



# JDI Briefs: Predictive mapping (predictive policing)

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## 1. Introduction

This briefing note provides details of the predictive mapping approach initially implemented in Trafford, Greater Manchester, drawing from research from the UCL Jill Dando Institute of Security and Crime Science. It also describes a refinement to the original processes adopted in Trafford after an evaluative analysis and site visits.

The initial focus in Greater Manchester has been on residential burglary. This predictive mapping is now being extended to other types of crimes such as pedal cycle theft, vehicle crime and street robbery. The approach uses standard technology available to police and community safety agencies, and in Trafford’s case the responses have made use of existing resources.

The briefing note describes the theory that underpins the predictive mapping approach, analysis that should be conducted, police and local partner response opportunities, results from Trafford, and practical considerations. The final section lists a number of resources for further information.

## 2. The theory

### 2.1. Repeat victimisation (RV)

For over 15 years there has been strong empirical evidence for RV. That is (in terms of burglary):

- If you are burgled you are at a heightened risk of being burgled again
- This is not to say you will definitely be burgled again, but your risk (following the initial incident) doubles
- This heightened risk rapidly decays with time, dropping to the same level of risk as other properties within 1-2 months. The highest period of risk is within a few days of the initial incident.

Because of this, the concept of RV is considered to be perhaps the best variable available for predicting crime.

### 2.2. Near repeat victimisation (NRV)

If you are burgled, then your neighbours are also at a heightened risk of being burgled. This level of risk is lower than for the property that has been burgled, and decays with distance from the burgled property. Similar to RV, this heightened risk decays over time.

This is illustrated in the figure opposite, showing how the heightened level of risk extends to neighbouring properties, and decays in space and time.

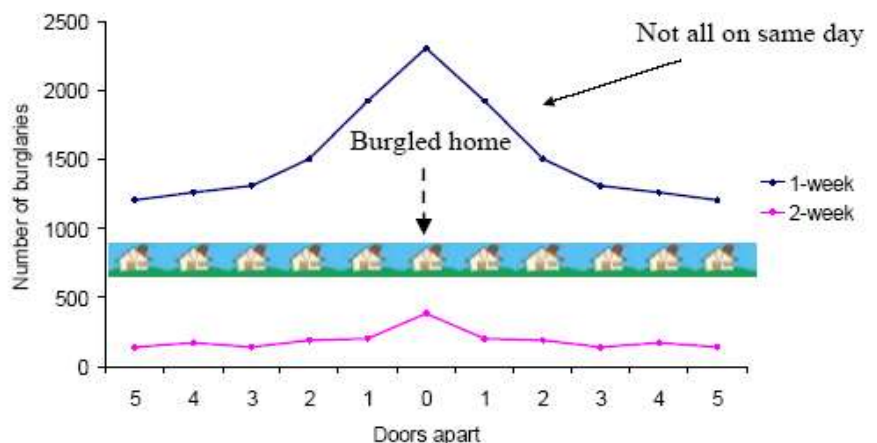


Figure 1. The spatio-temporal pattern of RV and NRV.

### 2.3. Boost and flag accounts

The reason for RVs and NRVs is primarily believed to relate to the boost account theory:

- Boost account: future victimisation is boosted by the initial incident i.e. the offender got away with it, so why not do it again, and to the same property because he knows how to get in, the layout of the property and what he left behind previously.

This boost theory also applies to neighbouring properties – the chances of being burgled are boosted by the initial burglary because the properties are more likely to be similar in design (in comparison to properties further away), the offender is already familiar with the area (having chosen to burgle here previously), the means of breaking in and the layout of the property are likely to be similar (so he knows his way around), and the neighbours are likely to have possessions worth stealing, similar to those he stole in the initial burglary.

The flag account theory suggests there is some enduring characteristic about the property that ‘flags’ it as being more vulnerable to a break-in. For example, it could be a property at the end of a terrace, which has an alley running along the back, appears to have poor door and window security – all of which are signals that identify an easy target to a would be offender.

In practice, it is likely that both theories are at play. For instance, the flag characteristics of a property may initially attract an offender because it’s seen as an easier target, with the risk of future burglary being boosted following an initial incident.

#### **2.4. Optimal forager and offender interviews**

A final theoretical consideration is that of the offender as an optimal forager. This is the concept of likening burglars to foraging animals. As a forager, an animal makes a trade-off between the energy value of the food that is immediately available and the effort that will be expended in reaching a better food source. The better food has to be good enough to offset the energy required to travel and attain it. The quality of the food in over-grazed areas diminishes until it re-grows. This is akin to a repeatedly burgled property, where the value of the items taken from this property declines until these items have been replaced. Once an area has been grazed out (i.e. skimmed of the best theft opportunities), the forager moves on. This foraging behaviour is consistent with the findings from interviews conducted with offenders.

### **3. Analysis**

The first part of any predictive mapping process involves establishing the impact that RV and NRV has on local burglary levels. If you do not have a RV or NRV problem then you can’t use burgled properties as a means of predicting future burglaries! However, evidence from a number of studies suggests:

- RV accounts for 7-15% of all burglary (that is counting only the repeats and not the initial incidents) i.e. if you have 100 burglaries in a month, upto 15 of these would be repeats
- NRV accounts for 10-40% of all burglaries.

There a number of ways you can measure the level of RV. The simplest is to use one year of recorded crime data and identify those properties that appear more than once. This can be done by identifying coincident x and y geographic coordinates, the same address (in its textual form e.g. 5 Acacia Avenue) or a combination of the two.

We advise using the free Near Repeat Calculator to measure near repeats. The NR Calculator identifies if there is a statistically significant NRV problem, and within which space and time metric e.g. within 2 days and 100m; within 1 day and 300m. It can also be used for identifying if there is a statistically significant RV problem. The NR Calculator also allows you to extract the results and map those burglaries that were near repeats as a consequence of an ‘originator’ burglary. See the resources section for further information.

### **4. Police and partnership responses**

The main aims of the responses for addressing RV and NRV are to reduce the heightened risk of properties being burgled and disrupt the foraging behaviour of the offender. This can be achieved in the following three ways:

- Minimising the heightened risk of RV: a crime prevention officer visits the burgled property within 12-24 hours and carries out a security audit. The main aim of this is to identify vulnerable features about the property and initiate immediate action to address these. It could include improving locks, mending a damaged garden fence (that provides easy access to the property), cutting back foliage to improve natural surveillance, and particularly in winter, fitting timer plug sockets so that certain lights come on during hours of darkness, even if the resident isn’t at home.

- Minimising the heightened risk of NRV: police officers should visit all neighbouring properties within 100m of the burgled property and deliver a message that has three components to it: informs – reassures – advises. The message should optimally be delivered verbally within 24 hours of the burglary. Posting a leaflet through the door with general burglary prevention advice is unlikely to resonate with the resident that they are at a heightened risk and that they should take immediate action. A script along the following lines should be used:
  - Inform: be honest and frank, and tell the resident *“I’m not sure whether you are aware, but there was a burglary a few doors up yesterday”*. It’s possible the resident knows there was a burglary or may be concerned why the police turned up at the door of a neighbour the day before
  - Reassure: tell them *“the chances of you being burgled are very low”* because they are. Although they are at a heightened risk, the actual probability of them being burgled is still very low. If you say *“you are at a heightened risk of being burgled”* it’s likely they will interpret this as a burglary is imminent! The fact that a police officer is on their doorstep speaking to them has already raised alarm and concern, so tempering this with a realistic measure of their risk is likely to reassure
  - Advise: tell them *“there are a couple of things that you can do to help us out. If you see anything suspicious then here is my number, give me a call”* (i.e. provide a telephone number that will prompt the police to respond). Then offer practical seasonally-sensitive, tailored crime prevention advice. For example, if it’s a Mum who’s about to go on the afternoon school run, and the previous burglary took place between 15.00 – 17.00, and its December advise them to leave a light on before they leave. This tailored advice should be guided by analysis specific to the burglary problem in this area, and the time of year. For example, if the burglary problem is more to do with car keys being stolen at night, and cars on the driveways being taken, the crime prevention advice should be tailored to this problem.

All three parts of this message must be delivered together. The aim here is to minimise the heightened risk of NRV, providing relevant information that resonates, and is more likely to empower residents to respond by taking some responsibility themselves to minimising their future risk by applying practical crime prevention measures. Anything that sends a signal to the offender that the house is occupied and it’s riskier to break in, will help to deter. The displacement pessimists will say he’ll just go next door, but if the message is delivered consistently, it’s likely the heightened neighbourhood vigilance will not result in a net displacement effect. Indeed, studies have shown that a diffusion of benefit is just as likely. If resources permit a security audit should be carried out on the two immediate neighbouring properties to the burgled property i.e. reduce burglary risk where it is next highest.

- It is likely that it will be the offender who committed the first burglary who will return to commit the repeat or near repeat. Police officers carrying out the door-to-door visits should be vigilant of suspicious persons. Research also suggests that it is likely that these repeat and near repeat spates are carried out by prolific offenders rather than offenders who commit the odd one or two burglaries. As it is likely that prolific offenders are more known to the police, if one is spotted in the neighbourhood their presence and whereabouts the day before should be challenged. Intelligence on these burglaries should also feed into the supervisory processes of prolific and priority offenders and recent prison releases. If a repeat or near repeat takes place then these should be prioritised for forensic analysis to see if this identifies someone known to the police.

In Trafford, Neighbourhood Police Team Police Community Support Officers (PCSOs) are used to deliver door-to-door messages. In the first four months of using this tactic, approximately 45% of messages were delivered verbally. When there has been no answer at the door, and resources permit, the PCSO makes a return visit or asks their neighbour to pass on the message. The presence of a police officer in high visibility clothing, visiting neighbours at the time of the day when the previous burglary happened will also have a deterrent effect on any would be returning offender looking to take advantage of other perceived opportunities in the area.

In summary, the response should offer targeted, tailored and seasonally-sensitive crime prevention, take advantage of deterrence opportunities to disrupt an offender’s behaviour, and prioritise forensic analysis alongside intelligence to support the supervision of prolific burglars.

**5. Results from Trafford – reduced burglary and increase in public confidence**

GMP Trafford have seen burglaries reduce by 27% in the first year of operating these responses. More notable is a reduction of 42% in areas identified as places of heightened risk and where their response has been targeted, compared to a reduction of 2% in non-targeted areas.

	<b>Targeted</b>	<b>Not targeted</b>	<b>Trafford</b>
<b>2009/10</b>	750	479	1229
<b>2010/11</b>	432	470	902
<b>Change</b>	<b>-42%</b>	<b>-2%</b>	<b>-27%</b>

More recent analysis has shown that levels of RV are now extremely low, with only 1 repeat per month in comparison to an expected 4 repeats per month (based on previous crime levels). Near repeats have fallen to 2 per week in comparison to an expected 4 near repeats per week (based on previous crime levels).

Another interesting observation is that GMP’s public confidence measure for Trafford far exceeds any other borough in Greater Manchester. While no evaluation has yet been carried out, it is possible that the 3000+ visits by PCSOs to residents, delivering a verbal message that is honest and frank, reassures and advises, and has led to fewer victims of crime, leaves a positive feeling of public confidence in the police.

Feedback from NPT Inspectors has also been positive, suggesting the tasking of PCSOs to visit neighbouring properties to a recently burgled home gives these PCSOs something very focused (and intelligence-led) for them to do.

Trafford have yet to evaluate if the approach has improved detection opportunities.

**6. Sustaining the reduction**

The temptation, following a response that has worked, is to take these responses for granted, consider the problem as solved and begin to remove this operational initiative. Repeats and near repeats are phenomena that occur in crime, so removing a response that is tailored to addressing RVs and NRVs is likely to result in an increase in RVs and NRVs!

Analysis of persistent and emerging hotspots in Trafford has helped to identify where a further 20% of burglary is likely to occur (in just 4% of the area of the borough). This has helped to identify strategic crime prevention opportunities with local partners and help further tailor responses that are specific to certain areas. For example, the analysis has helped identify an area of predominantly housing association managed property, and as result has prompted a partnered response between the police, council and housing association to address the vulnerability of these properties. That is, address some of the ‘flag account’ enduring characteristics of these properties.

**7. Practical considerations**

This predictive mapping approach is based on addressing repeats and near repeats. This therefore points to the initial requirement of analysing if you have a RV and/or NRV problem, and the proportion of offences that are RVs and NRVs. If you have neither, then the responses described in this briefing note are unlikely to address your crime problem! Establishing a measure of the level of RVs and NRVs will help you estimate the potential reductions you can achieve by minimising them.

A commendation to GMP Trafford is that they’ve designed their responses from the theory. Analysis helped them identify the presence of a RV and NRV problem, interpret it in relation to offender behaviour, victimisation and vulnerability, and then think through the practicality of their responses. They’ve also presented their work to practitioners and academics, not only to promote it but also open it to scrutiny. They also commissioned us to review their work halfway through, and identify if there were opportunities for improvement. The main improvement being the design and verbal delivery of the inform-reassure-advise message that has been fundamental to their most recent successes.

## 8. Application to other types of crime

RV and NRV are patterns seen in other types of crime, including vehicle crime, violent crime, pedal cycle theft and even shootings. This means the theory, analysis and concept of the responses that have been designed for dealing with burglary have potential in helping tackle these other types of crime.

## 9. Resources

The Trafford Experiment:

<http://www.ucl.ac.uk/scs/research-consultancy/geographical-analysis/GMPTraffordExpmnt>

The International Crime and Intelligence Analysis Conference, 2011: Disrupting the optimal forager: predictive risk mapping and domestic burglary reduction in Trafford, Greater Manchester:

[http://www.ucl.ac.uk/jdi/events/int-CIA-conf/Abstracts/ICIAC11\\_Stream5](http://www.ucl.ac.uk/jdi/events/int-CIA-conf/Abstracts/ICIAC11_Stream5)

Twitter: #predictivepolicing

UCL JDI Predictive Mapping training course:

<http://www.ucl.ac.uk/jdi/short-courses>

Near Repeat Calculator:

<http://www.temple.edu/cj/misc/nr/>

Farrell, G. and Pease, K. (1993). Once bitten, twice bitten: repeat victimisation and its implications for crime prevention:

<https://dspace.lboro.ac.uk/dspace-jspui/handle/2134/2149>

Lamm Weisel, D. (2005). Analysing repeat victimisation:

[http://www.popcenter.org/tools/repeat\\_victimization](http://www.popcenter.org/tools/repeat_victimization)

Johnson, S.D., and Bowers, K.J. (2004). The burglary as clue to the future: the beginnings of prospective hot-spotting. *European Journal of Criminology*, 1(2), 237-255.

Bowers, K.J., Johnson, S. and Pease, K. (2004) Prospective Hotspotting: The Future of Crime Mapping? *British Journal of Criminology* 44 (5), 641-658

Guerette, R. T. and Bowers, K. (2009) Assessing the extent of crime displacement and diffusion of benefit: A systematic review of situational crime prevention evaluations. *Criminology* 47(4) 1331-1368

## Feedback/comments

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