Predicting and Preventing: Developing a Risk Assessment Mechanism for Residential Housing

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The introduction of legislative requirements placed upon key agencies to consider the crime and disorder implications of every decision that they make has been a progressive step in crime reduction. Yet this requirement will not achieve its potential unless these partner agencies can agree upon which factors are indeed criminogenic and therefore what impact their decisions will have upon crime. Recognising the need for clarification within the field of designing out crime within the built environment, this paper presents a comprehensive, yet straightforward and usable crime risk assessment mechanism which Architectural Liaison Officers and Crime Prevention Design Advisors can use to predict the vulnerability of residential housing to future crime and disorder problems.

Key words: Risk assessment mechanism, crime reduction, Architectural Liaison Officers/Crime Prevention Design Advisors, Secured by Design, permeability.

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Introduction

This paper presents the findings of two pieces of research. The first, conducted between 2000 and 2001 and funded by the Home Office, emerged following the publication of an evaluation into the effectiveness of the Secured by Design (SBD) scheme (Armitage, 2000). The original evaluation had established that properties built to the SBD standard were less likely to experience burglary and total crime than their non-SBD counterparts. However, the question still remained as to which particular elements of the scheme conferred a crime reduction advantage. The second piece of research, conducted between 2000 and 2005 (without external funding), formed the basis of the author's PhD thesis. The aim of this research was to further explore which environmental factors were associated with crime risk and to use these findings to develop a crime risk assessment mechanism to allow crime reduction practitioners to anticipate future risk. As will become evident throughout this paper, the two shared the common aim of identifying which particular environmental factors make a property vulnerable to burglary.

The justification for conducting the research was twofold. The first lay with the need to clarify some of the confusion surrounding the issue of permeability and through movement and its impact upon crime. The second, more practical in nature, was the desire to create a risk assessment tool which would allow practitioners (faced with the task of assessing hundreds of planning applications) to make informed decisions regarding a property's likely risk of future victimisation.

Clarifying the Confusion

There is no doubt that the last two decades have seen a major change in the perception of how crime should be reduced and who should be responsible for this task. Crime (in particular acquisitive crime) is no longer viewed as a moral aberration to be explained, but rather as a risk to be calculated and avoided (Garland, 1996). The recognition that the historical reliance upon the police was both misguided and unfair marked a turning point in crime reduction and the extension of 'responsible authorities' through the Crime and Disorder Act (1998) and Police Reform Act (2002) formalised this shift in perception. However, whilst partner agencies are now required to consider the implications of their decisions upon crime and disorder (Section 17 of the Crime and Disorder Act), this requirement is futile unless these agencies can agree upon what impact their actions will actually have upon crime and disorder and which factors are criminogenic. A field in which this confusion has become increasingly evident is that of crime reduction through environmental design - in particular the clash between planning policy/guidance and the crime reduction aims of Architectural Liaison Officers (ALOs) and Crime Prevention Design Advisors (CPDAs). It is both acceptable and understandable that the government departments responsible for planning (Department for Communities and Local Government) and the reduction of crime and disorder (Home Office), although sharing the common goal of improving the sustainability of communities, will prioritise different issues. However, the problem arises when these departments (and therefore the policy which they produce) hold different views as to how to achieve this goal. One issue where this disparity in views is clearly apparent is that of permeability (or through movement) and its impact upon crime and disorder and the sustainability of communities.

There are numerous examples of both national and local planning policy and guidance which stress that permeability and through movement should be maximised, not only as a means of encouraging people to walk and cycle as opposed to using the car, but as a direct means of reducing crime. National examples include Places, Streets and Movement: A Companion guide to Design Bulletin 32 (Department of the Environment, Transport and the Regions, 1998) which states that: "The principle of the walkable neighbourhood is the key to creating a sociable, sustainable community" (p.39). By Design – Better Places to Live, a companion guide to PPG3 (Office of the Deputy Prime Minister, 2001) also suggests that: "The success or failure of a new development depends significantly on how well connected it is to existing areas, especially in terms of access to local services" (p.25). Examples of local planning policy which suggests that increased permeability will reduce/prevent crime and disorder include Dudley Metropolitan Borough Council's Design for Community Safety (2002) and Liverpool City Council's Urban Design Guide (2003). The Dudley guidance suggests that: "A connected network of streets contributes to personal safety and security of property by encouraging pedestrian activity which helps to provide natural surveillance and a degree of self-policing" (p.16). Similarly Liverpool's guidance claims that: "When people pass through an area they provide activity, security by 'natural surveillance' and passing trade" (p.23).

In direct contrast, guidance from the police (in the form of design principles and standards for the Secured by Design scheme) would suggests that: "Too many footpaths and through roads in developments help to make crime easier to commit…The more alternative routes there are, the more confident the wrongdoer feels, and the easier it is to commit crime" (Standards and Testing, 2004).

Unfortunately the recent publication of Safer Places: The Planning System and Crime Prevention (Office of the Deputy Prime Minister and Home Office, 2004) has done little to address the confusion. Although Safer Places highlights the importance of crime reduction considerations in planning and design, the message regarding through movement still remains unclear. For example, the guide highlights how safer places will have "well-defined routes, spaces and entrances that provide for convenient movement without compromising security" (p.16). Yet the following paragraph highlights how crime and anti-social behaviour are more likely to occur if "there are several ways into and out of an area – providing potential escape routes for criminal activity" (p.16). The answer, according to this guide, is that "too few connections can undermine vitality, too many – and especially too many under-used or poorly thought out connections – can increase the opportunity to commit crime" (p.16).

Unfortunately, this lack of clarity does not help practitioners tasked with making decisions about the crime implications of planning proposals or with advising developers on how to avoid criminogenic design. Take for example the commonplace proposal to a local authority by a private developer to build a development of 20 residential properties. The local authority for this area are bound by Section 17 of the Crime and Disorder Act (1998) which states that "it shall be the duty of each authority … to exercise its various functions with due regard to the likely effect of those functions on … crime and disorder in its area" (Great Britain, 1998). The local authority are also bound by Section 6 of the Human Rights Act (1998) which states that it is unlawful for a public authority to act in a way which is incompatible with a convention right. Three convention rights (Schedule 1 – Part 1, Articles 5 and 8 and Article 1 of the First Protocol, Part 2) relate to safety and security. Therefore, it is in

the interest of the local authority to ensure that the proposed development is designed in a manner which will reduce vulnerability to crime and disorder. Looking towards criminological research as an indication of how to design out crime would suggest that as a means of reducing crime opportunities properties should be designed with minimum access/egress and limited permeability (Brantingham and Brantingham, 1975, 1993, 2000; Bevis and Nutter, 1977; Brantingham *et al,* 1977; Brown and Altman, 1983; Newlands, 1983; Greenberg and Rohe, 1984; Beavon, 1984; Taylor and Gottfredson, 1987; Cromwell and Olson, 1991; Poyner and Webb, 1991; Rengert and Wasilchick, 2000; Wiles and Costello, 2000). As well as seeking guidance from criminological research, a local authority concerned with the reduction of crime may also look for guidance from the police. Again, as is highlighted above, this advice would suggest limiting footpaths and through movement. In contrast, the sources of guidance for planning departments (who are still part of the local authority bound by the Crime and Disorder Act and the Human Rights Act) would suggest that increasing permeability will not only increase sustainability, encourage people to walk and cycle as opposed to using the car, but will also reduce crime and the fear of crime. It is hoped that the research presented within this paper will go some way towards clarifying this confusion.

A Practical Tool - The Production of a Practical Risk Assessment Tool

As was highlighted within the introduction, the second justification for identifying which environmental factors are associated with burglary was the desire to develop a risk assessment tool to allow practitioners to assess the likelihood that a property will be victimised. Although several risk assessment indices already exist which allow the

prediction of victimisation based upon environmental factors, there are several justifications for the production of a new risk assessment tool.

The first justification relates to methodology. The crime risk assessment mechanism presented within this paper (the Burgess mechanism) is designed to be used by crime reduction practitioners when assessing proposed planning applications. A primary requirement of the tool is ease of use and simplicity. For that reason, the aim was for practitioners to be able to assess risk of victimisation without access to the additional data sets (offender residence and nuisance levels) required by tools such as that presented by Groff and LaVigne (2001).

The second justification is an extension of the first and relates to the desire to produce a mechanism which is clear, transparent and easy to use. The language used in tools such as that presented by Winchester and Jackson (1982) is unnecessarily complex. For example, Winchester and Jackson's environmental risk factors are displayed as statements with a score of 1 awarded for a yes response and a score of 0 awarded for a no. Statements such as 'housing plot not adjacent to the gardens of other houses' and 'not overlooked at the front by other houses' are confusing. Others are open to misinterpretation. For example, 'isolated' – what is isolated? Located in the country – what constitutes the country?

The third justification relates to transferability. Coleman's (1986) Design Disadvantage score relates to flats as opposed to houses. Winchester and Jackson's (1982) tool, perhaps unsurprisingly (due to data relating to Kent as opposed to West Yorkshire), proved ineffective as a tool to isolate environmental factors when applied

to West Yorkshire. Of the 1182 dwellings (the West Yorkshire sample) scored using the Winchester and Jackson mechanism, 0% were isolated, 0% were set at a distance from the road on which they stood, 0% were in a position with less than 5 houses in sight and 1% of the sample were located in the country.

The final justification for the production of a new risk-assessment tool was the desire to include additional variables which had not been covered in existing checklists. Specifically those relating to permeability, through movement and access.

Developing the Burgess Crime Risk Assessment Mechanism: Methodology

Before discussing the methodology utilised for the development of the mechanism, it is worth reiterating the original desire to create a simple, usable tool which could be utilised by crime reduction practitioners such as ALOs and CPDAs. A review of prediction methodologies resulted in the identification of the Burgess Points System, a method described by Simon (1971) as "one of the simplest prediction methods" (p.31) and commended by Nuttal *et al* (1977) as robust and simple. This method was selected on the grounds of simplicity and robustness rather than statistical sophistication and as such it does not address problems of multicollinearity (as more sophisticated models do) and is open to criticisms of shrinkage – in that it is a more powerful predictor of the sample on which it was constructed than any other sample. However, it has the crucial advantage of transparency of rationale and construction and can be used without access to statistical software packages. Using the Burgess Points System, a score is derived from the difference between the mean rate of crime suffered generally (by the whole sample) and the rate of crime suffered by houses

with a particular feature. The steps involved in creating the scoring system are detailed below.

Step One: Which Environmental Factors are Associated with Crime?

The 1058 properties utilised for this study were those included in an earlier evaluation of the effectiveness of Secured by Design scheme (Armitage, 2000). The 1058 properties were taken from 50 estates (25 SBD and 25 Non-SBD) which were spread evenly throughout West Yorkshire (10 in Huddersfield, 10 in Halifax, 10 in Wakefield, 10 in Leeds and 10 in Bradford). All properties were built between 1988 and 1998 and were owned by Registered Social Landlords. The collection of data relating to environmental factors involved conducting an assessment of each of these properties using a checklist specifically developed for this project (see appendix 1). The checklist included the seven categories: Road network – was the property located on a true cul-de-sac, a leaky cul-de-sac or a through road? Did it have a real or symbolic barrier (i.e. a change in the road texture or colour)? Access – how close was the property located to a footpath and where did that footpath lead to? Awareness space – how heavy was the volume of pedestrian and vehicular traffic in front of the property? Parking – was it on street, in-curtilage or did the property have a garage? Social climate – was there evidence of litter, graffiti or vandalism? Traces – did the property have a burglar alarm?

The completion of the checklist involved certain conventions which should be made explicit. The intention behind the collection of these data was to assess a property's vulnerability to burglary as viewed by an outsider i.e. a potential offender. Therefore,

when assessing whether there was evidence of factors such as a Neighbourhood Watch scheme the objective was not to analyse the intensity of that scheme or even whether it actually existed, but purely to measure evidence of its existence as seen by an outsider. If there was a Neighbourhood Watch scheme in an area but no overt signs of the scheme it would be categorised as no. On the other hand, if there was no working scheme in an area, but signs of a scheme were present, it would be categorised as yes.

Once data relating to the 33 environmental variables had been collected, each environmental factor was cross-tabulated with prior victimisation (using recorded crime data provided by West Yorkshire police). The results revealed that of the 33 environmental factors, 13 were associated with the risk of burglary at the statistically significant level of 0.1 (of the 1058 properties, 170 had been burgled once or more). Although this level of significance is more relaxed than the conventional level, it has the advantage of yielding enough environmental factors from which a checklist can emerge. The environmental factors associated with burglary are presented in table 1.

Table 1: Environmental Factors Associated with Burglary

Environmental Factors	Level of Statistical Significance
Is the property adjacent to open space?	*
Road Network	*
Presence of Real/Symbolic Barrier	*
Does Estate have a footpath leading to local shops?	**
Does Estate have a footpath leading to a maze of other footpaths?	**
Does Estate have a footpath leading to another residential area?	*
Volume of Traffic at Nearby Road Junction	**
Volume of Pedestrian Traffic in Front of Property	**
Signs of Neighbourhood Watch Scheme?	**
Evidence that Property has a Burglar Alarm?	**

Is there a Gate leading from footpath into rear garden?	*
Are there signs of brief desertion?	**
Are there signs of long-term desertion?	**

* denotes significance at level of <0.1 (using Chi-Square)
**denotes significance at level of <0.05 (using Chi-Square)

Step Two: Assigning Scores

Having established the environmental variables which should feature in any prioritisation of crime reduction effort, the next step was to turn these into a scale for risk assessment. The method used, as was outlined above, involved selecting the environmental factors which were associated with burglary at a statistically significant level and subtracting the average risk of burglary for the sample as a whole from the percentage risk associated with each variable. For example, if the average risk of burglary for the sample as a whole was 20% and the risk of burglary for houses in a Neighbourhood Watch area was 5% and in an area without Neighbourhood Watch was 50%, then the score awarded to houses in Neighbourhood Watch areas would be -15 and the score awarded to houses in areas not covered by a Neighbourhood watch scheme would be +30. Once a score had been given to each of the environmental factors the 1058 properties included within the sample were awarded a total score (based upon the factors which they possessed). If the scoring system was valid, the properties experiencing the highest levels of burglary should be those with the highest Burgess scores (and vice versa).

Step Three: Validating the Findings

To validate the scoring system houses were divided into the 10% with highest Burgess scores, the 10% with next highest and so on down to the 10% with the lowest

scores. The rate of burglary suffered by each such band was then calculated. The mean incidence and prevalence of burglary for each decile was established to ensure that the lowest decile experienced the lowest level of burglary and the highest decile experienced the highest levels of burglary. This validation proved successful with positive correlations between Burgess Score and burglary incidence and prevalence (see table 2 below).

Table 2: Correlation between Burgess Score and Victimisation

Relationship	Correlation Coefficient
Burgess Score and Burglary Incidence	+0.6418
Burgess Score and Burglary Prevalence	+0.7978

The final Burgess Crime Risk Assessment Mechanism for risk of burglary is presented in table 3 below.

Table 3: Burgess Mechanism – Risk of Burglary

Environmental Factor	Burgess Score
Proximity to open land	Located next to open land – *score +3.1* Not located next to open land – *score -0.8*
Road Layout	Situated on a *cul-de-sac* without a linked pathway (true *cul-de-sac*) – *score -2* Situated on a *cul-de-sac* with a linked pathway (leaky *cul-de-sac*) – *score +2.3* Situated on a through road – *score +1.7*
Barriers	Situated on an estate with a real or symbolic barrier – *score -2.1* Situated on an estate without a real or symbolic barrier – *score +1.8*
Footpaths	Situated on an estate which contains a footpath leading to local shops – *score +10.2* Situated on an estate which does not have a footpath leading to local shops – *score -0.6* Situated on an estate with a footpath leading to a maze of other footpaths – *score +10.4* Situated on an estate which does not have a footpath leading to a maze of other footpaths – *score -1.6* Situated on an estate which has a footpath leading to another residential area – *score +1.8* Situated on an estate which does not have a footpath leading to another

	residential area – *score -1.3* A gate leading from a rear footpath into the rear garden – *score +19.6* No gate leading from a rear path into rear garden – *score -0.3*
Pedestrian Movement	0-5 pedestrians pass in front of the property in five minutes – *score -0.4* 6+ pedestrians pass in front of the property in five minutes – *score +9.5*
Neighbourhood Watch	Situated on an estate with evidence of Neighbourhood Watch – *score -5* Situated on an estate without evidence of Neighbourhood Watch – *score +1*
Desertion	Property shows signs of brief desertion – *score +25.6* Property does not show signs of brief desertion – *score -0.3* Property shows signs of lengthy desertion – *score +29.4* Property does not show signs of lengthy desertion – *score -0.3*
Total Score =	

Conclusion

The justification for the research presented within this paper lay with the need to clarify the debate surrounding the impact of increased permeability upon levels of crime and to produce a tool to assist crime reduction practitioners in their assessment of future crime risk. The research was conducted as a response to the recognition that whilst an increasing number of partners were becoming aware of their responsibility for the reduction of crime, this progress remained worthless whilst partners failed to agree upon what impact their actions would have upon crime. For those whose job it is to make decisions about planning applications regarding the design and layout of residential housing there remains a conflict in both advice and demands. Whilst criminological research warns of the dangers involved in increasing access and permeability, design guidance encourages the development of walkable neighbourhoods. In many instances communication and discussion between planners and ALO/CPDAs has led to a sensible compromise, taking into account both sustainability and the need to encourage pedestrian movement whilst at the same time avoiding unnecessary victimisation risks. What appears to be an initial conflict can

result in agencies realising that they are singing from the same hymn sheet and that they share the same aims. In other instances the contradictory guidance has led to frustration, conflict and confusion.

As well as providing a tool to assist practitioners, the findings presented within this paper should clarify some of the confusion regarding the impact of permeability on levels of crime within residential areas. This research largely supports the premise that properties positioned within permeable estates are more vulnerable to victimisation. In fact 8 of the 13 environmental factors which are associated with risk of burglary (at a statistically significant level) are indicators of increased permeability and access. These include being located on a leaky *cul-de-sac* or through road, being located within close proximity of a footpath and high volumes of pedestrian traffic passing in front of the property. It is recognised that the impact of these findings may be accepted with less enthusiasm by different audiences - for practitioners the findings offer a tool to assist work practices, for policy-makers they challenge assumptions. However, if they simply highlight the existing confusion, some progress will have been made.

Appendix 1: Other Environmental Risk Factors Checklist

Address: Day: Date: Time: Observed by Resident (i.e. twitching curtains etc.): yes/no Questioned/Confronted by Resident: yes/no

Road Network	**Yes**	**No**	**Other**
1) *Cul de sac* without linked pathway			
2) *Cul de sac* with linked pathway			
3) Through road			
4) Entrance to estate is marked by symbolic/real barrier i.e. change in road Colour/texture, pillars, gate etc.			
Access *** footpath is any pedestrian thoroughfare that is NOT a pavement/sidewalk**	**Yes**	**No**	**Other**
5) Number of properties away from footpath* a) 0 (i.e. adjacent)			
b) 1-5 (properties)			
c) 6-10 (properties)			
6) Footpath leads to: a) Shops			
b) Open land			
c) Maze of other footpaths			
d) Other residential area			
7) Footpath runs at rear of house			
8) Gate leading from footpath into rear garden			
9) Property is visible from footpath			
10) Boundary of property is marked by a) Wall			
b) Solid Fence			
c) Post and Rail Fence i.e. see through			
d) Thorny foliage			
e) Fence/wall topped with trellis			
f) Nothing			

Property within 'Awareness Space' of Others?	**Yes**	**No**	**Other**
11) Within viewing distance of 'Stop' sign			
12) Volume of Traffic at 'stop sign' a) Light (0-5 vehicles stop within 3 minutes)			
b) Moderate (6-10 vehicles stop within 3 minutes)			
c) Heavy (10+ vehicles stop within 3 minutes)			
13) Within viewing distance of traffic lights			
14) Volume of Traffic at traffic lights a) Light (0-5 vehicles stop within 3 minutes)			
b) Moderate (6-10 vehicles stop within 3 minutes)			
c) Heavy (10+ vehicles stop within 3 minutes)			
15) Within viewing distance of road junction			
16) Volume of traffic at road junction a) Light (0-5 vehicles stop within 3 minutes)			
b) Moderate (6-10 vehicles stop within 3 minutes)			
c) Heavy (10+ vehicles stop within 3 minutes)			
17) Average speed of traffic in front of residence			
18) Volume of traffic in front of residence a) Light (0-5 vehicles pass in 3 minutes)			
b) Moderate (6-10 vehicles pass in 3 minutes)			
c) Heavy (10+ vehicles pass in 3 minutes)			
19) Volume of pedestrian traffic in front of residence a) Light (0-5 pedestrians pass in 3 minutes)			
b) Moderate (6-10 pedestrians pass in 3 minutes)			
c) Heavy (10+ pedestrians pass in 3 minutes)			
20) People 'hanging around' within vicinity of property			
Surveillance	**Yes**	**No**	**Other**
21) Front door facing street			
Parking	**Yes**	**No**	**Other**
22) Driveway			
23) Garage			
24) Communal Parking			
25) Street parking			
Social Climate	**Yes**	**No**	**Other**
26) Evidence of Neighbourhood Watch Scheme			
27) Evidence of Litter/Graffiti within vicinity of property a) None			
b) Some			
c) Heavy			

28) General upkeep of Property a) No signs of disrepair			
b) Some sign of disrepair			
c) Many signs of disrepair			
29) Signs of short term desertion: e.g. milk bottles left outside			
30) Signs of long term desertion e.g. untended garden, piles of letters/newspapers, property boarded up			
Traces	**Yes**	**No**	**Other**
31) Evidence of dog			
32) Evidence of burglar alarm			
33) Window open/door ajar			

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