Do Social Barriers Affect Urban Crime Trips?

The Effects of Ethnic and Economic Neighbourhood Compositions on the Flow of Crime in The Hague, The Netherlands

DANIELLE REYNALD, MARGIT AVERDIJK, HENK ELFFERS and WIM BERNASCO

Using data on all cleared crimes in the city of The Hague, The Netherlands, in the period 1996–2004, we study the flow of crime between the ninety-four neighbourhoods of the city, i.e. the flows from the neighbourhoods where offenders live into the neighbourhoods where they commit their offences. The results show that in addition to physical distance, ethnic and economic differences between neighbourhoods ('social barriers') also significantly limit the flow of crime between them.

Theoretical Background

In *The Bonfire of the Vanities* (Wolfe, 1987), a wealthy white Wall Street investment banker and his mistress miss their turn on the thruway and get lost in the South Bronx, a poor black area in New York City. Afraid of being robbed they panic, and their Mercedes hits and fatally injures a young black man. In the events that evolve after the accident, two urban neighbourhood lifestyles clash with disastrous consequences.

The novel vividly illustrates that people are most comfortable in environments that are similar to their own. Within their routine activity patterns, people tend to be most attracted to neighbourhoods that reflect a similar lifestyle to the one to which they are accustomed (De Poot *et al.*, 2005). The most critical of these lifestyle factors include two salient aspects of population composition: ethnicity and affluence. Both ethnic differences and economic differences could act as social borders, especially if there is a clear transition from one neighbourhood to another in terms of these characteristics (*Ibid*.). Thus, a neighbourhood is perceived as an attractive destination for a trip only if it is sufficiently similar to the neighbourhood of origin.

Ethnic and economic dissimilarities between origin neighbourhoods and potential destination neighbourhoods may give rise to feelings ranging from slight uneasiness to fear of crime. Such differences may therefore be perceived as social barriers, and function in that way. Social borders may affect a variety of spatial behaviours, including residential mobility patterns and spatial shopping behaviour. It is an interesting question whether they also affect criminal behaviour.

The present paper is concerned with the question of whether ethnic and economic differences also function as social barriers to the mobility of offenders. Do they stop offenders, or otherwise influence their geographical and criminal behaviour?

The idea that social characteristics of urban neighbourhoods are related to crime and delinquency has been studied in the literature for about a century. The classic studies on juvenile delinquency in Chicago and other US cities (Shaw and McKay, 1942) showed that neighbourhoods characterized by economic deprivation, mixed ethnic populations and high population turnover rates tended to have high rates of juvenile delinquency. This means that juvenile delinquents lived in these neighbourhoods. It did not necessarily mean that they committed their offences there.

The theoretical explanation for these relations has been labelled 'social disorganization' or 'social efficacy' (Sampson, Raudenbush and Earls, 1997). It asserts that communities need a certain level of social cohesion and social control amongst residents to prevent criminal acts being committed, either by residents themselves or by non-residents from outside the community. If cohesion and control are weak, residents have few incentives to help protect the properties and safety of their neighbours and the wider community.

The social disorganization perspective focuses on the social organization of communities, and it has never clearly focused on the relation between where offenders live and where they offend. There is, however, also a comprehensive empirical literature that documents offender mobility and criminal location choice. Many studies have shown that most offenders commit their offences close to their homes (Baldwin and Bottoms, 1976, pp. 78–98; Hesseling, 1992; Phillips, 1980; Ratcliffe, 2003; Turner, 1969; Wiles and Costello, 2000), that the journey may involve a directional component (Constanzo, Halperin and Gale, 1996; Godwin, 2001), and that the average distance travelled varies across types of offences (Boggs, 1965; Capone, Nichols and Woodrow, 1976; Gabor and Gottheil, 1984; Rhodes and Conly, 1981), and across types of offenders (Canter and Larkin, 1993; Gabor and Gottheil, 1984; Phillips, 1980; Wiles and Costello, 2000).

Largely missing from this literature is the idea that an offence requires a suitable target and an opportunity to be committed, and that the availability of targets and opportunities varies geographically. For example, the finding that larger travel distances to crime sites are associated with higher (potential) profits of robbery (Capone, Nichols and Woodrow, 1975; Van Koppen and Jansen, 1998) and burglary (Snook, 2004) suggests that offenders make trade-offs between distance and other aspects of target attractiveness. Indeed, ethnographic research involving interviews with offenders has demonstrated that most offenders do evaluate the attractiveness of potential targets and situations not only in terms of distance, but also in terms of accessibility, prospective profits and risks of detection (Bennett and Wright, 1984; Nee and Taylor, 2000; Rengert and Wasilchick, 2000; Taylor and Nee, 1988; Wright, Logie and Decker, 1995). Thus, while distance is certainly an important aspect of criminal location choice, it should not be treated as the phenomenon to be explained, but as part of the explanation (Kleemans, 1996).

Recognizing that in order to understand criminal location choice, information on the geography of delinquency (where offenders live) has to be linked to the geography of crime (where offences take place) and to information on barriers to mobility, some scholars have turned to models that were originally developed in geography. In these *gravity models*, the number of crime trips from one neighbourhood to another neighbourhood is modelled as a function of 'push' and 'pull' factors that indicate the extent to which neighbourhoods 'produce' burglars and 'attract' offences respectively, and of the distance between the two neighbourhoods as well (as a measure of impedance or friction, i.e. as a barrier to movement). These models use aggregated journey-to-crime data, analysing as the dependent variable the number of crime trips between pairs of neighbourhoods. This approach has been applied to the location choice of offenders in general (Smith, 1976) and of residential burglars in particular (Rengert, 2004; Kleemans, 1996).

The results of De Poot *et al*. (2005) suggest that the spatial behaviour of offenders is not only affected by physical distance but that it is also influenced by the perception of social barriers. Rengert (2004) points out that, with some exceptions (e.g. Carter and Hill, 1979), very few studies have identified the strength of social barriers or investigated the implications of such barriers on the spatial structure of crime within metropolitan areas.

Two general theories have been put forward to explain spatial variation in criminal activities, rational choice theory and routine activities theory. According to rational choice theory, the location choice of offenders is made in light of the costs involved in offending at particular locations. These costs are assessed in terms of the distance to the target location, familiarity with the surrounding area and, by extension, the risks incurred by offending in the potential target area (De Poot *et al.*, 2005; Walsh, 1986). Traversing a social border will likely incur additional risks, since this will cause an offender to 'stand out'.

While rational choice theory assumes purposeful action, routine activities theory focuses on 'systematic coincidence'. According to routine activities theory, opportunities for committing crimes are often as important as the motivation to commit crimes. According to routine activities theory, crimes occur where and when a motivated offender comes into contact with a suitable and unguarded target or victim. Thus, routine activities theory explains offenders' location choice in terms of the criminal opportunities that present themselves in places known to the offender through his routine activities. De Poot *et al.* (2005) suggest that this theory holds true for well planned crimes as well as more impulsive crimes. This suggests that criminal traffic from the offender's home/origin neighbourhood to the destination neighbourhood of a target is mediated by the absence or presence of social borders. In cases where potential neighbourhoods are equally suitable, therefore, the offender is more likely to choose a location that falls within the same social category as his origin neighbourhood, rather than cross a social barrier to get to a target location (*Ibid.*).

The current study builds on these ideas by investigating the extent to which social barriers restrict the mobility of offenders. In line with some of the above mentioned studies (De Poot *et al.*, 2005; Kleemans, 1996; Smith, 1976) we apply geographic travel models to crime trips between neighbourhoods in the city of The Hague, The Netherlands. To extend the study of De Poot *et al*. (2005), we do not restrict the analysis to adjacent neighbourhoods (this allows us to include distance as a factor influencing the volume of crime trips). In addition to Smith (1976) and Kleemans (1996), and in order to assess the importance of social barriers, we include measures of ethnic dissimilarity and economic dissimilarity between neighbourhoods.

The analysis is aimed at predicting the number of crime trips between all pairs of neighbourhoods on the basis of the following variables:

- Total number of crime trips from the origin neighbourhood (taken as a measure of offender concentration at the origin neighbourhood).

- Total number of crime trips to the destination neighbourhood (taken as a measure of overall attractiveness of the destination neighbourhood)

- The total distance between two neighbourhoods (as an indicator of the physical barrier that affects mobility between neighbourhoods).

- Difference in ethnic composition (expectation of more criminal traffic between neighbourhoods that are similar in terms of ethnic composition, than between those that are not).

- Difference in economic conditions (expectation of more criminal traffic between neighbourhoods that are similar in terms of economic conditions).

Note that the concentration of offenders in origin neighbourhoods and the total number of trips to destination neighbourhoods are used here as control variables only. Based on basic gravity models, it is argued that spatial interaction is guided by 'push' and 'pull' factors that indicate the attraction of a place. Thus, the total number of crime trips to the destination neighbourhood indicates how attractive the neighbourhood is for offenders, and is thereby a proxy to the pull factor 'attraction'. Likewise, the total number of crime trips from the origin neighbourhood is a proxy to the pull factor 'production'. Production and attraction should therefore be interpreted as combined proxies for factors influencing the level of delinquency in origin neighbourhoods, such as the percentage of youth, economic deprivation, divorce rate, etc., and as proxies for generic attractiveness (i.e. for all types of offences) of destination neighbourhoods, such as the presence of shops, bars and restaurants and public services.

The variables of theoretical interest are the measures of physical, ethnic and economic distance. We hypothesize that once the other two variables are controlled for, criminal traffic between neighbourhoods will decrease with distance between the neighbourhoods, and with dissimilarities in ethnic composition and economic status of the neighbourhoods.

Data

To test hypotheses on the effects of social barriers on the criminal traffic between neighbourhoods, data on crime trips are required, i.e. data that specify for each offence where (in which neighbourhood) the offender lived, and where (in which neighbourhood) the offence occurred. In this study we used data on all 62,871 offences from 1996 to 2004 that were registered and cleared by the police, and were committed in the city of The Hague by offenders living in The Hague at the time of the offence.

With a population of 470,000, The Hague is the third largest city in The Netherlands. It is the country's 'administrative capital', as it hosts the Dutch national parliament, the government departments, and many semi-governmental organizations. The city is situated on the North Sea coast, and its current boundaries include the former coastal villages of Scheveningen and Kijkduin.

The Hague comprises ninety-four neighbourhoods, most of them residential. While levels of spatial segregation between social and ethnic groups in The Netherlands are low compared to many other nations, The Hague has been known as one of the most segregated cities in the country. Traditionally, the 6 km long Laan van Meerdervoort was perceived by locals as the boundary between the more affluent seaside part of the city and the poorer inland neighbourhoods. Figure 1 shows that there is still some truth in that observation. With the exception of a few neighbourhoods around the harbour of Scheveningen, the entire seaside part of The Hague is more affluent than the inland area. While the economic segregation of the city has a century-long history, more recently a considerable amount of ethnic segregation has developed in the city, as figure 2 shows. Close to the city centre, in the less affluent part of the city, there are a few neighbourhoods that host a majority of ethnic minorities. As the comparison between the two maps shows, there is a substantial overlap between affluence and ethnic composition, but the correlation is not perfect (the correlation between average *per capita* income and percentage ethnic minorities is –0.71).

For the purpose of this study, it should be noted that physical barriers in The Hague,

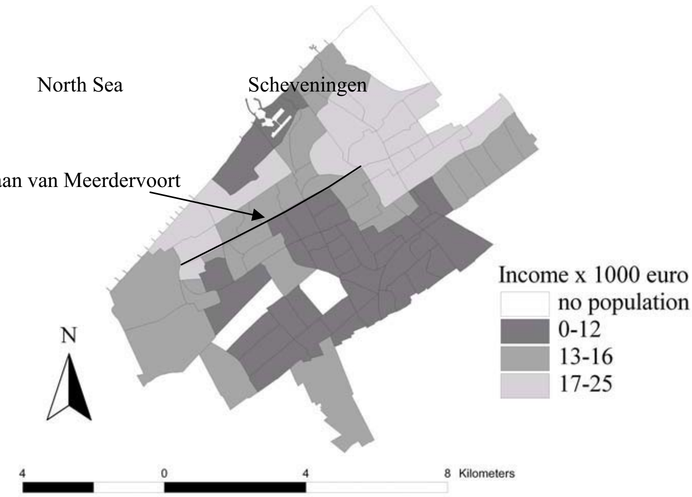

Figure 1. Affluence and deprivation in The Hague (average annual per capita income).

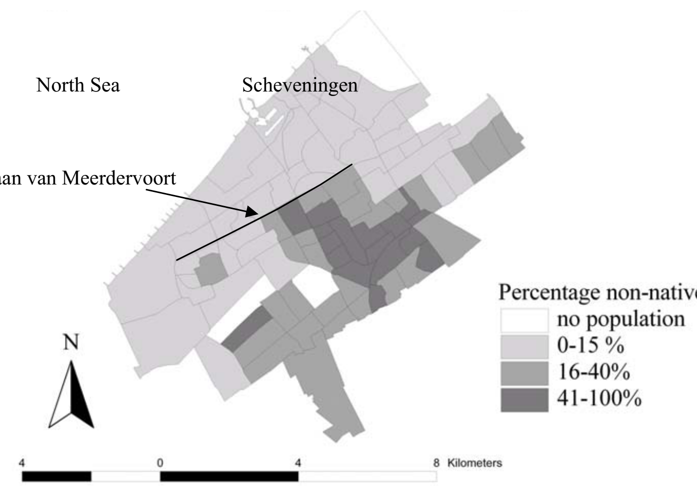

Figure 2. Ethnic segregation in The Hague (percentage non-native population).

such as rivers or railroad tracks, have not been found to influence significantly the journey-to-crime of offenders (Peeters, 2007).

As our propositions on the effects of social barriers do not depend in any way on the type of offence involved, we used crime trips for all offences, including not only property offences (37 per cent) but also traffic offences (23 per cent), violent crime (17 per cent), public order (7 per cent), vandalism (5 per cent), drug related offences (4 per cent) and other crimes (7 per cent).

Crimes were aggregated over both origin and destination neighbourhoods, resulting in $94^2 = 8836$ origin-destination combinations, of which 94 are cases where origin and destination are the same neighbourhood. If crime trips occur in these 94 cases, they are 'internal' crime trips, i.e. offenders committing offences in their own neighbourhoods.

Crime trips were aggregated over destination neighbourhoods into a variable measuring the 'total inflow' of criminal traffic into each neighbourhood, as a measure of their overall criminal attractiveness. Similarly, a 'total outflow' variable was generated by aggregating the number of crime trips over all origin neighbourhoods, as a measure of the concentration of offenders that reside in the neighbourhoods. The 'inflow' and 'outflow' variables were then merged back into the data as control variables to represent all crime trips across the study area.

The physical distance between neighbourhood pairs was defined as the Euclidian distance between the neighbourhood centroids. An adjustment was made to the resulting zero distances of internal crime trips. For all internal crime trips, the distance was defined as half the square root of the neighbourhood surface. This is approximately the average distance between two random points in the neighbourhood (Ghosh, 1951).

In order to operationalize the ethnic and economic 'barriers' between neighbourhoods, files containing structural neighbourhood characteristics of both the origin and destination neighbourhoods were linked to the aggregated police data.

The ethnic barrier was defined in terms of the 'ethnic distance' between a neighbourhood pair. This measure, 'the distance index of neighbourhood ethnicity' (DINE), is an extension on the index of qualitative variation (Agresti and Agresti, 1978) that is normally used to measure heterogeneity in qualitative variables in a single social entity like a group, class, or network (for an application to neighbourhood ethnic heterogeneity see Bernasco and Luykx, 2003). The index of qualitative variation (IQV) of ethnicity in a neighbourhood is the probability that when two random members of the neighbourhood population are matched, they are of a different ethnic group. For example, the IQV of a neighbourhood A consisting of 500 native Dutch residents (D_A), 300 Turkish residents (T_A) and 200 Moroccan residents (M_A) is:

$$IQV_A = 1 - \frac{D_A(D_A - 1) + T_A(T_A - 1) + M_A(M_A - 1)}{(D_A + T_A + M_A)(D_A + T_A + M_A - 1)}$$

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

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

$$DINE_{AB} = 1 - \frac{D_A D_B + T_A T_B + M_A M_B}{(D_A + T_A + M_A)(D_B + T_B + M_B)}$$

$$= 1 - \frac{500 \times 800 + 300 \times 100 + 200 \times 100}{1000 \times 1000} = 0.55$$

Note that the IQV of a neighbourhood is defined as the DINE of that neighbourhood with itself.

The economic barrier was defined, much more simply, as the absolute difference between the average annual *per capita* income of residents in the two neighbourhoods. As for two neighbourhoods where no income data were available, this variable is unavailable for 372 neighbourhood pairs, so that the final analysis contains 8,464 neighbourhood pairs.

Results

The assessment of the relative effects of the physical and social barrier variables on the number of crimes from the origin neighbourhood into the destination neighbourhood, was conducted using regression analysis. There are a few reasons why a regular OLS regression analysis is not optimal in this case. First, the underlying 'gravity' model is defined in terms of logarithms of the dependent variable and of the covariates (see Kleemans, 1996; Smith, 1976). A more substantive reason is that the dependent variable, the number of crime trips from the origin neighbourhood to the destination neighbourhood, is highly skewed (skewness 9.86), which may violate a standard assumption of OLS regression analysis. For example, 30 per cent of the origin-destination pairs does not involve a single crime trip. This skewness remains substantial if the two aggregate inflow and outflow control variables are included in the model (i.e. the residuals of the model are about equally skewed).

A logarithmic transformation of the dependent variable (and replacing the zero value by 0.10 before taking logarithms) remedies this problem completely (the skewness of the logarithmic transformation equals –0.01). Therefore, we have tested the influence of physical and social barriers on the volume of urban crime trips with the following regression model:

$$\ln(\#crimetrips) = \beta_0 + \beta_1 \ln(inflow) + \beta_2 \ln(outflow) + \beta_3 distance + \beta_4 DINE + \beta_5 incomediff$$

The results are presented in table 1, and the correlations between the independent variables are displayed in table 2.

Table 1 presents two models. The first includes geographical distance and the control variables for inflow and outflow. In the second model ethnic distance and economic distance are added. The negative coefficient of geographic distance reveals that the higher the physical distance, the lower the amount of crime trips between neighbourhoods. When the ethnic and economic distances are added in the second model, this result holds, although the coefficient for geographic distance is slightly reduced. The negative coefficients for ethnic and economic distance reveal that a higher amount of socio-economic dissimilarity between neighbourhoods is related to a lower number of crime trips. The size of the (standardized) coefficients shows that geographic distance is more important in predicting the flow between neighbourhoods than socio-economic distance. The R^2 of the first model reveals that the variables, when taken together, explain 62 per cent of the variance in the number of crime trips. When the social distance measures are added in the

Table 1. Standardized (beta) coefficients for regression models (baseline with geographic distance and baseline with geographic and social distances).

	Baseline + Geo	*Baseline + Geo + Social*
Controls		
ln(inflow)	0.33	0.34
ln(outflow)	0.60	0.61
Distances		
Geographic distance	–0.29	–0.27
Ethnic distance (DINE)		–0.06
Economic distance		–0.14
R^2	0.62	0.65
N	8464	8464

Note: all coefficients significant $p < 0.001$ two-sided.

Table 2. Correlation coefficients ($N = 8464$).

	ln(inflow)	*ln(outflow)*	*Geographic distance*	*Ethnic distance (DINE)*	*Economic distance*
ln(inflow)					
ln(outflow)	0.00				
Geographic distance	–0.19	–0.11			
Ethnic distance (DINE)	0.38	0.37	–0.18		
Economic distance	–0.08	–0.09	0.14	0.32	

second model, the explained variance (R^2) is boosted to 65 per cent.

Table 2 presents the bivariate relationship between the independent variables. Ranging from 0.00 to 0.38, the correlation coefficients are not very high and therefore there is no particular concern for bias in the regression analysis.

Clearly, the expectations are confirmed, as the effects of both social distances are negative, i.e. they function as barriers to criminal movements, in addition to geographical distance. The effects of the social barriers are both smaller than the effect of geographic distance.

To appraise the contribution of the two social barrier variables to the unexplained variance, it should be understood that if the first model is interpreted as a baseline or control model, then the control model leaves 38 per cent of the variance unexplained (i.e.1.0 minus the R^2 value) and that 38 per cent is reduced to 35 per cent by the inclusion of the two social barrier variables, which seems a modest reduction. However, according to Cohen (1988; cited in Murphy and Myors, 1998) this qualifies as a small to medium effect.

Thus, ethnic and economic differences between neighbourhoods do act as social barriers which disrupt the flow of criminal traffic between neighbourhoods, but their role in modifying the urban flow of crime should not be exaggerated.

To verify that the results are robust and importantly do not depend on the chosen model specification, we repeated the analyses with the following modifications:

- The exclusion of all 'internal crime trip' categories, i.e. without the 94 cases in which the origin and destination were equal (1 per cent).

- The exclusion of origin-destination pairs that had zero crime trips (30 per cent).

- The exclusion of origin-destination pairs where either the origin produced fewer than 100 crime trips or the destination received fewer than 100 crime trips (22 per cent).

The results, summarized in table 3, show that the results presented in table 1 are quite robust. All estimated effects are significant and in the same direction.

Discussion

The outcomes of the analysis suggest that

Table 3. Standardized (beta) coefficients for three regression models (baseline with geographic and social distances).

	Exclude internal crime trips	*Exclude origin-destination pairs with zero crime trips*	*Exclude cases with inflow<100 or outflow <100*
Controls			
ln(inflow)	0.35	0.48	0.47
ln(outflow)	0.63	0.55	0.55
Distances			
Geographic distance	–0.25	–0.37	–0.33
Ethnic distance (DINE)	–0.07	–0.13	–0.17
Economic distance	–0.13	–0.11	–0.09
R^2	0.65	0.62	0.62
N	8372	5936	6570

Note: all coefficients significant $p < 0.001$ two-sided.

in addition to distance, social barriers also inhibit the flow of traffic between urban neighbourhoods. In line with the hypotheses, it appears that both ethnic and economic dissimilarities have a negative effect on the number of crime trips between neighbourhoods.

A caveat to be made is that the analysis is based on crime trips in a single city, and that as a consequence the results apply only to short-distance urban crime trips. Inbound trips from outside The Hague, and outbound trips from The Hague to elsewhere, are excluded from the analysis. Further, the city of The Hague is known to be strongly socially and spatially segregated in comparison to other Dutch cities. Spatially, the poorest neighbourhoods are situated close together just south of the city centre. Future research on this issue would need to investigate the crime flows in other cities, including cities that have other socio-spatial patterns (in particular cities where many of the poorer neighbourhoods are situated on the outskirts, far away from the centre, e.g. Paris).

The theoretical implications of our findings are modest, as the existence of social barriers is compatible with and supported by both routine activity theory and rational choice theory. An interesting theoretical issue is the extent to which crime trips are started with the explicit intention to commit a crime, or whether crimes are a by-product of trips made for other (legal) purposes like shopping, recreation or visiting friends and relatives. Future work could distinguish between crime types to enhance the theoretical implications, for example by making the distinction between 'planned crimes' (rational choice theory) and 'impulsive crimes' (routine activities theory).

An influential view on mobility models like the one we have presented for crime trips is Stouffer's (1940; 1960) intervening opportunities model. Stouffer claims that the size of the flow between an origin and a destination depends not only on the pull factors in the destination, push factors in the origin and the distance that separates them, but also, and importantly, on which alternative destinations (intervening opportunities) lie between them. For example, if *B* lies on the way from *A* to *C*, then the extent to which *C* is the destination of crime trips from *A* depends on whether *B* is an attractive crime trip destination for offenders from *A* or not. Future analyses might use this idea to assess whether indeed the volume of criminal flow depends on intervening criminal opportunities.

Our analysis investigates aggregate flows of crime, not individual crime trips or individual travel decision-making. Aggregate flows, however, are sums of individual trips. They are based on individual decision-making and on individual behaviour.

A promising approach to the study of spatial patterns in urban crime would be to use data on disaggregated crime trips, and study the micro-level criminal movements in terms of criminal decision-making. A major advantage of this approach for understanding how social barriers affect offender movements, is that the disaggregated approach makes it possible to use individual characteristics such as gender, age, ethnic origin, employment status and previous criminal involvement in the model and assess whether, given an origin area, these characteristics affect the choice of target areas (for an application to residential burglary, see Bernasco and Nieuwbeerta, 2005).

Disaggregated trips, including mode of transport choice and the actual measurement of transportation networks (public transport and road networks) have also been used in travel demand models that have been developed in urban transportation research. These models have recently been adapted to crime data and implemented in the CrimeStat software (Levine, 2004).

The comprehensive literature on the length of the journey-to-crime and the small body of literature on the urban flow of crime have mostly ignored that a large percentage of offences are committed by groups of offenders. Except for a few (e.g. Baldwin and Bottoms, 1976; Bernasco, 2006; Wiles and Costello, 2000), most studies referenced here have analysed offences committed by groups of co-offenders as if they were separate offences committed by solitary offenders, possibly because the police data on which they based their work did not contain the 'link' between the co-offenders. It would be very worthwhile to gain more insight into the extent to which certain flows of crime consist of co-offending trips, for example those originating in suburban neighbourhoods and having their destinations in central neighbourhoods. An investigation of the structure of co-offending could also shed some light on the question of whether it is true that crime trips by co-offenders originate from the same or adjacent neighbourhoods.

REFERENCES

Agresti, A. and Agresti, B.F. (1978) Statistical analysis of qualitative variation, in Schuessler, K.F. (ed.) *Sociological Methodology*. San Francisco: Jossey-Bass, pp. 204–237.

Baldwin, J. and Bottoms, A.E. (1976) *The Urban Criminal: A Study in Sheffield*. London: Tavistock Publications.

Bennett, T. and Wright, R. (1984) *Burglars on Burglary: Prevention and the Offender*. Brookfield, VT: Gower.

Bernasco, W. (2006) Co-offending and the choice of target areas in burglary. *Journal of Investigative Psychology and Offender Profiling*, **3**(3), pp. 139–155.

Bernasco, W. and Luykx, F. (2003) Effects of attractiveness, opportunity and accessibility to burglars on residential burglary rates of urban neighborhoods. *Criminology*, **41**, pp. 981–1001.

Bernasco, W. and Nieuwbeerta, P. (2005) How do residential burglars select target areas? *British Journal of Criminology*, **44**, pp. 296–315.

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

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

Capone, D.L., Nichols, J. and Woodrow, W. (1975) Crime and distance: an analysis of offender behavior in space. *Proceedings of the Association of American Geographers*, **7**, pp. 45–49.

Capone, D.L., Nichols, J. and Woodrow, W. (1976) Urban structure and criminal mobility. *American Behavioral Scientist*, **20**, pp. 199–213.

Carter, R.L. and Hill, K.Q. (1979) *The Criminal's Image of the City*. New York: Pergamon.

Constanzo, C.M., Halperin, W.C. and Gale, N. (1996) Criminal mobility and the directional component in journeys to crime, in Rengert, G.F. (ed.) *Metropolitan Crime Patterns*. Monsey, NY: Criminal Justice Press, pp. 73–95.

De Poot, C.J., Luykx, F., Elffers, H. and Dudink, C. (2005) Hier wonen en daar plegen? Sociale grenzen en locatiekeuze. *Tijdschrift voor Criminologie*, **47**, pp. 255–268.

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

Ghosh, B. (1951) Random distances within a rectangle and between two rectangles. *Bulletin of Calcutta Mathematical Society*, **43**, pp. 17–24.

Godwin, G.M. (2001) Geographic profiling, in Godwin, G.M. (Ed.), *Criminal Psychology and Forensic Technology: A Collaborative Approach to Effective Profiling*. Boca Raton, FL: CRC Press, pp. 275–287.

Hesseling, R.B.P. (1992) Using data on offender mobility in ecological research. *Journal of Quantitative Criminology*, **34**, pp. 95–112.

Kleemans, E.R. (1996) *Strategische misdaadanalyse en stedelijke criminaliteit. Een toepassing van de rationele keuzebenadering op stedelijke criminaliteitspatronen en het gedrag van daders, toegespitst op het delict woninginbraak* [Strategic crime analysis and urban crime. An application of the rational choice approach to urban crime patterns and offender behaviour, especially residential burglary]. Enschede: Universiteit Twente.

Levine, N. (2004) CrimeStat III: A Spatial Statistics Program for the Analysis of Crime Incident Locations (Version 3.0). Houston, TX/ Washington, DC: Ned Levine & Associates/ National Institute of Justice.

Murphy, K.R. and Myors, B. (1998) *Statistical Power Analysis. A Simple and General Model for Traditional and Modern Hypothesis Tests.* Mahwah, NJ: Lawrence Erlbaum Associates.

Nee, C. and Taylor, M. (2000) Examining burglars' target selection: interview, experiment or ethnomethodology? *Psychology Crime & Law*, **6**, pp. 45–59.

Peeters, M.P. (2007) *The Influence of Physical Barriers on the Journey-to-crime of Offenders*. Leiden: University of Leiden.

Phillips, P.D. (1980) Characteristics and typology of the journey to crime, in Harries, K.D. (ed.) *Crime: A Spatial Perspective*. New York: Columbia University Press, pp. 167–180.

Ratcliffe, J.H. (2003) Suburb boundaries and residential burglars. *Trends and Issues in Crime and Criminal Justice*, No. 246, pp. 1–6.

Rengert, G.F. (2004) The journey to crime, in Keijser, J. de (ed.) *Punishment, Places and Perpetrators: Developments in Criminology and Criminal Justice Research*. Uffculme, Devon: Willan, pp. 169–181.

Rengert, G.F. and Wasilchick, J. (2000) *Suburban Burglary: A Tale of Two Suburbs*. Springfield, IL: Charles C. Thomas.

Rhodes, W.M. and Conly, C. (1981) Crime and mobility: an empirical study, in Brantingham, P.J. (ed.) *Environmental Criminology*. Beverly Hills, CA: Sage, pp. 167–188.

Sampson, R.J., Raudenbush, S.W. and Earls, F. (1997) Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*, **277**, pp. 918–924.

Shaw, C.R. and McKay, H.D. (1942) *Juvenile Delinquency and Urban Areas*. Chicago: University of Chicago Press.

Smith, T.S. (1976) Inverse distance variations for the flow of crime in urban areas. *Social Forces*, **54**, pp. 804–815.

Snook, B. (2004) Individual differences in distance traveled by serial burglars. *Journal of Investigative Psychology and Offender Profiling*, **1**, pp. 53–66.

Stouffer, S.A. (1940) Intervening opportunities: a theory relating mobility and distance. *American Sociological Review*, **5**, pp. 845–867.

Stouffer, S.A. (1960) Intervening opportunities and competing migrants. *Journal of Regional Science*, **2**, pp. 1–26.

Taylor, M. and Nee, C. (1988) The role of cues in simulated residential burglary – a preliminary investigation. *British Journal of Criminology*, **28**, pp. 396–401.

Turner, S. (1969) Delinquency and distance, in Wolfgang, M.E. (ed.) *Delinquency: Selected Studies*. New York: John Wiley, pp. 11–26.

Van Koppen, P.J. and Jansen, R.W.J. (1998) The road to robbery: travel patterns in commercial robberies. *British Journal of Criminology*, **38**, pp. 230–246.

Walsh, D. (1986) Victim selection procedures among economic criminals: the rational choice perspective, in Clarke, R.V. (ed.) *The Reasoning Criminal*. New York: Springer, pp. 39–52.

Wiles, P. and Costello, A. (2000) *The 'Road to Nowhere': The Evidence for Travelling Criminals*. London: Research, Development and Statistics Directorate, Home Office (Home Office Research Study 207).

Wolfe, T. (1987) *The Bonfire of the Vanities*. New York: Farrar, Straus & Giroux.

Wright, R.T., Logie, R.H. and Decker, S.H. (1995) Criminal expertise and offender decision making: an experimental study of the target selection process in residential burglary. *Journal of Research in Crime and Delinquency*, **32**, pp. 39–53.

ACKNOWLEDGEMENTS

In this study we used data kindly provided by the Haaglanden Regional Police Force, on all 62,871 offences from 1996 to 2004 that were registered and cleared by them, and were committed in the city of The Hague by offenders living there at the time of the offence.