

OF TARGETS AND SUPERTARGETS: A ROUTINE ACTIVITY THEORY OF HIGH CRIME RATES

Graham Farrell, Ken Clark, Dan Ellingworth, Ken Pease^{1,2}

Abstract

Empirical work has shown that high crime areas have disproportionate amounts of repeat victimisation. However, there is inadequate theoretical explanation. As a move towards a theory we consider a mathematical model of crime rates grounded in routine activity theory. Using the binomial distribution, victimisation is measured as a series of Bernoulli trials, with crime measured for each of incidence (crimes per capita), prevalence (victims per capita), and concentration (crimes per victim). The model is then revised so that a proportion of targets progress to become chronically victimised 'supertargets'. The notion of supertargets is introduced to refer to the 3 or 4 percent of chronically victimised targets that account for around 40 percent of victimisation. We demonstrate theory-testing relating to crime requires the inclusion of the crime concentration rate to incorporate repeat victimisation and indicate how mathematical modelling may, in turn, illuminate the crime concentration predictions of routine activity theory.

¹ Ken Pease and Graham Farrell are Professors at the Midlands Centre for Criminology and Criminal Justice, Department of Social Sciences, Loughborough University.

Ken Clark is Senior Lecturer in the School of Economic Studies, University of Manchester.

Dan Ellingworth is Senior Lecturer in the Department of Sociology, Manchester Metropolitan University.

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INTRODUCTION

In the last three decades, theories of crime have been greatly informed by an influx of thinking that supersedes criminology's traditionally myopic focus on offenders. Most notably, the exposure/lifestyle theory (Hindelang et al. 1978), routine activity theory (Cohen and Felson 1979) and work relating to environmental criminology and crime pattern theory (Brantingham and Brantingham 1980) have significantly influenced thinking about criminal victimisation and crime rates. The role of victims and other targets, and their interaction with the environment or context, are now understood to play a major role in determining the opportunity structure (Clarke and Cornish 1986) in which offences occur and aggregate crime rates are determined.

Recognition of the importance of targets and environments has generated a range of further specialised studies. Increasingly, research is paying attention to repeat victimisation, or the repeated criminal victimisation of the same persons, places, vehicles or other targets however defined (Ratcliffe and McCullagh 1998; Pease 1998; Farrell and Pease 2000). Statistical modelling has sought to incorporate repeat victimisation and the distribution of crime via the negative binomial and other techniques (Osborn et al. 1996; Osborn and Tseloni 1998; Tseloni and Farrell 2002; Wittebrood *et al.* 2004).

The two theoretical explanations of repeat victimisation to date are risk heterogeneity (flag) and event dependence (boost). Both are straightforward. Risk heterogeneity runs thus: If risks among targets are heterogeneous, then the same targets appear attractive to different offenders and are consequently repeatedly victimised - that is, characteristics *flag* a suitable target. Event dependence is also as it sounds: Offenders

learn upon successfully victimising a target that it is suitable, and that if it remains unchanged they can similarly victimise it again - hence successful crime *boosts* the likelihood of a repeat. These explanations fit the rational choice perspective of offending (Becker 1968, Cornish and Clarke 1986, 2000), wherein repeat victimisation is perceived as the result of a rational but crude cost-benefit decision on the part of the offender (Bouloukos and Farrell 1997). Tseloni and Pease found evidence in favour of both explanations for repeat personal victimisation in their examination of the National Crime Victimization Survey (Tseloni and Pease 2003).

Amongst targets, risk is extremely unevenly distributed. In any given year, most people are not victimised, and victim surveys suggest that about a third of people may experience some type of crime. Yet many, often most, of those victims are not repeatedly victimised. This means that they did not prove sufficiently attractive to warrant further victimisation, or something changed to reduce the risk of repetition. However, of those victimised again, a subset that compose a small segment of the population typically prove so prone to victimisation that they are victimised many times. The British Crime Survey suggests that 16 percent of the population experience property crime but 2 percent of the population experience 41 percent of it, and that 8 percent of the population experience personal crime, but 1 percent experience 59 percent of it (Pease 1998; 3). Similar, sometimes more skewed, patterns are found amongst property crimes against businesses (e.g. Taylor 1999) and attacks upon computer networks (Moitra and Konda, 2004).

The particular interest of the present study is the role of repeat victimisation in area crime rates. While it has long been known that areas vary hugely in terms of crime

incidence (crimes per unit at-risk), it is now understood that repeat victimisation contributes disproportionately to that rate in the most crime-prone areas. Trickett et al. (1992) were the first to identify and measure the role of repeat victimisation, finding it particularly prominent in the ten percent of areas with the highest crime incidence rates. The 1992 study used data from the British Crime Survey, but police recorded crime data for burglaries in different US cities showed similar areal patterns (Lamm Weisel and Faggiani 2001).

Overall therefore, despite an increase in empirical studies and in individual-level explanations of repeat victimisation, there has been little theoretical exploration of the spatial distribution and role of repeat victimisation in high crime as found by empirical study. In what follows, we present a theoretical model that seeks to begin to fill this gap. Prior to the model, the analysis of the areal distribution of crime is replicated in order to provide the empirical foundation upon which the theory is built.

THE AREAL DISTRIBUTION OF CRIME

This empirical section also introduces some key definitions and terms. Three measures of area crime rate are utilized in what follows. The crime incidence rate (i) is the number of crimes per unit at risk. The crime prevalence rate (v) is the number of victims or targets per unit at risk. When 'unit at risk' refers to persons, it is a per capita measure. For property crimes such as burglary, the number of 'units at risk' could be the number of households. Hence as appropriate, units-at-risk could refer to persons, households, other properties and places, vehicles, or other targets however defined. In much of what follows we refer to people and victims for simplicity, but for a general

model these can be taken as inclusive of other types of targets. Incidence and prevalence are defined as follows.

$$\text{incidence, } i = \frac{\text{number of crimes}}{\text{number of units at risk}}$$

$$\text{prevalence, } v = \frac{\text{number of victims}}{\text{number of units at risk}}$$

Crime concentration C is defined as the number of crimes per victimised target, and can be thought of as the ratio of crime incidence i to crime prevalence v .

$$\text{concentration, } C = \frac{\text{crimes}}{\text{victims}} = \frac{\text{incidence}}{\text{prevalence}}$$

In the paper 'What is different about high crime areas?', Trickett *et al.* (1992) found that crime in high crime areas is composed disproportionately of repeat victimisation. They concluded that both prevalence and concentration contributed to area differences in crime incidence, with concentration differences contributing disproportionately to the high levels of crime in the most crime-ridden decile of areas sampled. That analysis is replicated here.³ Areas were grouped at the Parliamentary constituency level. The data used were number of survey respondents, victims and crimes, for personal crime and property crime separately. The decile rates of incidence, prevalence and concentration are presented as Tables 1 and 2 for personal and property crime respectively, so that the reader can get a feel for the crime patterns. In those tables, for convenience of scale, crime prevalence refers to the number of victims per 100 people in an area (victims or targets per capita), crime incidence to the number of crimes per 100 people in an area (crimes per capita). Whenever someone in an area is victimised more than once, crime

³ We also replicated the analysis upon two further sweeps of the BCS to check that the findings are not a product of this particular sweep (results available upon request).

incidence becomes greater than crime prevalence and concentration becomes greater than one.

The data were grouped into deciles according to area crime *incidence*. Thus the 10% of sampled constituencies with the lowest crime incidence comprise decile one, and the 10% of sampling points with the next lowest crime incidence comprise decile two, and so on. Self-evidently, knowing any two crime rate variables for a decile determines the third. From the raw data, crime incidence (i) and prevalence rates (v) were calculated. In decile 4 of Table 2, for example, there were 11.36 victims per 100 respondents (prevalence, v) and 15.27 victimisations per 100 respondents (incidence, i), so the average number of victimisations per victim (concentration, C) was $(15.27 / 11.36) = 1.34$.

It is evident that concentration plays an important role in the overall make-up of area crime rates. For areas with higher crime prevalence (more victimised targets per unit at risk), this is disproportionately the case. There is a positive non-linear association between crime prevalence and concentration, beyond what would be expected by a random process. We note, however, that this analysis does not provide a definitive statement of the strength of the relationship between area incidence and prevalence. To do that, the unit of analysis would be the individual sampling point rather than the crime decile, and the modelling alternatives would have to be explored more systematically. The present analysis would not depict changes in the distribution of victimisation among repeat victims. That is, the simple measure of concentration used in this paper neglects the shape of the tail of repeat victims, and it may be that this

will be crucial in understanding the components of area crime rates, as discussed below.

Table 1: British Crime Survey - Area Decile Counts and Rates for Personal Crime

Decile	Incidents	Victims	Respondents	<i>i</i>	<i>v</i>	<i>C</i>
1	0	0	840	0.00	0.00	-
2	6	6	936	0.64	0.64	1.00
3	37	37	969	3.82	3.82	1.00
4	67	60	1094	6.12	5.48	1.12
5	105	89	1135	9.25	7.84	1.18
6	135	89	1135	11.89	7.84	1.52
7	189	122	1256	15.05	9.71	1.55
8	272	138	1172	23.21	11.77	1.97
9	439	166	1351	32.49	12.29	2.64
10	1145	161	956	119.77	16.84	7.11

Table 2: British Crime Survey - Area Decile Counts and Rates for Property Crime

Decile	Incidents	Victims	Respondents	<i>i</i>	<i>v</i>	<i>C</i>
1	15	15	827	1.81	1.81	1.00
2	60	55	1027	5.84	5.36	1.09
3	114	92	976	11.68	9.43	1.24
4	168	125	1100	15.27	11.36	1.34
5	236	164	1076	21.93	15.24	1.44
6	301	179	1041	28.91	17.20	1.68
7	392	224	1193	32.86	18.78	1.75
8	560	274	1239	45.20	22.11	2.04
9	816	324	1398	58.37	23.18	2.52
10	1226	311	1028	119.26	30.25	3.94

THE THEORETICAL MODEL

Routine activity theory postulates that a crime takes place upon the convergence in time and space of a potential offender and a suitable victim in the absence of a capable guardian. Cohen and Felson (1979) suggest that changing socio-economic structure facilitates this convergence and thus allows "illegal activities to feed upon the legal activities of everyday life" (p588). They illustrate their hypothesis by the distribution of crimes inside and outside families, increase in the proportions of households unattended

during the day, the relationship between the portability of television sets and their theft, and so on. However, like much criminology, they do not separate their predictions into those of prevalence and concentration of crime. What follows is an attempt to consider the distribution of crime alongside the precepts of routine activity theory, separating out measures of concentration and prevalence. Its intent in its present form is to be a heuristic device. Some of the patterns observed do call to mind some routine activity axioms. For example, it is known that victimisation is concentrated upon particular people, places, and other targets however defined. Intuitively, it seems easier to protect oneself against property than personal offences, so that suitable victim status would persist more in relation to personal than property crime. One cannot make oneself younger or stronger, but one can install an intruder alarm. Even if the other two terms were randomly present, that alone might suggest a greater concentration of personal than property victimisation. In areas where there are many suitable victims, the supply of motivated offenders may be the limiting factor, and generate a relatively low rate of repeat victimisation. Because the factors are likely to covary, the observed pattern is no doubt less clearly discernible. However, the reader will recognise that, in principle, analysis of the levels of prevalence and concentration together may allow an understanding of observed crime patterns that analysis of crime incidence would not. While it is acknowledged that even the second model presented may require further iterations in order to better fit reality, the basic point - that an area crime 'signature' in terms of both prevalence and concentration will be more revealing than scrutiny of crime incidence alone - remains. Hence we believe that the model and the implications of this analysis make a sufficiently significant contribution to warrant making them publicly available, and thus subject to the academic criticism by which they might be progressed.

Two models of area crime rates are developed here. Model 1 is a simple model of interactions between suitable victims and likely offenders in the absence of capable guardians (Cohen and Felson 1979). This may go some way towards explaining differences in area crime rates, but is really a launch pad for the second model. Model 2 incorporates the notion that victimisation increases the likelihood of further victimisation. The model produces an embryonic form of frequently victimised 'supertargets' that account for significant amounts of crime in high crime areas.

Model 1: An Interactive Routine Activities Model

There is no self-evident reason why crimes against the same target are more likely to be perpetrated in high crime areas, or why prevalence and concentration differ as between personal and property crime. Here it is explained in terms of routine activity theory (Cohen and Felson, 1979, Felson 1986, 1998). We explore potential interactions between the variables of routine activity theory and the effects upon area crime rates. In what follows we refer to victims rather than the more generic term of targets, for simplicity and to follow the terminology of routine activity theory.

To generalize from the three terms of routine activity theory, consider a simple scenario in which there are a number of potential victims, N . Of these, S are suitable victims and define $s = S/N$. Of the time-place contexts inhabited by these potential victims, a proportion p_M can be characterized as containing a likely offender while a proportion p_A is characterized by the absence of a capable guardian. If these two circumstances are independent and are independent of whether a suitable victim is present, (i.e. independent of s) then the probability of their convergence is the product $p = p_M p_A$.

To move the process into modelling repeat victimisation, individual potential victims can be thought of as facing a number of 'potential crime contexts' in any period. For the moment, this is taken to be exogenously determined. The model should later be refined to locate the number of potential crime contexts in the attributes of lifestyle and area. The provisional characterization of the victimisation process allows us to consider it as a series of t independent Bernoulli trials with a "success" probability (i.e. a probability of being a crime victim or victimised target in any trial) given by p . Each trial is a context of potential crime. A crime will occur only if a motivated offender is present and a capable guardian is missing. This specification allows the use of the Binomial distribution.

The expected number of crimes per individual (the term is used here for a potential target, for brevity) is given by tp . Multiplying this by s gives us the incidence rate. Hence

$$i = stp \quad (1)$$

where

i = crime incidence

s = the proportion of the population that are suitable victims

t = the number of independent potential crime contexts

p = the probability of convergence of likely offenders and no guardian (p_{MPA}).

Think now of the proportion of suitable victims who will be victimised. This is 1 minus the probability of never being a victim, which according to the Binomial distribution is

$(1-p)^t$. Hence crime prevalence is

$$v = s(1-(1-p)^t) \quad (2)$$

and so concentration is

$$C = \frac{tp}{1-(1-p)^t} \quad (3)$$

The interesting feature of this equation is that the number of suitable victims does not affect crime concentration. This is not true of either crime incidence or crime prevalence. Crime concentration increases in p and thus (symmetrically) increases in p_A and p_M . Concentration is also increasing in t . Table 3 sets out hypothetical crime rates by decile, assuming that $t = 5$ and that the proportion of suitable victims varies between 0.1 and 1. Hence, in Table 3, the levels of guardianship and likely offenders are constant while the proportion of suitable targets increases across deciles. The outcomes are increasing incidence and prevalence rates but a constant concentration rate.

Table 3: Area Crime Rate Model 1 with Variability in Supply of Suitable Targets

Area Decile	Proportion of contexts with			t	Crime rates		
	Target (s)	Offender (p_M)	No Guardian (p_A)		Incidence (i)	Prevalence (v)	Concentration (C)
1	.10	.20	.80	5	.08	.06	1.38
2	.20	.20	.80	5	.16	.12	1.38
3	.30	.20	.80	5	.24	.17	1.38
4	.40	.20	.80	5	.32	.23	1.38
5	.50	.20	.80	5	.40	.29	1.38
6	.60	.20	.80	5	.48	.35	1.38
7	.70	.20	.80	5	.56	.41	1.38
8	.80	.20	.80	5	.64	.47	1.38
9	.90	.20	.80	5	.72	.52	1.38
10	1.00	.20	.80	5	.80	.58	1.38

Note: In Tables 3 and 4, differences due to rounding may influence the crime rate outcomes.

Table 4: Area Crime Rate Model 1 with Variable Supply of Likely Offenders

Area Decile	Proportion of contexts with			<i>t</i>	Crime rates		
	Target (<i>s</i>)	Offender (<i>p_M</i>)	No Guardian (<i>p_A</i>)		Incidence (<i>i</i>)	Prevalence (<i>v</i>)	Concentration (<i>C</i>)
1	.20	.10	.80	5	.08	.07	1.17
2	.20	.20	.80	5	.16	.12	1.38
3	.20	.30	.80	5	.24	.15	1.61
4	.20	.40	.80	5	.32	.17	1.87
5	.20	.50	.80	5	.40	.18	2.17
6	.20	.60	.80	5	.48	.19	2.49
7	.20	.70	.80	5	.56	.20	2.85
8	.20	.80	.80	5	.64	.20	3.22
9	.20	.90	.80	5	.72	.20	3.61
10	.20	1.00	.80	5	.80	.20	4.00

Table 4 shows that concentration rates will increase with the proportion of contexts featuring likely offenders. Hence in Table 4, the levels of guardianship and suitable targets are constant while likely offenders increases across deciles. The result is different to that of Table 3 and results in a linear increase in incidence, increasing prevalence to the maximum of 0.2, and an increasing concentration rate that is slightly nonlinear. Of course, identical effects would be yielded by similar variation in the proportion of contexts featuring capable guardians.

The contribution of Model 1 is to illustrate how different levels of the input variables (suitable targets, likely offenders, guardianship, time-space interactions) interact to produce crime rate effects that differ in each of incidence, prevalence and concentration.

Note, however, that the number of time-space interactions has not yet been varied, and this is discussed in what follows.

Does the Model Yield Enough Concentration - Or Too Much?

In the model, concentration is bounded by t . In the model as illustrated, maximum concentration is 5. Setting t at 10 would make it 10, and so on. This term is perhaps necessarily ambiguous. How can place and time be sliced up into units so that only one crime can occur in each slice? Violence between those who live together can take place many times a day. A complicated fraud may take months to set up. Approaching the issue from another direction, if a year's victimisation experience is considered, t cannot be less than the number of victimisations suffered by the most victimised respondent, which will be in excess of fifty according to what is known about victimisation from surveys. One way of depicting the relationship between the variables is the three-dimensional graph of crime concentration against p and t . This is presented as Figure 1, where t is allowed to vary up to 10. The concentration surface and the associated contour curve presented in Figure 2 offer the universe of possibilities of concentration and probability of victimisation.

The surface shows that the concentration of victimisation depends crucially upon where the maximum number of victimisation possibilities t is set. Its shape is wrong, in that it does not mirror that observed in areal analysis of BCS data. Concentration increases steadily in Figure 1, not dramatically as in the data in Tables 1 and 2. There are two plausible reasons for this:

1. The linearity of the relationships in the model result from the linearity of the values of the variables inserted, rather than from real life. In a process in which motivated offenders seek out suitable victims where capable guardians are not characteristics of the area, there could be a kind of 'assortative mating' of the necessary conditions for crime in the worst areas.

2. The second possibility must represent at least part of the truth. It is that victimisation changes the probability of victimisation. This is the route that will be explored in the remainder of this paper.

Figure 1

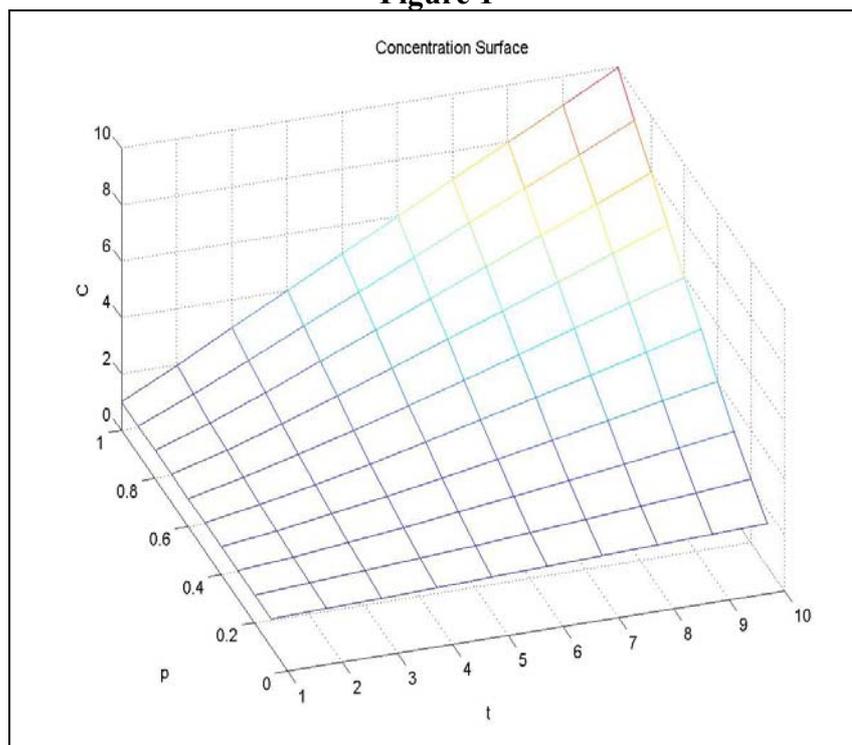
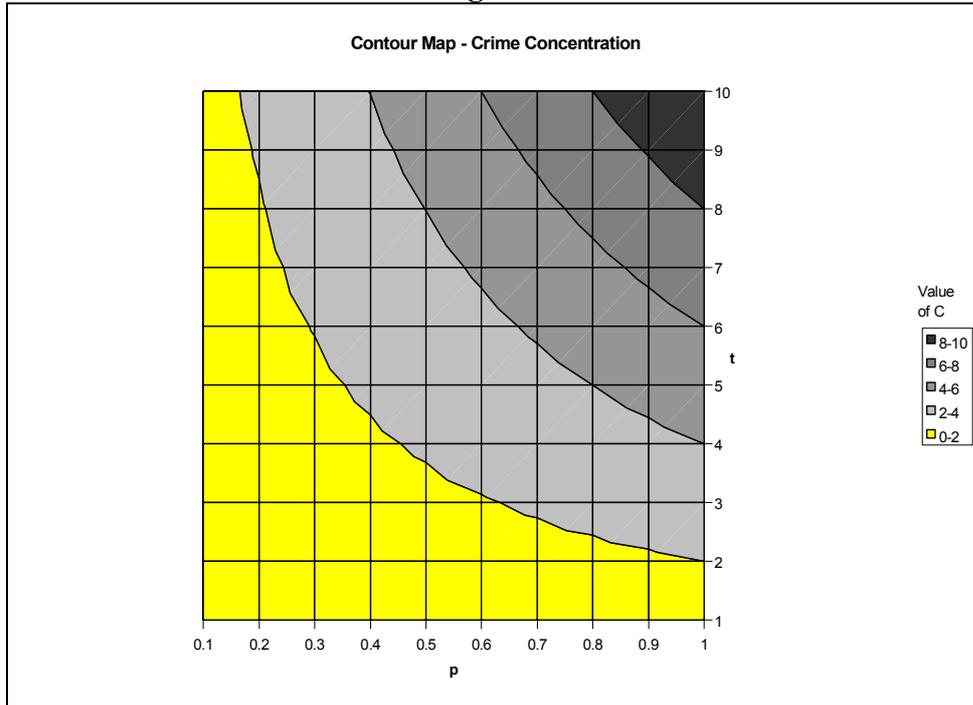


Figure 2



Model 2 – The Supertargets Model

There is evidence that victimisation changes the likelihood of victimisation, and that it does so independently of area and demography (Ellingworth et al. 1995). The net effect is to increase the risk of victimisation. How can this be understood in terms of routine activity theory? The implication is that the ‘suitability’ of a target can be more fully assessed once it has been victimised. The burglar only knows a house contains nothing worth stealing once inside, or that there is a sleeping Rottweiler in the bedroom. The violent man only knows of his intended victim's unexpected strength or willingness to invoke capable guardians once the first assault has been launched. The hacker does not know they can enter a network repeatedly until after the initial break-in. In short, the motivated offender will often prefer to seek out a target established as suitable by prior victimisation to the unknown quantity of a new victim. This would account for the high

proportion of repeat victimisations identified as series events, involving 'probably' the same perpetrator in similar circumstances (see Chenery et al. 1996).

Perhaps the most plausible explanation is that in reality, victimisation changes the perception of target suitability in all cases. In some cases, it confirms target suitability and makes the probability of repeat victimisation higher. In other cases, it makes the probability lower either by the offender's bad experience of the first victimisation, or changes made by the victim in the wake of the offence. Thus after victimisation a presumed suitable target changes into a super-suitable target or an unsuitable target. If there were a number of super-suitable targets (henceforth supertargets and/or supervictims when referring to individuals), the degree of concentration of crimes upon them would obviously be greater (see Sparks 1981 for what remains a classic statement of possible reasons for observed patterns of repeat victimisation). In what follows, the transition from presumed-suitable targets to supertarget will be considered. The other aspect of the change, from presumed suitable target to unsuitable target, will not be considered in this paper.

Let some proportion m of suitable targets be supertargets. If suitable targets face t_1 potential crime contexts then conditional upon being victimised on any one of these occasions, supertargets will face an additional t_2 potential crime contexts. In this more complex scenario it can be shown that incidence is

$$i = sp[t_1 + mt_2(1 - (1 - p)^{t_1})] \quad (4)$$

while prevalence is

$$v = s[1 - (1 - p)^{t_1}] \quad (5)$$

hence concentration is

$$C = \frac{p[t_1 + mt_2(1 - (1 - p)^{t_1})]}{1 - (1 - p)^{t_1}} = \frac{pt_1}{1 - (1 - p)^{t_1}} + pmt_2 \quad (6)$$

This expression demonstrates that concentration now depends upon the proportion of suitable targets prone to further victimisation (supertargets) as well as the variables considered important previously. A special case is worthy of note. If $m = 0$ then (6) collapses to the expression for concentration derived in the initial model, equation (3).

Table 5: Area Crime Rate Model 2 with Supertargets

Decile	Proportion of contexts with			t_1	t_2	m	Crime rates		
	p_A	p_M	s				i	v	C
1	.2	.2	.35	2	4	.3	2.93	2.74	1.07
2	.3	.3	.4	2	4	.4	8.19	6.88	1.19
3	.4	.3	.4	2	4	.4	11.33	9.02	1.25
4	.4	.4	.5	2	4	.4	19.76	14.72	1.34
5	.45	.5	.42	2	4	.4	24.96	16.77	1.49
6	.45	.5	.3	3	4	.4	26.02	16.04	1.62
7	.5	.5	.3	3	4	.4	29.43	17.34	1.69
8	.5	.5	.43	3	5	.5	47.79	24.86	1.92
9	.55	.5	.4	3	6	.65	59.55	24.76	2.40
10	.65	.6	.35	4	7	.75	116.3	30.15	3.86

Note: m = proportion of supertargets.

Before discussing the implications of these results for crime rates it is worth noting that this model relies on an extremely simple specification of the process by which suitable victims become supertargets. In the real world, what the BCS purports to measure - criminal victimisation - is an ongoing process and the survey respondents' answers constitute a snapshot of their experiences over a particular period of time. Clearly any

respondent's history of victimisation prior to the period of observation will have an impact on what they report. In our model there is a once and for all opportunity to become a supertarget, a status which is never rescinded and, after facing $t_1 + t_2$ potential crime contexts, the process is complete. More realistic models might feature a range of potential mechanisms by which suitable targets transition between target and supertarget status. These would necessarily be more mathematically complicated. Our supertargets models eschews such complications in order to focus attention on *conditionality* – the idea that prior victimisation is crucial in explaining current victimisation and crime concentration rates.

Table 5 illustrates crime rates that emerge from Model 2. The parameter values have been chosen to mimic levels evident in the BCS. The model is inadequate in that it is known that the probability of a fourth victimisation after a third is higher than that of a third after a second, which is in turn higher than a second after a first (Ellingworth *et al.* 1995). In addition, the variable which changes in this model is t , the number of space-time interactions. Arguably, the mechanism should be the increased likelihood of the presence of a likely offender. Refinement of the model is a matter for the future.

DISCUSSION

The essential purpose of this paper is heuristic. It takes the measure of crime concentration (the number of victimisations per target) to have been unduly neglected in the development of crime theory. The attempt to apply routine activity theory to the explanation of concentration differences yielded some insights. The first was that the proportion of suitable targets was not a factor in determining the area concentration rate, although it influenced prevalence and incidence. In contrast, the supply of motivated offenders and capable guardians impacted upon concentration as well as other outcomes.

The next observation was a matter of fresh perception rather than data. It was that the upper limit of concentration was the number of crime contexts (time-space interactions) it was possible to fit into a period, and that this number had to be large. In other words, the common perception is that repeat victimisation is far more frequent than it would be by random occurrence (which it is). However, by the standards of end-to-end offences, of burglars standing in line for their turn to get into a suitable house, the amount of repeat victimisation is quite small. Whether the amount of repeat victimisation should be regarded as high (which it is as a proportion of all victimisation) or low (which it is as a proportion of maximum possible concentration) is a matter of taste. The question of the 'right' number of units into which time and place should be sliced to get a sensible measure of maximum concentration is probably unanswerable, and may limit the usefulness of the approach taken in this paper. For the moment, it is assumed that the slices should be equally thin across areas, and can thus safely be ignored in the present context.

The simple model of victimisation elaborated above showed steady increases in concentration rates when the constituent variables increased steadily. In real life, concentration increases markedly in the ninth and tenth decile. Two possible reasons for this were selected for further consideration. One is the distribution of motivated offenders and capable guardians by place. Further empirical investigation of their variation is required to explore this further. Existing empirical studies of lifestyle and routine activity models might be adapted to further examine area crime rates.

The second possible reason for the large increases in concentration is that victimisation feeds upon victimisation. It is known that the probability of repeat victimisation increases with the number of prior victimisations. It is known that prior victimisation contributes to crime hazard in an additive way with household attributes and demography. It is known that repeat victimisation is most likely to be quick. There is both direct and indirect evidence to suggest that the same perpetrators are involved. The link to the present analysis is the realisation that the judgment of target suitability is best made *after* a first victimisation. The best judgment an offender can make before the first offence is that a victim is presumed suitable. After the offence, this presumption is either confirmed (to yield a supertarget) or disaffirmed (to yield an unsuitable target). The model changed likelihood of victimisation after an offence and was capable of mimicking the increased concentration of crime in the ninth and tenth deciles. It seems increasingly likely that offenders seek out those who are obviously suitable victims, and, on the basis of their first victimisation, commit a repeat. Perpetrators of repeated crimes against the same victim seem to be often the same people (see Winkel (1991), Chenery et al. (1996), Ashton et al. 1998; Everson and Pease 2000). This kind of 'assortative

mating' of suitable victims and motivated offenders is only fully possible *after* at least one victimisation.

The meaning of the constituents of routine activity theory varies by type of crime. For example, a 'suitable victim or target' for burglary differs from that for robbery, while that for bank robbery differs again. Whilst the model could be extensively manipulated to show the influence upon concentration with different levels of each of the factors, the marginal returns to this analysis may well be diminishing. The authors' are conscious of the fact that, while the concept of supertargets/supervictims may be important, the model presented understates the degree of skew of victimisation in the population when compared to reality. However, it is proposed that while refinements of the model might be able to incorporate this phenomena, this should not preclude recognition of either the role of chronically victimised targets in generating area crime rates or the potential utility of the model.

An empirical model might attempt to test the influence of the different variables in determining the rate of crime in an area. This kind of model would tie in well with other matters of criminological importance. For example, if suitable proxy measures could be used to create the three variables, what is the impact of acting upon one of the variables? What is the relative influence of each of the variables upon the area crime rate? What is the marginal change in the crime rate of a decrease of one offender? Are the crimes which this offender would have committed then committed by other motivated offenders so that the overall level of crime is unaffected? This would be the case if a substitution effect took place so that the frequency of offending of some offenders increased to the extent that, even with a reduction in the number of offenders, the impact upon the crime

rate was minimal. Does a marginal change in the level of guardianship in an area have a greater impact upon the crime rate than a marginal change in the number of offenders, or suitable targets? Policy implications might derive from a model that assists in determining optimal resource allocations to influencing each variable.

The model presents further possibilities for the study of crime. The minimal or theoretically limiting case of the model springs to mind: it is surely that relating to domestic violence, a crime that is typically avoided in theoretical explanations. A key feature of domestic violence is its frequently repeated nature. Using the present model, the 'typical' (if such exists) case of domestic violence would involve one potential female victim or survivor, and one potential male offender. The absence of capable guardians is frequent since they are typically alone often, the only other people present being children in some cases. In this scenario crime prevalence remains constant (one victim) and concentration equals crime incidence which relies almost solely on the frequency of the offender becoming motivated (which may correspond to drinking habits and lifestyle). There are many time-space interaction contexts in a cohabiting relationship.

CONCLUSION

A routine activities model was developed to assist in the understanding of the spatial distribution of crime. It reaffirms that crime theories should incorporate an understanding of the concentration rate, and hence repeat victimisation. The model offered a plausible explanation of high crime rate areas in the interaction of the key variables of routine activities, and in victimisation changing the probability of future victimisation against the same target. The theory fits with a range of empirical studies relating to area crime rates and repeat victimisation.

The theory presented here should be viewed as preliminary. It does not reflect the various influences upon the suitability of targets, upon the motivation and ability of potential offenders, upon the capability of guardianship, or upon the frequency of their interaction. Modifiers of the key variables could be envisaged and, perhaps, subject to empirical testing. Nevertheless, we propose the theory furthers our understanding of crime rates and provides a platform for further study. At the least, the study illustrates the importance for criminological theory of incorporating the concentration of victimisation alongside the crime incidence and prevalence rates.

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