore needs to look closely at the proximity of co-offenders' residences and the impact of that distance on their decision to travel.

Conclusions

Difference in distance travelled by serial burglars has implications for strategies used to assist police decision-making, such as *geographic profiling* (Canter & Gregory, 1994; House, 1997; Rossmo, 2000). These strategies have been used mainly for investigations into very serious crimes such as rape and murder. The present research has considered the more frequent crime of burglary. However, these geographic profiling strategies typically rely on the assumption that offenders live within their activity space. This study has not explored that assumption directly but support for the finding that offenders do not travel very far to commit their crimes lends weight to the possibility that the 'volume' crime of burglary may also be amenable to the same type of decision strategies. However, the current results also indicate that geographic profiles should take account of the individual differences in distances travelled.

REFERENCES

Baldwin, J., & Bottoms, A. E. (1976). *The urban criminal: a study in Sheffield*. London: Tavistock Publications.

Boggs, S. (1965). Urban crime patterns. *American Sociological Review*, *30*, 899–908.

Brantingham, P. J., & Brantingham, P. (1981). *Environmental criminology*. Beverly Hills: Sage.

Bullock, H. A. (1955). Urban homicide in theory and fact. *Journal of Criminal Law, Criminology and Police Science*, *45*, 565–575.

Canter, D. (1994). *Criminal shadows.* London: Harper Collins.

Canter, D., & Larkin, P. (1993). The environmental range of serial rapist. *The Journal of Environmental Psychology*, *13*, 63–69.

Canter, D., & Gregory, A. (1994). Identifying the residential location of rapists. *Journal of the Forensic Science Society*, *34*, 164–175.

Canter, D. V., Coffey, T., Huntley, M., & Missen, C. (2000). Predicting serial killers' home base using a decision support system. *Journal of Quantitative Criminology*, *16*, 457–478.

Capone, D. L., & Nichols, W. W, Jr. (1975). An analysis of offender behavior. *Proceedings of the American Geographer*, *7*, 45–49.

Costello, A., & Wiles, P. (2001). GIS and the journey to crime: An analysis of patterns in South Yorkshire. In A. Hirschfield, & K. Bowers (Eds.), *Mapping and analysing crime data: lessons from research and practice* (pp. 27–60). London: Taylor and Francis.

Davies, A., & Dale, A. (1995). *Locating the stranger rapists*. London: Police Research Group.

Erlanson, O. (1946). The scene of a sex offence as related to the residence of the offender. *American Journal of Police Science*, *31*, 338–342.

Fritzon, K. (1998). *Differentiating arsonists: an action systems model of malicious fire setting*. Unpublished Doctoral Thesis, University of Liverpool, Liverpool, UK.

Gabor, T., & Gottheil, E. (1984). Offender characteristics and spatial mobility: an empirical study and some policy implications. *Canadian Journal of Criminology*, *26*, 267–281.

Georges-Abeyie, D. E., & Harries, K. D. (1980). *Crime: A spatial perspective*. New York: Columbia University Press.

House, J. C. (1997). Towards a practical application of offender profiling: the RNC's criminal suspect prioritization system. In J. L. Jackson, & D. A. Bekerian (Eds.), *Offender profiling theory, research and practice*. Chichester: John Wiley and Sons Ltd.

Nichols, W. W. Jr. (1980). Mental maps, social characteristics and crime mobility. In D. E. Georges-Abeyie, & K. D. Harries (Eds.), *Crime: a spatial perspective* (pp. 156–165). New York: Columbia University Press.

Phillips, P. D. (1980). Characteristics and typology of the journey to crime. In D. E. Georges-Abeyie, & K. D. Harries (Eds.), *Crime: a spatial perspective* (pp. 167–179). New York: Columbia University Press.

Pyle, G. F. (1974). *The spatial dynamics of crime*. (Research Paper No. 159). Chicago: Department of Geography, University of Chicago.

Repetto, T. A. (1974). *Residential crime*. Cambridge, MA: Ballinger.

Rossmo, K. D. (2000). *Geographic profiling*. Boca Raton, FL: CRC Press.

Snook, B., Taylor, P. J., & Bennell, C. (in press). Geographic profiling: the fast, frugal and accurate way. *Applied Cognitive Psychology*.

Van Koppen, P. J., & Jansen, W. J. (1998). The road to robbery: travel patterns in commercial robberies. *British Journal of Criminology*, *38*, 230–247.

Warren, J., Reboussin, R., & Hazelwood, R. R. (1995). *The geographic and temporal sequencing of serial rape*. Final report submitted to the National Institute of Justice, July 15.

Warren, J., Reboussin, R., Hazelwood, R., Cummings, A., Gibbs, N., & Trumbetta, S. (1998). Crime scene and distance correlates of serial rape. *Journal of Quantitative Criminology*, *14*, 35–59.
White, C. R. (1932). The relation of felonies to environmental factors in Indianapolis. *Social Forces*, *10*, 498–509.