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Evidence-Based Policing of

Residential Burglary:

A Systematic Review of

What Could Reduce Burglary in Denmark

A Report for the Danish Politi to



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ABSTRACT

What can Danish police do to reduce burglary of people's homes? A substantial body of global research is relevant to this question. It illustrates, but does not provide, specific guidance for a Danish "Triple-T" framework of police decision-making about burglary. The relevant research can be applied in this action framework of 1) selective *targeting* of police actions, 2) comparative *testing* of police actions against burglary, and 3) comprehensive *tracking* of police actions performed each week in relation to weekly burglaries. This framework can be illustrated in a case study of Triple-T against burglary.

A Case Study. Police in Leeds, England, selectively *targeted* a series of 14 known repeat burglars in one neighbourhood beat based on their modus operandi (M.O.) in crimes with prior arrests in that area. With no increase in officers, they *tested* a strategy of investigation conviction and prison sentence. Burglaries went down 60% in the test beat, compared to no change in other areas. Then police *tracked* the ongoing incarceration in relation to the M.O.s of all new offences, finding that burglaries dropped with each new burglar going to prison.

1. Selective *Targeting* of Burglars and Burglaries. Police in Leeds succeeded because they targeted the small percentage of all burglars who committed the majority of all burglaries in a high-burglary area. New *"big data"* methods are now used to predict who will commit the most burglaries, as well as where they are most likely to occur. Intensive investigations of specific burglaries or burglars can also be targeted based on data-analytic forecasts of *how likely each case is to be solved*, so that more cases can be solved overall.

2. Comparative Testing of Burglary Prevention and Detection. Once high-yield burglars and burglary incidents are targeted in Denmark, what worked elsewhere could be tested here.

Prevention tactics that worked overseas include an *arrest crackdown* of the most active burglars in an area, *warning messages* to suspected burglars and recruiters of young people as co-offenders, *warnings & prevention kits* for neighbours of burglarized homes, *serving warrants* and *covert surveillance* of convicted burglars recently released from prison, and police *not prosecuting first-offender* burglars who agree to voluntary rehabilitation, including restorative meetings with burglary victims.

Detection methods from overseas that can be tested locally include *offence-offender profiles* to identify known burglars with similar modus operandi patterns in each new burglary (which tripled arrest rates per burglary); spending *slightly more time* at initial crime-scene investigations; *expanding DNA collection* at crime scenes (also tripling arrests); *closing most cases* after initial investigation unless a statistical forecast indicates an arrest is likely; *dispatching more officers* to burglaries in progress.

3. Tracking Burglars, Burglaries and Policing. Once successful tests support more effective policies for preventing and detecting burglaries, both crime and policing may "adapt" to new policies. A weekly statistical "burglary dashboard" for observing and correcting any newly developed patterns can be tested as a means of driving burglaries down, and not just displacing them to other people, places or methods, at local and District levels.

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SUMMARY

What can Danish police do to reduce burglary of people's homes? A substantial body of global research is relevant to this question, and could be useful for designing innovations in Denmark. How much of that global research evidence would hold true in Denmark is unknown. The only way to answer that question would be to repeat the research previously done other countries in Denmark itself. Even better would be to undertake the same project in different areas of Denmark, exploring whether certain burglary prevention strategies might work better than others across the 14 police districts. These strategies contain many specific tactics, all of which can be organized into three kinds of innovation: targeting, testing and tracking—the three "Ts" of evidence-based policing strategy.

Triple-T Framework. The global knowledge on policing residential burglary falls into the three main categories of decisions on the uses of police resources against burglars and burglaries. The purpose of this report is to provide a framework for policing residential burglary, on which to present a research-based menu of different possible projects for Danish police to consider. The framework is focused on three kinds of decisions for managing police actions:

targeting more police resources on the most harmful, high-priority crimes and criminals (a "power few");

testing ways police can stop or slow down those priority offenders and offences; and

tracking how burglars change their behaviour in response to what police actions are actually implemented.

Reactive vs. Proactive Policing. This framework encompasses policing that is both *reactive* to the report of each burglary reported by a crime victim, and *proactive* in identifying and arresting burglars based on their ongoing *modus operandi*. It raises a key question of what the optimal balance may be between reactive and proactive policing of the small number of burglars.

A Research Smorgasbord. This report does not presume to lay out a police strategy for reducing residential burglary in Denmark. It offers a menu of research findings under all three "Ts" from which Danish district and national police can pick and choose. The report concludes by recommending some easily-launched projects that can prime the pump for further development. Yet no evidence shows that one pathway for innovation works better than any other. The main aim of the report is to provide one or more attractive options for getting started with a research-based approach to policing burglary.

A Case Study: Targeting A Few Burglars, Testing A Crackdown, Tracking Trends. Police in Leeds, England, selectively *targeted* a series of 14 known repeat burglars in one neighbourhood beat based on their modus operandi (M.O.) in crimes with prior arrests. The crackdown was given no increase in the number of police officers, relying "*simply upon the reallocation of existing policing resources by using the local community beat officer and the sergeant*" [just two police officers]. What Leeds police *tested* was a strategy of investigating one person at a time, achieving arrests, pre-trial custody, conviction and prison sentences, until they had arrested and incarcerated 80% of the list of targeted repeat burglars. As the proportion of targeted burglars who were jailed went up, the number of burglaries went down, dropping by 60% in the test beat. By comparison, there was no change across the rest of the District in the number of burglaries. Nor was there any increase in burglaries in the area surrounding the target beat; instead, burglary also dropped in those adjacent areas, suggesting a spreading deterrent or incapacitation effect rather than a displacement effect. After the crackdown succeeded, police continued to *track* the ongoing arrests in relation to the number of new offences and M.O. used in those offences. This tracking constituted ongoing feedback to the beat officer and sergeant, with ongoing praise of arresting each repeat offender.

The Leeds case study illustrates the larger principles of a research-informed, evidence-based policing strategy for making better decisions on the three Ts.

1. Targeting Burglars and Burglaries. In the available research, a small percentage of all burglars apparently commit the majority of all burglaries, often at a small minority of residences. While most reported burglaries remain unsolved in countries with honest crime reporting, enough burglars are caught to identify a wide range of offence frequency. In general, most burglars are arrested for very few burglaries, while a few burglars are arrested for many. This pattern can be identified by looking backwards at prior arrests. But those prior arrests can help to predict future crimes.

New "*big data*" methods are now available that can predict who will commit the most burglaries, as well as where burglaries are most likely to occur. These predictions can build on new concepts in classifying burglars.

- Prolific burglars can be identified as suspects at each burglary scene by linking a *modus operandi* (MO) profile at each scene to MO profiles of burglars who have been arrested in the past.
- The most prolific burglars in any police district can be identified and updated regularly by systematically *ranking* all arrested burglars by lifetime total burglary arrests, and using intelligence to identify most active burglars each week;
- Older burglars who become "*recruiters*" of younger, first-offender burglars can be identified by rank-ordering all arrested burglars by their numbers of co-offenders, based upon their history of arrests for jointly committing burglaries.
- An updated list of potential burglary suspects can be produced weekly with statistical risk analysis of likely repeat offending for all *burglars returning from prison*, past on prior risk factors.
- Policing *locations* where burglaries are predicted can also be targeted after each crime, based on repeat burglary patterns.
- Intensive investigations of specific burglaries or burglars can be targeted based on data-analytic forecasts of *how likely each case is to be solved*.

2. Testing Burglary Prevention and Detection. Once high-yield burglary targets are identified, tactics succeeding against those targets elsewhere could be tested in Denmark.

Prevention tactics that police have tested overseas to reduce burglaries include the following:

- an *arrest crackdown* of the most active, previously detected burglars in an area;
- *warning messages* to burglars who repeatedly recruit young people as co-offenders;
- *home visits* by police to known burglars on a periodic basis;
- covert *surveillance of convicted* burglars recently released from prison, sometimes catching them in the act of burglary or in possession of stolen goods
- *police advising victims* of how to "harden" their homes against access by burglars;
- *police loaning burglary victims a package of prevention hardware* to use in their homes for a period of time after each burglary, the rotating the package to victims of new burglaries;
- police *not prosecuting first-offender* burglars who agree to voluntary rehabilitation tactics, including restorative meetings with burglary victims.

Detection tactics that police have tested overseas to arrest more burglars include the following:

- Generating *offence-offender profiles* to identify known burglars with similar modus operandi patterns in each new burglary case (which hase tripled arrest rates per burglary);
- Burglary investigators spending *slightly more time* at each burglarized home in initial crime-scene investigations;
- Burglary investigators *expanding DNA analysis of evidence collected* at crime scenes (which also tripling arrest rates);
- Closing most cases after initial investigation unless a statistical forecast indicates an arrest is likely (this tactic appears to have saved wasted time, but the crucial test of whether it actually increases detections has yet to be conducted anywhere).
- **3.** Tracking Burglars, Burglaries and Policing. If successful tests in Denmark supported more effective policies for preventing and detecting burglaries, the next challenge would be to fully implement those policies. Many policies that are effective in tests have failed in practice for lack of tracking. No police agency overseas has ever fully-implemented the Triple T *above the beat level*, although the Leeds example shows how well a program can be implemented on a small scale. The challenge is to raise implementation to a large scale, with most Districts tracking hundreds of home burglaries and police actions against them each year. A weekly statistical "burglary dashboard" for observing and correcting any newly developed patterns can, for example, be tested as a means of driving burglaries of homes down even further, and not just displacing them to other people, places or methods—both locally and nationally.

Not Response Time. One measure research suggests should not be tracked is average police response time from the minute a burglary is reported (Spelman & Brown 1981). The delay between when a burglary occurs and when it is reported is, on average, so long that rapid police response becomes irrelevant to solving a case. The exception to this pattern is any "contact" burglary in which a victim encounters a burglar in the home, or sees a burglar fleeing the home upon arrival.

Tracking Targeting Implementation. Given extensive evidence that burglary reductions come more often from "proactive" (police-initiated) actions than from "reactive" (citizen-requested) actions (Reiss, 1971), the biggest challenge any police agency faces may be to implement a strategy that is more proactive and less reactive than traditional strategy. The core indicators for tracking this issue with *prevention* activities can include a weekly compilation of percentage of preventive actions accomplished (deBrito 2017) for each local police beat. The core indicators for tracking this issue with *detection* activities can be built on the distinction between investigating *burglars* vs. *burglaries*. To the extent that investigative tasks can be assigned in relation to specific suspects, they would be deemed proactive; to the extent that the tasks are assigned in relation to specific cases, they would be deemed reactive.

On an ongoing (perhaps monthly) basis, a tracking dashboard for targeted prevention tactics could assess both the *implementation* of those tactics as well as their *impact*. It could also lead to short-term decisions to invest more or less uniformed police time in various preventive tactics. One commonly used indicator is percentage of burglaries followed by a repeat burglary within 4 weeks, which (while low in Denmark generally) may also vary across areas and within them over time. Tracking that measure could help insure an always-nimble response to shifting burglary patterns.

A tracking dashboard for detections could compare the yield of burglars arrested from proactive vs. reactive investigations. It could also lead to short-term decisions to invest more or less investigative time in the two different strategies.

Tracking Prevention Actions. One prime example of the importance of tracking is the tactic of immediately notifying neighbours of any burglary in their immediate vicinity. This tactic requires hundreds of homes a week to receive information from police, despite the tedium that such work may generate. Pegram (2016) has documented the failure of an English police force to deliver the prescribed notifications without relentless auditing and feeding back to individuals that they had not accomplished the assigned notifications (into mailboxes in the targeted homes). Similarly, the programs of police visiting known burglars or warning burglar recruiters can easily fall victim to implementation failures. A serious commitment to insuring that assignments are completed, based on best evidence, can only be fulfilled by tracking. Whether 100% of the assignments need to be audited, only 5%, or something in between is not a question that research has yet addressed, overseas or in Denmark. It would, however, be a major step forward to learn the answer by comparing "census" tracking to "sample" tracking—the latter being far less expensive and intrusive for those being tracked.

Tracking Investigative Actions. The key concept in creating fair comparisons between different strategies and tactics of detections is the rate of *detections per officer-hour*. Absent a "level playing field" of constant measures of police time invested, it is not uncommon for people who prefer one method over another to distort the statistics in favour of that preference. Most of the police budget is comprised of personnel costs, but little cost-accounting assigns those costs to different activities. Optimizing investigative resources to

increase burglary detections can begin with a standard for tracking the time of each investigator in relation to different activities. While that once may have been a paperwork burden, digital tools or notifications to dispatch centres can easily record the start and end times of each investigator's activity with each burglary suspect (proactively investigated) or burglary case (reactively investigated).

A further tool for assessing returns on investments of investigative time is the idea of a Danish "*crime harm index*," which will soon be available for use by Danish police. The index is under development by Danish police staff based on either actual sentence lengths for each crime type, or prosecutorial rankings of the severity of each offence type (cite two M.St. theses completed in 2017). The value of detecting each burglar or burglary can then be weighted by the overall index value based on seriousness of different crimes committed in the course of, or in addition to, burglaries committed. These and other tools can refine the traditional computation of detection rates by Districts and areas.

Burglary Prevention by Police Action: Specific Examples

- Burglaries in Birmingham, UK have been prevented in a police experiment that loaned a "free" burglary prevention hardware package (home lights, timers, chimes) to both burglary victims and their nearest neighbours immediately after each burglary, reducing both the re-victimisation of the original target and the burglary rates of neighbours relative to control areas (Johnson et al 2017).
- A police warning randomly assigned to known criminal network recruiters by Sacramento Police reduced arrests for burglary and other crimes by recruiters (Ariel and Englefield 2017).
- Home visits to burglary offenders in randomly assigned burglary hot spots in a suburban US city showed non-significant but promising burglary reductions (Santos & Santos 2016).
- Burglars who were caught in the act while under randomly assigned police surveillance were five times more likely to be incapacitated from committing burglaries by being sentenced to a long prison sentence (Martin and Sherman 1985).
- Since Sherman & Weisburd (1995) first tested increased police patrol in marked cars near micro-place hot spots of crime, a series of replications of hot spots patrol experiments have reduced a range of crimes including residential burglaries, based on small increases in patrol time relative to control areas (Braga et al 2012).
- Juvenile offenders, including many burglary arrestees, were less likely to commit further crime across a large systematic review of randomized trials if they were diverted from prosecution than if they were processed in juvenile court (Petrosino et al 2010).
- More arrested first offenders, including burglars, were deflected to less harmful offending when they were diverted from prosecution to immediate rehabilitation supervised by police in a randomized experiment in Birmingham UK (Slothower et al 2017).
- Burglars who pled guilty in London were deflected to less harmful offending if they were randomly assigned to police-led restorative justice conferences with their victim than if they were not (Sherman, et al, 2015).

Increased Detections: Specific Examples

- More burglars can be arrested by using evidence-based "offence-offender" profiling (Fox and Farrington 2012, 2016), linking categories of burglary modus operandi reported at the crime scene to match M.O. types to the kinds of people (and specific individuals) previously arrested for burglaries with that kind of M.O. (Fox and Farrington 2015).
- More burglars can be arrested if crime scene investigators spend somewhat more time at a residential burglary crime scene, and take more time to speak to victims (Antrobus and Pilotto, 2016).
- Statistical models can predict with 85% accuracy at the point of initial investigation whether a further investigation of that reported burglary is highly unlikely to lead to an arrest and prosecution; conversely, if a case is likely to be "solvable," more time can be invested in it to fulfil that potential (Eck 1983).
- One predictor of whether a burglary will be solved is the number of police officers assigned to the early stage of an investigation; adding more officers to initial investigations may make more difference to detections than adding more officers after triage based on predicted detection probability (Coupe 2016). Similar findings are reported by Robinson and Tilley (2009), both based on UK data.
- Adding DNA testing to investigations of burglary cases with DNA evidence tripled the rate of detections in a large randomized experiment in five US cities with some 500 cases (Roman et al 2009).

Pathways to Fewer Burglaries: A Research & Development Smorgasbord

There is no research on the question of where it is best to begin an evidence-based approach to policing burglars and burglaries. What seems to matter most is for someone willing to lead selects a place to start, and pursues that pathway with persistence and resilience. Whether someone reading this document is most attracted to targeting, tracking or testing may not matter. What may matter most is that the spark of curiosity is struck, igniting the fuel to produce new knowledge and action for reducing burglary in Denmark. This seems most likely to happen with relatively small, or at least tightly focused projects. The following are merely two examples drawn from a much larger range of possibilities.

- **Targeting Prolific Burglars Across One Police District.** A sweep of every name of persons arrested for burglary over five years could lead to a useful analysis of arrest patterns, comparable to studies of domestic abuse patterns (Bland 2015; Barnham 2017). This segmentation of 100% of arrestees would likely find a "power few" of burglars whose actions could be targeted with great potential for burglary reduction.
- Offence-Offender Profiling. Analyzing MO patterns for different types of burglars (Fox and Farrington 2012; Armstrong 2017) can yield a small list of suspects for each burglary, based on previous identification of the same MO. Creating such a data base for a police district would provide a resource that could be tested for increasing detections.

REPORT

1. Objectives and Methods

1.1.Objectives of this Study

The objectives of this study are three-fold:

First, to present a systematic description of the available global research on what police can do to reduce residential burglarySecond, to put that research in a coherent framework of police decisions to target, test and track the use of police resources in reducing residential burglary.Third, to offer a range of opportunities from which Danish police may choose to replicate or apply these research findings in their own efforts to reduce residential burglary.

The **first objective** of systematic description requires that the report use a technical method of research known as a "systematic review," which is described in section 1.2. below. The logic of this method is to be as comprehensive as possible in identifying all answers to the same question. When the answers are consistent, we can generally be more confident that the answers are correct. When the answers are inconsistent, we must be more cautious in drawing any conclusions—except that more research is needed. Even when the answers are consistent, more research may always be needed about whether the conclusions would apply to Denmark in 2018. That is especially true if the findings were based on burglars and burglary patterns in England in 1997.

It is important to note what the systematic review excluded. Because the focus was on policing that reduces the *number* of burglaries, the review omits any discussion of other roles police play in relation to burglary. The review omits discussion of important research, for example, on how police can help to reduce the post-traumatic stress symptoms of burglary victims (Angel et al 2014), or on how police can increase victim satisfaction with police investigations of burglary (Antrobus and Pilotto 2016). All three objectives share this focus on reducing burglaries. The report defines this focus as including the *detection* of burglary, and *arrests* and *prosecutions* of burglars as a core element of police strategy for burglary reduction.

The **second objective** (of arranging the research in a coherent framework of evidence-based policing) is designed to help police "connect the dots" between research findings and police operational decision-making. It is one thing to say that there *is* research on policing burglary. It is another thing to *envision how* that research can be put to work. The Cambridge Police Executive Programme has a constant discussion of "so what?" in relation to each and every police research project. This discussion is led by the former Chief Constable of a large English police district (Surrey) who was also the head of a national policing inspection agency dating back to the 1850s. His role in discussing research is always aimed at insuring

clarity of the specific steps that would need to be taken to use the research in action. This report does not aim to do that with each topic it discusses. It does aim to provide a framework by which the use of any research on policing can be put into action against residential burglary.

The **third objective** (of providing a smorgasbord of possible projects) is offered to increase the odds that at least one project described in the report will whet the appetite of some reader who will act on it. Offering a wide range of choices can sometimes discourage people from making any choice at all. Yet in this case, our theory is that what police in other countries have done--with great enthusiasm--may prove equally appealing to at least one of the 10,000+ Danish police officers. As we know from our Cambridge thesis projects undertaken by hundreds of police from around the world, very success research projects can be achieved from the dedication of just one officer.

The next section (Section 1.2) provides technical detail about how the research review for this report was conducted. Readers who wish to focus more on the substance of the report may wish to skip ahead to Part 2 of the report, the case study of Triple-T policing against burglary in Leeds, England.

1.2.Methods Used to Identify Relevant Research

Search Strategy

The research cited in this study was obtained with the aid of a rapid evidence assessment to identify and review literature on police-led burglary interventions in relation to i) prevention, ii) detection, or iii) solvability.

Unlike a full systematic review, which aims to search the entire evidence base comprehensively, the scope and coverage of the rapid evidence assessment was focused on the most relevant literature. This focus was accomplished through the use of search and screening criteria selected to find the most relevant studies. The search also relied on earlier literature reviews conducted for the Cambridge Centre for Evidence-Based Policing (2017) report to TrygFonden, *Mobilising civil society against residential burglary: The evidence.* Our literature review for this report covered academic literature as well as "grey" (unpublished) literature. The main search engines used were Web of Science, Criminal Justice Abstracts and Academic Search Complete, because they cover academic publications from a wide range of disciplines.

Details of the searches conducted are in Table , with inclusion and exclusion criteria summarised below.

TABLE 1: Search Results Summary

Search criterion	Studies found	Number of abstracts reviewed	Articles included on the basis of title and abstract
		Tevieweu	review*

Burglary AND Police AND Prevention			
TOPIC: (burglar* police prevention) Timespan 1980 - present. Index: Criminal Justice Abstracts	30	6	1
TOPIC: (burglar* police prevention) Timespan 1980 - present. Index Academic Search Complete	20	4	1
TOPIC: (burglar* police prevention) Timespan 1980 - present. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI- SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC	35	5	4
Burglary AND police AND detection			
TOPIC: (burglar* police detect*) Timespan 1980 - present. Index: Criminal Justice Abstracts	21	12	2
TOPIC: (burglar* police detect*) Timespan 1980 - present. Index Academic Search Complete	28	8	2
TOPIC: (burglar* police detection) Timespan 1980 - present. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI- SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC	12	3	1
TOPIC: (burglar* police detect*) Timespan 1980 - present. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI- SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC	27	8	5
Burglary and police and solvability			
TOPIC: (burglar* police solveability OR solvability) Timespan 1980 - present. Index: Criminal Justice Abstracts	19	4	1
TOPIC: (burglar* police solveability OR solvability) Timespan 1980 - present. Index Academic Search Complete	1	0	0

TOPIC: (burglar* police solveability OR solvability) Timespan 1980 - present. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR- EXPANDED, IC	2	5	1

* Does not include sources already captured in a previous search (i.e. duplicates).

Table

For all searches, the publication timeframe was 1980 onwards to capture literature from the past 37 years. The rationale behind this relatively wide timeframe for the searches is that on many key questions concerning burglary, the best research evidence remains that which was published in the 1980s. At that time, burglary rates were far higher in the US and the UK than they are today, and attracted more academic attention in English-language research than in more recent years. Article language was not specified in the search engine terms, but the searches used English terms and all included articles were written in English. Both the searches on prevention and detection impact assessments were limited to studies using control or comparison groups. No such restriction was placed on the search for studies of crime solvability factors, as those studies did not need a comparison to demonstrate absolute levels of predictive accuracy. Solvability studies yield models that predict which cases are most likely or unlikely to be solved; these models can be used by police to focus resources more effectively. Commentaries, editorials, features and conference abstracts were generally excluded.

Also included for full text review were 13 articles that had been identified in a previous review of the literature conducted for the TrygFonden.

 Table 2 Searches run to identify articles for rapid evidence assessment

Search criterion	Studie s found	Number of abstracts reviewed	Articles included on the basis of title and abstract review*
Burglary AND Police AND Prevention			
TOPIC: (burglar* police prevention) Timespan 1980 - present. Index: Criminal Justice Abstracts	30	6	1
TOPIC: (burglar* police prevention) Timespan 1980 - present. Index Academic Search Complete	20	4	1
TOPIC: (burglar* police prevention) Timespan 1980 - present. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC		5	4
Burglary AND police AND detection			
TOPIC: (burglar* police detect*) Timespan 1980 - present. Index: Criminal Justice Abstracts	21	12	2
TOPIC: (burglar* police detect*) Timespan 1980 - present. Index Academic Search Complete	28	8	2
TOPIC: (burglar* police detection) Timespan 1980 - present. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC	12	3	1
TOPIC: (burglar* police detect*) Timespan 1980 - present. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC	27	8	5

Burglary and police and solvability			
TOPIC: (burglar* police solveability OR solvability) Timespan 1980 - present. Index: Criminal Justice Abstracts	19	4	1
TOPIC: (burglar* police solveability OR solvability) Timespan 1980 - present. Index Academic Search Complete	1	0	0
TOPIC: (burglar* police solveability OR solvability) Timespan 1980 - present. Indexes: SCI- EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC	2	5	1

* Does not include sources already captured in a previous search (i.e. duplicates).

Table 3 Inclusion and	exclusion	criteria foi	r rapid	evidence	assessment
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Included	Excluded
 Publications from 1980 onwards Articles in English Articles reporting primary research Articles about police-led burglary interventions in relation to i) prevention, ii) detection, or iii) solvability Comparative studies (except solvability search) 	 Publications from prior to 1980 Commentaries, editorials, features and conference abstracts Comparative studies (except solvability search)

2. <u>A Case Study of Evidence-Based Policing Against Burglary: Leeds, England</u>

Introduction: The Triple-T Framework

The most operational framework for applying research to police decision-making is the "Triple-T" of evidence-based policing: targeting, testing and tracking (Sherman 2013). This framework can apply to any and all objectives the police may have. It is simply a way of organizing research findings in relation to three specific categories of operational decision-making:

Targeting some crimes or offenders as higher priorities than others, with commensurately greater investments of police time relative to other crimes and offenders.

Testing whether one kind of police action works better than another in accomplishing reductions in crime or bringing offenders to justice, in order to adopt a preferred policy of dealing with a category of cases with a particular set of police actions.

Tracking whether police are carrying out the preferred policy, and to what extent, by officer, unit, or any other categories, in relation to crime trends and patterns over time in order to feed back that information to officers and their supervisors, improve performance, and reduce crime even more—or test an even better plan of police actions for combating that crime or offender type.



Reactive vs. Proactive Targeting. The Triple-T framework applies to both reactive and proactive targeting decisions (Reiss 1971). *Reactive* decisions are police responses to requests for immediate police action on a case-by-case basis; these decisions may lead to targeting some crimes more than others, or even some requests not at all. *Proactive* decisions are police-initiated decisions to investigate some, but not most, potential offenders, situations or crime types based on analysis of many cases over a long time period. This distinction is crucial to understanding the Case Study in this Section of the report.

The Case Study was a proactive police effort to reduce all burglaries by targeting a small number of burglars. It is a story of "triage," in which local police decided to make burglary a top priority of one police beat. The story does not reveal a full targeting analysis, in which all potential crime types and offenders might be compared. But it does illustrate a systematic process of defining selection criteria, then "trawling" through official records to identify the targets for police operational actions. The case study was not even self-consciously applying a Triple-T framework; police and analysts were simply applying the more basic SARA (Scanning, Analysis, Response, Assessment) model of problem-oriented policing (Goldstein 1979, 1990; Eck and Spelman 1987). Yet there were very clear about changing their focus from a case-by-case reactive strategy to a proactively aimed, precisely constructed plan based on research into their own available local data. In retrospect, it seems to be an excellent choice of a case study for illustrating the potential for supplementing reactive police responses, burglary-by-burglary, with a proactive strategy that aims at causes rather than symptoms—the criminals, not just the crimes.



A house in the Boggart Hill (Police Beat 6, Killingbeck Division), Leeds, England

Targeting

Targeting police resources, like navigating an automobile from Copenhagen to Aarhus, is not just one decision; it is also a series of decisions. In the case of the West Yorkshire Police in England, the 1995 decision to target 14 burglars in one police beat started at a much higher level of scanning the map. As Figure 1 (Farrell et al 1998: 3) shows, Beat 6 in the Killingbeck Police Division (named, perhaps, by Danish Viking predecessors of the current occupants) had jumped to the second highest rate of burglaries per [100] household[s] in Financial Year 1995 across the 21 beats in the Division. Over 1 in 5 households suffered a burglary that year—a far higher rate than Denmark on average. But it was also a far higher rate than average in the Division, or across all of England. *It is only by tracking the rate of burglaries per household, per police beat, that a concentration of burglaries in a few beats can be seen.*



Tracking the burglary rates in this way is also unusual in police operational crime analysis. Most large police agencies track crimes by summing raw totals per operational unit, such as how many burglaries each beat had. But without asking how many homes each beat has, police may be mis-targeting their resources in relation to the needs of residents. It seems not only fairer to each household to understand how their *risk per household* compares; it is also more revealing of how burglars themselves are making decisions about where to commit their burglaries.

According to the UK government report on the Case Study (Farrell et al 1998), the police pursued this Triple-T strategy with a theory of targeting. That theory began with

1) the comparative concentration of burglaries per households.

It then went on to develop a logic model combining several related facts citing research in other communities (Farrell et al 1998: 3-4):

"A small proportion of prolific offenders account for a disproportionate amount of all crime...

• Frequent offenders are often generalists (committing many different types of crimes) rather than specialists (in one type of crime). This is particularly true for 'common' property crimes such as burglary and car crimes....

• Rates of recidivism are high and increase with further involvement with the criminal justice system: burglars continue even after imprisonment or other punishment, and those imprisoned the most often are also those most likely to offend again.

• Burglars will generally target houses close to where they live" [based on US studies].

With this theory of which burglars to target with anticipation of greatest reductions in burglary, the report described how the project went on to analyze police data to identify their most valuable targets (Farrell et al 1998: 4):

"West Yorkshire Police have access to records of previous convictions of offenders, and to criminal justice system records of who is currently in prison or young offender institutions. The trawl of records, combined with local knowledge of the community beat constable and sergeant, led to the development of a profile of local burglars. Burglars living in the Boggart Hill area were included in the profile if they had all of four characteristics. They had to be:

- A known burglar (having a prior record).
- A prolific burglar (who would account for a disproportionate amount of burglaries).
- Currently 'at large'.
- Known or suspected to be active in undertaking burglaries.

This process yielded a list of 14 previously convicted burglars with confirmed current residence in the area. Each of these burglars' prior burglaries was analyzed for the offender's *Modus Operandi* (M.O.) of committing the crime. The report says that the beat officer and sergeant then matched these M.O.s to each new burglary as it was reported. With one suspect, or only a few, in mind for each new burglary, the beat officer tried to obtain as much evidence as possible that the targeted suspect had committed the crime with a similar M.O. The completion of this action was that "during 1995, the fourteen most prolific 'known' burglars were identified, targeted and arrested" (Farrell et al 1998: 4).

Testing: Effects on Burglary

What gave this Case Study a *test*, and made it a more lasting contribution to knowledge than less systematically documented police work, is central to this Report to the Danish Politi. In the first three points below, they employed evidence-based *targeting*. It was only at points 5 through 10, however, that what they did became evidence-based *testing*, by comparing the targeted area to similar areas not targeted, and tracking the changes with each burglar sent to prison.

- 1. The police assigned to Boggart Hill on Beat 6 not only identified the individuals they wanted to *target* through a systematic process of reviewing all possible candidates, keeping 100% who qualified, they also
- 2. used the target list proactively to seek out opportunities to arrest the targeted offenders on the basis of each new burglary that was reported, doing so with enough success that
- 3. fully 100% of the targeted burglars were actually arrested and incarcerated.
- 4. At the same time that the police were carrying out their plan for a "crackdown" (Sherman 1990) on the targeted burglars, locking them up one-by-one, they were also tracking the rate at which burglaries were reported in Beat 6.
- 5. In addition to tracking burglaries in the targeted beat, they were tracking burglaries in the rest of the Killingbeck Division that was not using this new program.
- 6. By putting together the two trends in burglaries per 100 households, they could measure both the *direction* of the difference in the trends as well as the *magnitude* of that difference.
- 7. The drop in the Beat 6 monthly rate of burglaries per 100 households from 2.3 to under 1 per month, while the rest of the division remained fairly constant, showed that Beat 6 had a 62% drop in residential burglary rate from 1995 to 1996 (See Figure 3).
- 8. While that difference could have had other causes besides the crackdown on the targeted prolific burglars, the sharp, sudden changes in Beat 6 at the same time make a cause-and effect relationship at least plausible. That contrast thus puts the burden of proof on additional research to try to identify some other events at exactly the same time that could equally "fit the facts" of the 62% decline.



9. No Displacement. While one theory could be that the burglaries were just "moved elsewhere" or "displaced," the data displayed in Figure 4 shows facts that contradict a displacement theory. At the same time that burglaries were going down by 62% in Beat 6, they were also going by 18% in the areas immediately surrounding Beat 6. Rather than displacing crime to the nearby areas, the project seemed to have "diffused the benefit" of the crackdown.



10. **The Targeted 14 Burglars.** What makes the case even stronger for the crackdown on burglars *causing* the 62% reduction in burglary is the data shown in Figure 5 (Farrell et al 1998). Those data show how the decline in burglaries over time was closely related to the decline in the proportion of the targeted burglars who were still on the streets and not yet locked up. The decline in burglaries tracks the decline in active burglars at liberty very tightly. While the correlation of these two trends does not prove cause and effect, there is a strong suggestion of causation because the correlation is so nearly perfect. That is especially plausible given the trend in Figure 3 showing that burglary counts in the rest of the police division were remaining unchanged in that period.



Tracking

The major limitation of this case study is on the Third "T" of tracking. The Boggart Hill case study runs out of time coverage in the period covered by the report. Ideally, we would want to discuss a number of facts that could be tracked over time, especially if something like this project was replicated in Denmark:

- How burglary rates compared across all 21 beats in 1996, 1997, 1998 and later
- Whether a repeating the same prolific burglar "crackdown" approach in any new police beats suffering high rates of burglary would produce similarly impressive reductions in burglary rates
- Whether repeating the same approach in other areas would even produce such a clear list of prolific burglars, or whether other areas had different kinds of burglars (Fox and Farrington 2012).
- Whether the burglars from Beat 6 who were sent to prison for several years came back to the area after they were released from prison.
- If those burglars did return, did police use the same tactics—or did they switch to less intensive actions such as police visiting the burglars' homes regularly to check on how well they are obeying the law (see Santos and Santos 2016, discussed in Section 4 below).
- Was the MO data base for the Killingbeck Division dropped after the success of the Beat 6 Project, or was it continued and expanded?
- If it was expanded, did it become standard practice for detectives or beat officers to consult in order to generate a small list of local suspects for immediate investigation—perhaps catching them in possession of the recently stolen goods before the goods can be "fenced" to a receiver of stolen property?

These and other ongoing issues can turn a targeting and testing exercise into the new standard operating procedure, a "best practice," business-as-usual protocol that insures the best use of the knowledge gained by the innovation. The third T in evidence-based policing comes last, but only because it depends on targeting and testing; not because it is least important. As any review will show of how improvements are achieved in such fields as airline pre-flight inspections or highway maintenance, *tracking* is the *sine qua non* of better safety. The key questions are always 1) just what to track, and 2) what action to take as soon as tracking reveals something important has not been done, with a potentially harmful result.

The principle of tracking is very well-embedded in *reactive* policing. If a police car is dispatched to a burglary in progress but does not arrive for one hour, police dispatchers will usually know that immediately and raise an alarm. That kind of tracking is widely accepted and highly transparent. What may be equally important, if harder to establish, is *proactive* tracking. For example, if a Division creates a program requiring beat police officers to visit burglars at home after the burglars have been released from prison, how is it to be tracked? How would the Divisional commander know whether there is 100% implementation of the program—or 90%, or even 30%? The recent work of Santos & Santos (2016) in Florida shows how such programs can be tracked. The challenge is not technical. It is more, it seems,

a matter of adopting a framework for proactive policing that is as comprehensive in its tracking as the well-established systems of reactive policing have become.

Lessons of the Case Study

A number of lessons can be drawn from the Case study of 1995-96 in Leeds, England. Most important is the demonstrated capacity to generate and apply the Tripe-T framework of evidence-based policing. One could say this is not new, but rather a sharpening of what a systemic version of T-T-T should look like. Yet one can also say that the Boggart Hill project *was* new, because it was far more comprehensive than anything that had ever been done before.

It follows that because the approach was new, it probably died. By 2007 when the author of this report started teaching UK police leaders, the kind of evidence-based policing described in Farrell et al (1998) was basically unheard of around the UK. There is scant evidence that police practice has kept up with the growth of research, even in the agencies where the research has been done. It may be that researchers themselves are to blame, but the blame game is not productive. The key question is whether this kind of approach, as illustrated further in this report, can succeed in reducing burglary even beyond its 20-year lows in Denmark. That question is for the reader to answer.

3. Targeting Police Resources for Fighting Burglary

3.1. "Targeting" as Prioritizing

The concept of selective targeting is of military origin, one familiar to Galileo and his successors who tried to improve the aim of cannons at their targets. "Targeting" is a concept widely used today in fields such as medicine, in which there is an effort to limit collateral damage. A chemotherapy treatment that aims just at the cancer is ideal, especially if it causes no harm to surrounding tissue. Much the same can be said about targeting the use of state sanctions by police officers, who have much incentive to limit the use of legitimate force to the people and behaviour that can best justify the powerful intervention.

At the same time, business has developed a strategy of targeting its investment in repeat customers who yield the highest value in profits. Frequent flyer incentives are a prime example. Most of the revenue airlines receive comes from a small fraction of customers. Airlines have every reason to concentrate most attention and marketing on that "power few" fraction to keep the airline in business. Police have a similar incentive, by analogy, to cut crime by focusing on the most prolific, or most serious offenders. Police also have a problem no airline has: they are responsible for hundreds of different kinds of crime simultaneously. It is far more difficult for a *system* to balance all those kinds of crime than it is to lavish attention on a few airline passengers.

The Boggart Hill case study showed what can happen when police prioritize burglary at the local level. Yet that is not always possible. Many competing priorities, from terrorism to immigration, may deflect the best of plans to set a priority and accomplish it. Democracies are not patient with long-term plans when short-term crises erupt. Nonetheless, police are better off with a rational system for allocating resources, if only as a counterweight to any sudden requests to re-set priorities on short notice.

This report cannot address the full range of issues affecting democratic prioritysetting for police agencies. What it can address is a kind of "closed system:" given a certain level of resources that can be invested in reducing burglary for the next year, or month, or week, what is the best way to allocate those resources?

The answer must begin with a return to proactive vs. reactive targeting.

3.2. Proactive vs. Reactive Targeting

Research has long answered some, but not all, of the key questions about two different systems for mobilizing police resources. What we know is that for many kinds of crimes, proactive targeting is the *only* way police can protect the public in a timely fashion. People-trafficking, modern slavery, child sexual abuse suffered in silence, and even drunk driving (or texting-driving) are prime examples of crimes that lack complainants. If the problem exists, but police are not requested to address them case-by-case, proactive targeting is required. What we do not know from research is how much, or what proportion of, police time is needed to deal with these unreported crimes. We have no good research evidence for allocating police resources into reported vs. unreported harm.

Burglary is not that kind of problem. Victims of burglary report most of those crimes to the police. Yet there is still a question to address about reactive vs. proactive targeting of

resources against burglary. There is no question of whether it is possible to use proactive policing against burglary; ample research cited in this report shows that it is. The question is what research might do to inform a targeting decision about what proportion of local police resources should go into reactive vs. proactive efforts to combat targeting.

UK police have been increasingly assertive about the growing difficulty they have in responding to every "past" burglary report by dispatching a police car. For, say, the 9% of burglaries reported "in progress" (Blake and Coupe 2001), where there may be a threat of violence or a chance of catching a fleeing burglar, there is a different analysis to be done. But for the 90% of burglaries reported after offenders have fled the scene, the likelihood of an arrest is low all over the world. Chief police officers under pressure to deal with high volumes of domestic and sexual abuse, let alone gang crime and terrorism, have publicly discussed alternatives to sending cars to every burglary. What they have not proposed, however, is a realignment of resources to fight burglary in a different way: by targeting burglars rather than burglaries.

The Leeds Case Study is not well known in the UK or abroad. If it were, however, it might be the basis for a public discussion of the question research has yet to answer: *can more burglaries be prevented by targeting burglars or burglaries*? In a world of limited resources, what proportion of a "burglary budget" should police invest in proactive vs. reactive targeting? There is, of course, no formal budget for burglary; the funding is embedded in local uniformed operations and detective investigators. But the money can be traced through time records per case spent on reactive policing of burglary. It could also, in principle, be tracked for proactive policing.

The starting point for answering the question is not the measurement of time, but rather the nature of the targeting. In the last five years, that targeting has built on the Boggart Hill case study. There is now a clear system of proactive targeting to adopt, based on M.O.s as well as other data. The system may even be useful in reactive responses to reported burglary. These new studies open the door to merging proactive and reactive policing. Yet the key is to make the burglar the primary unit of targeting, while using each burglary as a source of intelligence about the burglar—and a tool for arresting, prosecuting and (we hope) rehabilitating the burglar.

In the meantime, there is much time to be saved by limiting reactive policing to the initial on-scene investigation, using solvability factors to identify the small fraction of cases that are likely to benefit from any further investment.

3.3. Reactive Case Targeting: High-Yield Investments

Since the 1970s, research has shown that most burglaries will never be solved if the burglar is not caught at the crime scene (Blake and Coupe 2001). The few cases that could be solved, however, can be predicted from a checklist of evidence in hand at the end of the initial investigation (Eck 1983). These predictions have gotten better over time, even as detectives around the world have largely ignored the use of statistically calculated solvability factors. In the short run, the research needs to find ways to persuade detectives to use computerized decision support tools to supplement their professional experience in making these predictions—and in allocating scarce investigative time.

3.3.1. Solvability Factors

The "common sense" checklist compiled by the Stanford Research Institute (SRI) in the 1970s encountered great scepticism, at least initially. Yet it was vindicated by a major study at the Police Executive Research Forum (PERF), which drew on 12,000 closed burglary cases from 26 police departments to test the SRI model (Eck 1979). The analysis centred on six elements of information about the case at the conclusion of the initial investigation, such as whether anyone had seen a suspect flee the scene, or whether there was a description of a car that a burglar might have used, or whether there were fingerprints found, etc. These elements predicted, with 85% accuracy, whether or not an arrest was made in each case.

Whether the same predictive elements would work best today seems doubtful. There are new kinds of evidence, from DNA to digital shoeprints, that can be entered into a solvability prediction. There are also better statistical methods to use, especially big data, across large police units, which can make such forecasts with increasing precision.

3.3.2. Big Data Forecasts: Case Solvability

While much of the world continues to document investigations with paper files, many police agencies are in the process of converting to digital records. Once that is accomplished, huge samples of the kind used by PERF in 1979 (at great cost) will be available almost free of charge. Drawing on digital records that are kept for legal purposes, statisticians can use artificial intelligence to forecast rare events. Just as the rare events of extreme weather, like hurricanes and tornadoes, can be predicted better with larger data sets, the rare events of solving burglaries after an initial investigation can be predicted more accurately with "machine learning."

In those predictions, the "machines" (computers) can be used to identify the most predictive combinations of information elements across millions of possible combinations. These methods are already used to predict serious offending by repeat offenders, with as low as 2% error in predicting someone will *not* become seriously violent. Similarly, in predicting that a burglary will not be solved, an error rate of 2% is possible. The benefit of accepting that error rate could be making investigators available for a huge increase in proactive policing of prolific burglars.

3.3.3. Comparing Targeted to Non-Targeted Investigations

Until investigation records are more widely digitized, there is an excellent second-best method available for making the same predictions. That method costs a bit more and may have a bit more error. Yet it can be done relatively quickly. That method is a modification of the medical "case-control" study, in which causes of illness are identified by comparing similar people who either do or do not contract the illness.

One large study of doctors with lung cancer, for example, compared them to doctors of a similar age without lung cancer; the main difference was that the healthy doctors rarely smoked cigarettes, while the doctors with lung cancer were almost always smokers. In a

similar way, burglary cases that are solved can be compared to burglary cases that are not solved. The elements of evidence from the preliminary investigation that were different between the solved and unsolved cases can then form the basis for a predictive model of solvability. The catch is this: only a skilled detective can review the paper records of each case at the close of the preliminary investigation.

That method is exactly what the Kent, UK, Police recently did to create a model predicting whether non-domestic violence cases could be solved (McFadzien & Sherman 2017). In that model, a statistical comparison of cases leading to detection (N = 482) was made to a random sample of cases that were investigated but did not produce a sanctioned detection (N = 522). This comparison showed that detections could be predicted with reasonably high accuracy based on what is known at the time of the decision to assign for further investigation, based on whether or not these eight evidentiary factors were present:

- 1. Support of the victim,
- 2. A cooperative witness,
- 3. A named suspect,
- 4. Connections to other cases,
- 5. Less than a 28-day delay between the incident and the creation of the case,
- 6. CCTV evidence known to be available,
- 7. Police testimony evidence available,
- 8. Forensic evidence available.

How Accurate was the Kent Forecasting Tool? The Cambridge Centre tested the Kent tool on a third Kent data sample: a random selection of 931 cases from 2016 that had not been included in the original samples. The result of the test was that the *tool recommended 70% of the cases for filing, of which 96% were correctly forecast* as not leading to detection, for a 4% "false negative" rate. The tool also forecast that 286 of the 931 cases were good investments for investigation; 113 of these 286 were actually detected, for a 40% true positive rate. This 40% compares to just 15% true positive detections at present for these kinds of crimes. That test means that the forecast could have prevented wasted effort on 67% of all cases, *while raising the detection rate for cases assigned from 15% to 40%*.

How Does Investigative Forecasting Work in Practice? The Kent Police have built a software solution to house the statistical triage tool that is now operational. The software allows the Kent investigative management staff to rapidly input the presence or absence of the 8 predictors and receive a recommendation to assign or file the case. Once the Kent Police finalize the exact statistical thresholds for the model it can become operational immediately.

What Effect Can Forecasting Have on Detection Rates? It is impossible to measure exactly how much impact the forecasting tool will have without a controlled test, which we recommend as Phase II of this project. With a 70% reduction in overall workload, investigating officers would be assigned cases with characteristics that strongly predict a detection. While this should, in principle, produce more cases overall leading to detection, careful measurement of the amount of time spent on each case would be needed to be confident about the effects of the forecasting. Further research comparing assignments based on forecasting to case assignments based on current methods would be required to

measure this and other impacts of implementing this bespoke statistical triage tool in the Kent Police.

3.3.4. Comparing Two Methods of Targeting Cases: Clinical vs. Statistical

The key experiment that remains to be done, with either "big data" or "case control" models, is a direct comparison of the statistical model to the clinical judgment of detectives. In principle, evidence-based solvability factors could substantially increase detection rates (Eck 1979). At minimum, their use could achieve the same detection rates but at much lower cost. This approach offers a major opportunity for evidence-based targeting. Yet it lacks a crucial piece of evidence that is needed to recommend their widespread adoption.

The most important new evidence about statistical solvability factors would be a randomized trial comparing the overall detection rates of a team of detectives using tested solvability factors to target cases for investigation to the detection rates of a team using unstructured discretion to target cases. By randomly assigning all incoming cases to one or the other of the two teams, the experiment would yield a valid estimate of using one system or the other.

3.4. Proactive Targeting

Proactive targeting can be defined as any method of identifying a policing target based on a pattern of events rather than a single case. That pattern can be linked to a situation, a location, a victim or an offender. In some cases, it can be a series of links that are used in combination to identify the most productive targets possible. Some of these methods, for example, combine places with people—to identify people in places.

One such approach to proactive targeting is described above in the Case Study of Boggart Hill. A second approach, in Florida, is reported in Santos and Santos (2016). As in the Case Study, the Florida targeting was a combination of place-based hot spots of burglary, with place-based burglars identified as living in or near the hot spots. The 151 suspects targeted in Florida were all those who resided in 24 out of 48 burglary-and-vehicle-crime hot spots covering an average of 0.6 square miles each. The eligibility criteria for these offenders included everyone arrested for residential burglary or theft from vehicles, as well as all convicted offenders on active felony probation (a community sentence) with a prior burglary arrest, and non-violent convicted offenders on felony probation for drug offenses (based on the high correlation between drug offenses and burglary). Once the list was compiled from a "data trawl," the suspects current residence was identified and the project was launched. The results are described below in Section 4.2.4 below.

3.4.1. Previously Detected Burglars: LCAP

The use of solvability factors helps to target what cases *not* to work on; the use of Latent-Class Analysis Profiling (LCAP) helps to decide which burglars to target intensive work on. LCAP is the result of many years work by Professor David Farrington and his colleagues, most recently including some breakthroughs in burglary detections in Florida (Fox and Farrington 2012, 2015). As they summarized their first report (2012):

"This research creates a new criminal profile for burglary by establishing the link among certain offender traits, past criminal behaviour, and crime scene features. Utilizing latent class analysis (LCA) to identify underlying groups within the offender and offense characteristics, the relationship between certain offense styles and the most likely offender may then be established. These offense–offender profiles may be used by police to predict traits of an unknown offender based on information from a crime scene alone. Based on a sample of 405 burglaries committed between 2008 and 2009 in Florida, four criminal history groups, four offender types, and four offense styles were identified using LCA. A significant relationship was found among the offense styles and offender trait types, as well as between the offender trait and criminal history categories." (Fox and Farrington 2015: 156).

The four kinds of "offense styles" (what this report calls M.O.s) associated with four kinds of offenders are presented in Table 2 below, taken from Fox and Farrington (2015). By examining the crime scene with a coding instrument for the key variables in offence description, the kind of offender (including prior criminal history) who has been charged with burglaries of that offence description in the past can be identified. This process can not only reduce the number of likely suspects; it can also provide specific evidence against specific individuals whose previous offending has matched the M.O. in the present case. This is exactly the kind of approach reported, with much success, in Boggart Hill in 1995-6.

Offense style	Offense description	Offender description				
Opportunistic	Unlawful entry—Entry left open No preparation or tools Unoccupied residence Low value items stolen Little evidence left behind	Young offenders Adolescent onset Short criminal career Low offending frequency Do not know victim	Mostly male, but some female offenders Versatility, prior petty theft/ shoplifting arrests Do not have a car			
Organized	Clean but forced entry Tools brought to scene No evidence left behind High value items stolen that often require fence/ network	Older offenders Adolescent onset High offending frequency Limited versatility—Prior arrests for theft/burglary	Often have a car Cohabiting or have partner May have met victim			
Disorganized	Forced entry Scene left in disarray Tools and/or evidence left Low value or no items stolen	Young offenders Early onset Long criminal career High offending frequency	Versatility—Past arrests for drug offenses Do not know victim			
Interpersonal	Occupied residence Target is victim—Not objects Attempted, threatened, or committed violence at scene Personal items stolen	Adult aged Late criminal onset Solo offender Have a car Single/not cohabiting	No record—But if arrested usually for violence Select female victims Know of victim			

TABLE 2:	Burglary	Offense	Styles	and	Features	of	Offenders	Who	Commit	Them
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Source: Fox & Farrington 2015.

The main limitation to LCAP, or any other method of proactive targeting, is that its primary value lies with previously detected burglars. While the proportion of burglars who have never been caught is unknown, the question remains partly academic. The part that is not academic is the capacity of LCAP to identify previously undetected burglars solely by their M.O. Thus even if someone has never been arrested, they can become the prime suspect in a series of reported burglaries where an M.O. may appear that is unique to those offenders. While in the short run, LCAP is limited to previously detected offenders, LCAP can increase the potential for solving a large number of burglaries the first time a repeat burglar is caught.

3.4.2. Undetected Burglars by M-O

The LCAP approach to *all* burglaries, not just solved burglaries, is exactly what is under way in Durham, England. The analysis also includes cases in which individuals are suspected based on intelligence, and not actually arrested or charged. For her MSt thesis at the University of Cambridge Police Executive Programme, Andrea Armstrong is using these methods to analyze five years of burglary reports in Durham for her study entitled "Crime scene behaviour and offender predictability: Examining burglars' behavioural consistency across burglaries and specificity of modus operandi." The key research questions of the study are as follows:

- A) How many distinctively different MO combinations of offense elements are associated with each individual known burglary suspect, and what is the distribution and mean of the number of MO codes per suspect across separate burglaries they are suspected of having committed?
- B) How many known burglary suspects have been linked to each distinct burglary MO code?
- C) For each known burglary suspect with at least two detections, what percent of suspects have the same M.O. in more than 2 detected burglaries, and how long is the average time between same-MO-code-burglaries associated with the same suspect?
- D) What percentage of unsolved offences can be matched to a name, under several mathematical definitions of what constitutes a match?
- E) How accurately can we predict the name of a burglar from the MO code in a small number of test cases?

The aim of the Durham research is to examine the different behaviours of burglars, in order to assess the offender stability of M.O. behaviours. For those prolific offenders, the data will highlight how many different M.O.s the offender displays. This will help to show if there are crime scenes unsolved with distinctive M.O.s (demonstrating that some offenders are prolific but do not get caught).

To test the accuracy of this model, data from the first four months of 2017 will be coded and used in comparison to the previous five years database to search for offenders with an identical MO code. This will give a list of possible offenders for this new offence. These names will then be compared to the actual arrest details for this offence. If the arrested person is among the list, it will count as a match. If the arrested person's name is not on the list, it will be counted as incorrect. If the arrested person does not have a previous arrest, then it will count as a new offender, and not be included in the calculation.

4. Testing Police Actions

4.1. Good Tests vs. Not-so-Good Tests

The concept of "evidence" in evidence-based policing is not about fingerprints or DNA; it is about facts that test a theory. Whether the theory is an accusation than Johann Pedersen committed a burglary, or that burglary alarms prevent burglaries, the concept is the same. If a fingerprint from a burglary is smeared, the evidence is compromised; it is insufficient to test the theory. If the statistics show that homes with alarms have fewer burglaries, the test is also compromised: homes with burglar alarms may belong to people with more money and prudent personalities, which provide an equally plausible cause of a lower burglary rate. Any good test eliminates as many rival explanations as possible. Even Sherlock Holmes said so: "When you have eliminated the impossible, whatever remains, *however improbable*, must be the truth" (Conan Doyle 1890).

Table 1 below (from Sherman 2013) shows a scale for good evidence in all three Ts. The evidence required is different for each, but it all varies from strong to weak. The main source of difference is how many rival explanations the evidence can eliminate. The strength of evidence regarding testing is particularly dependent on eliminating alternative explanations, because it hinges on the concept of cause and effect.

	Kinds of Decisions						
Strength of Evidence	Targeting	Testing	Tracking				
Strong	85% or greater accuracy of predic- tions in over 5,000 cases	Multiple random control trials pro- ducing similar findings in field set- tings	Monthly audits of measurement sys- tems; less than 5% magnitude of error				
Medium	60% or greater accuracy of predic- tions in over 1,000 cases	One random control trial, or 5–10 controlled quasi experiments with similar findings, in field settings	Annual audits of measurement sys- tems; less than 5% magnitudes of error				
Suggestive	Correlations without prospective tests of prediction accuracy	One or two before-after field tests with large effect sizes	Audit within past 3–5 years; less than 5% magnitude of error				

TABLE 1 "Good Evidence" Scales for Different Kinds of Police Decisions: Criteria for Strength of Evidence

The concept of a randomized controlled trial (RCT) is often associated with evidence-based policing. Its requirements are simple, but the results of such trials are powerful. By taking all possible targets in any police operation—offenders, victims, addresses, banks—and using a lottery to decide which of two (or more) police methods each unit will receive, the RCT can identify a clear cause-and-effect link between a choice of police method and the result of that choice (for future crime, prosecutions, arrest rates, etc.) RCTs can be difficult to do with a small set of units, such as neighbourhoods in a police district. Yet sometimes they are easier than less robust methods of identifying cause and effect.

Some critics dismiss the entire idea of evidence in police decision-making on the grounds that RCTs are unrealistic in policing. Yet around the world, over 130 RCTs have been reported in the English language alone; at least 70 more are under way (Neyroud 2017). More important,

it is not essential that every test in policing consist of an RCT. As Table 1 shows, medium evidence can consist of "quasi-experiments" as simple as the test in the Boggart Hill Case Study (Section 2): a before-after field test with a similar comparison group or area.

What Table 2 does not say is that describes standards for generalizing from one place or time to another. If the evidence is gathered in the same place and time as a police decision is made, then there is much less need to have multiple tests. For Boggart Hill—or Port St. Lucie Florida in Section 4.2.4 below—to have multiple tests before making a decision about the place where the test was done would seem excessive. As the Port St. Lucie case shows, the police decided to keep and expand the program they had on the strength of reasonably good reductions in burglaries—even though there was some risk of the results having occurred by chance.

What was more important than risk of chance was the certainty that they could use the same organizational system of targeting and contacting burglars, with good implementation of the procedures (including tracking systems). That alone probably increased the odds that a "rollout" of the policy beyond the 24 test sites would probably have a good effect. And because the effect had been found with an RCT, it was even more likely to have had a true cause-and-effect relationship than the test used in Boggart Hill—which was simply a comparison of one test area to the rest of the division.

A **Summary** of what makes a good test is the standard set for this review: a before vs. after comparison of burglary trends in policing one way versus trends in policing it another way. On that basis, this report has excluded all tests in which burglary simply went down, without a comparison group. But the report also recommends, where possible, that police use the best evidence they can to compare different ways to combat burglary—with RCTs when possible, and with multiple tests where it is not. Very few tests of anti-burglary policing can meet that standard. But it would not take long before many such tests could be conducted in Denmark.

4.2. Preventing Burglaries

4.2.1. Arrest crackdown of repeat burglars

The review found a number of reports of arrest crackdowns on known burglars. Only the Case Study (Section 2) met the evidence standard of a comparison of trends. Yet it is important to note that the core idea in Boggart Hill was using Latent Class Analysis Policing (LCAP) in linking burglars to burglaries with forensic evidence. This idea was also tested by Fox and Farrington (2015), as described in section 4.3.2 below. Their test did not extend to measuring any reductions in burglaries. But it did show that LCAP profiling of M.O.s can lead to a tripling of detection rates. The potential for testing the effects of a large LCAP data base on *both* detections and burglary rates seems to be substantial.

4.2.2. Warnings by police to suspected burglars in home visits

As noted in the Section 3 discussion of targeting, a very promising nine-month experiment in visits by detectives to the homes of suspected burglars and other criminals

(Santos and Santos 2016) was conducted in 2013-14 by the Port St. Lucie Police Department in Florida (population = 170,000, police officers = 224). The 151 suspects police targeted were all those who resided in 24 out of 48 randomly assigned burglary-and-vehicle-crime hot spots covering an average of 0.6 square miles each. The eligibility criteria for these offenders, as discussed in section 3, included everyone arrested for residential burglary or theft from vehicles, all convicted offenders on active felony probation (a community sentence) with a prior burglary arrest, and non-violent convicted offenders on felony probation for drug offenses. The design of the experiment tested the theory that visiting local burglary suspects in 24 randomly selected hot spots would reduce the rate of burglary reports, relative to 24 similar hot spots randomly assigned to *not* receive any proactive burglary prevention treatment.

Unlike the Boggart Hill Case Study project (Section 2), the Port St. Lucie prevention strategy was not to incarcerate the suspects; it was merely to deter them. Under a strategy called "focused deterrence," a number of experiments have found that direct communication to suspects reduced their repeat offending rates (Braga & Weisburd 2012). In this Florida home visits experiment, the detectives who visited the suspects were prepared as follows (Santos & Santos 2016: 381-382):

The crime analyst then provided the detectives with a standardized packet.....which contained a comprehensive criminal and corrections history; any contacts made with the police department, as a victim, a witness, in a call for service, or in a traffic citation; a list of the targeted offender's associates; residence history; credit history; history with city services (e.g., utilities, code enforcement); and social media activity (e.g., Facebook, Twitter, Instagram). The [packets for].. all targeted offenders living in a particular hot spot were put together in a "hot spot book," which was updated throughout the study by the crime analyst, who tracked each targeted offender's arrests, residential addresses, and other activity throughout the intervention period.

Two detectives were assigned to perform all of the 1143 home visits to the 151 targeted offenders for the 9-month project. Each detective responsible for visiting all the offenders in 12 of the 24 targeted hot spots (about 75 offenders for each detective). Accompanied by one other detective for safety, the detectives visited the targeted suspects primarily on weekday evenings. They used a variety of reasons to explain why they were visiting: required curfew checks, asking suspects' knowledge of recent burglaries, or just "stopping by." On 23% of the visits the suspect did not appear, but in 77% the detectives had face-to-face communication with the suspect. In these conversations, "detectives communicated effectively with both the offenders and their families and encouraged them to desist from their criminal activity." (Santos & Santos 2016: 395). The detectives preferred speaking to convicted offenders rather than those who had only been arrested and not convicted, feeling the former cases gave them more legitimacy for bothering offenders at home.

Compared to a 9-month period before the experiment began, the 24 targeted hot spots had about 20% fewer burglary reports during the experimental period than the 24 control group hot spots. More important, perhaps, was that while both control and experimental areas had statistically significant reductions in burglaries during the 9-month treatment period compared to the same 9 months in the prior year, the 39%

reduction in burglary in the treatment area was half again as big as the 26% reduction in the control area. The authors discount this difference because it does not appear, in a complex statistical model (negative binomial regression), to have had less than a 5% risk of being due to chance. Yet other analysts could interpret the findings as impressive, especially since the model included the number of contacts with offenders in each unit. This arguably put too many factors into a small sample, which the authors admit that the study was biased against showing success because it lacked adequate statistical power.

The concept of "power" describes something like the strength of a telescope: a stronger lens allows us to see more stars than a weaker lens. In this case, the power of the experimental design made the true impact of this prevention tactic difficult to measure with just 48 burglary-car crime hot spots. A separate test of the study's power suggested that the experiment should have had 102 hot spots (instead of the 48 it had) to be able to detect a moderately large effect as not being due to chance. Yet the findings were consistently in the direction of the program having prevented burglary.

Perhaps even more important, if not conclusive, was another finding: the 151 burglars visited monthly in the treatment period had a statistically significant 68% reduction in their repeat arrest rates compared to the prior 9 months. Unfortunately, there was no control group of burglary suspects in the other 24 hot spots, so this repeat-arrest test does not meet our comparison-group requirement for the review. Yet with even more indicators in the right direction, the evidence begins to lean towards a conclusion of positive impact.

One key comparison was indeed statistically significant: the number of arrests per arrestee in each hot spot. This measure saw a large increase in the control group hot spots, but not in the treatment group. That suggests a direct effect on the suspected burglars, regardless of any conclusion about where they might have been offending.

Perhaps the best test of the program's success was that the police agency decided, based on all the evidence, that the results were promising enough to expand the tactic across all burglary-car crime hot spots. As of two years after completion of the experiment, the authors of the report describe the program as embedded in the proactive crime prevention strategy of the Port St. Lucie Police.

4.2.3. Warnings to burglary recruiters: a social network approach

The Sacramento, California police have developed social network analysis in relation to a number of offense types, including burglary. For his MSt thesis at Cambridge, Officer Ashley Englefield (2012) found that about one in four arrested burglars had first been arrested with an older co-offender (called "recruiters") who had repeatedly been arrested with younger first offenders. He also found that one in five arrested burglars could be located within one or more social networks (see graphic below).

In an experiment based on the network-based targeting analysis, Englefield and Ariel (2017) went on to test the effect of a warning to the recruiter. The RCT was not limited to burglary alone, but many of the recruiters or their recruits had burglary arrests.


The RCT targeted a sample of 421 criminal "recruiters," with 206 of these prolific offenders randomly assigned to a home visit, "knock and talk" warning to desist from criminal activity. The 206 targeted recruiters were linked by at least three previous arrests to younger first offenders in the same offense, or co-offenders, of which 1,014 were thereby defined as their "recruits." The other 215 prolific offenders, who were associated with 991 recruits, served as the control group. Across both the treatment and control groups, the recruiters had an average of 6.1 prior arrests with 14.6 charges. The recruits had an average of 3.3 arrests and 6.63 charges.

For 120 days, the treatment group was to receive monthly warnings from uniformed police officers to desist from crime or recruiting younger people into crime. The warnings were preferably conducted as face-to-face encounters. They could take place anywhere, including but not limited to the recruiter's home, vehicle, or place of employment. The warning was to follow a script that formally advised the recruiters that they are under increased police scrutiny. The warning was to end by the officer giving the recruiter a "contact card" that included a list of resources for assisting the recruiter with drug

rehabilitation, jobs counseling, and other services. The card is displayed below.



You have been identified by the Sacramento Police Department Crime Analysis Unit as being a habitual offender. Our records indicate that you have been arrested at least three or more times in the past 4 years, at least once in the last two years, and at least once for a Part I crime. Because of your history of offending the Sacramento Police Department will be making regular visits to ensure that you are not continuing to break the law. These visits will be random and unannounced. Any questions can be directed at the officer from whom you received this card or the Sacramento Police Department. Resources for altering your pattern of offending can be located on the reverse side of this card.

While police actually made contact with only two-thirds of the recruiters (62%), the overall effect of the contact was nonetheless clear. Englefield and Ariel measured the effect of these warnings on the arrest rates (by all officers) of the recruiters, their recruits, and the entire social network. The one-year followup period effect on the recruiters was a 13% reduction in the average number of arrests, and a 21% reduction in charges. The effects were in the same direction for both recruits and the full network, but smaller. The results while the warnings were being delivered were even larger, with 47% lower arrests of the treatment group recruiters, 50% fewer arrests of the recruits, and 20% fewer arrests among the entire network. While the full details of this study have not yet been published, it is an encouraging finding for the potential value of a "focused deterrence" strategy (Braga and Weisburd 2012) for burglary recruiters.

4.2.4. Warnings to neighbours of burglary victims

This subsection reports the evidence that warning neighbours of each burglary can cause substantial reductions in repeat burglaries and near-repeats (defined as subsequent burglaries of neighbours of the initial victim). It is suggestive but not conclusive. In the next subsection (4.2.5), more conclusive evidence is reported for a similar strategy in Birmingham tested with an RCT.

The 2013 Leeds Study. In our earlier report on what civil society can do to prevent burglary (Sherman et al 2017), we described a test of warning neighbours that was actually conducted by police. The earlier report noted that, in theory, citizens could do the work of these notifications. But that was not what was done in the actual experiment. In a second study in Leeds, England, the West Yorkshire Police actually made all the notifications to nearest neighbours with their own personnel. It remains unknown whether a consistent and reliable warning system can be operated solely by neighbourhood residents. What is known is that

when the West Yorkshire Police set out to make these notifications, a quasi-experiment found impressive reductions in burglary.

In a project documented for his MSt thesis at Cambridge, a local Leeds police commander, Chris Rowley (2013), required that police staff make visits to all 40 houses surrounding each burgled house within 24 hours after a burglary. They also made directed patrols in areas of up to 400m surrounding the burgled property for several weeks. The cocooning visits were conducted by Police Community Support Officers (who lack full arrest powers but wear uniforms similar to fully-powered officers. The visits involved, when possible, a) face-to-face interaction and engagement with the occupants of the 40 houses, to inform them of what had taken place and reassure them that they could take steps to prevent being victimized and b) a visual audit of the property and its surroundings with regard to risk assessment. Where necessary this included information on where to obtain the support or financial assistance to purchase and install crime prevention hardware. Residents were also supplied with a home security booklet. If they were not home, information was left in their mailboxes.

The Leeds intervention ran for 3 months in 2012. Its impact was assessed by comparing two units of analysis: a) the burglary count in the aftermath of each burglary in the 40 houses surrounding each property burgled in the 60 days after the first burglary in the experimental time period, and b) the same counts based on burglaries occurring on the same date during the same 3 months the year before. The impact evaluation based on that comparison found a reduction of 37.5 % in repeat or near-repeat burglaries during the experimental time period compared to the prior year. Further evaluation data made a similar comparison in a wider area around each "super-cocoon." Even as far out as 400m surrounding the initially burgled property—far beyond the areas for visits or patrols—a clear effect was found. For up to 15 days after the trigger burglary there was an 18.2% reduction in repeats/ near-repeats, compared to the same 3 months period the year before, at 400m.

The effect of this Leeds test of what is sometimes called "super-cocooning" was that in the 3 months of the project duration, an estimated 318 burglaries were prevented (relative to the year before). By comparing the police staff costs for conducting the cocooning visits and the criminal justice costs of investigating and prosecuting burglary offences, it was calculated that for every pound spent on the cocooning efforts in this intervention £9.4 were saved. Yet there are several caveats to keep in mind:

Caveat 1: All cocooning projects to date included a combination of the cocooning visits with directed patrols, so it is impossible to distinguish the relative contribution of the cocooning visits and the patrols.

Caveat 2: The visits in these studies were conducted by Police Community Support Officers, not sworn police officers. These civilian staff members of UK police agencies undergo crime prevention training, but do not possess the same powers as police officers. In addition to dispensing crime prevention advice, police officers (perhaps better than PCSOs) can also use this opportunity to provide valuable reassurance to the public. Thus the police agencies may wish to have "real" police retain this role as it provides a teachable moment with a very positive focus – helping the public to prevent a possible crime, rather than asking for

information in the aftermath of a crime. It remains an open empirical question as to whether police officers are essential in achieving these effects.

Caveat 3: The test was not a comparison with another area in the same time frame. By using an "historical" comparison group, the test ran the risk that some difference in burglary patterns from the year before to the test year might have confounded the results. That said, no one has suggested a specific mechanism that would make the historical controls invalid. But because it was not a randomized trial, there is a possibility that some other causal mechanism (besides notifying neighbours) could have affected all of the repeat burglary patterns in the police area in the test year.

Thames Valley Near-Neighbour Warning: "Operation Reacher"

Similar caveats as immediately above apply to another thesis done at Cambridge by another English police commander, Superintendent Jim Weems (2014), although Weems improved on Leeds by including a comparison between treated and untreated areas. His own abstract of the study summarizes much of the key conclusions from the study, except for the complications of the comparative analysis. The abstract is a clear and impressive description of what police officers can do when leading their own research under university supervision, and supported by a strong team of analysts (Weems 2014: 5-7):

Whilst previous studies have shown an increased risk of victimisation the nearer a premises is to a recently burgled house, such an evaluation has not previously been considered across the entire Thames Valley Police area. To consider whether this theory is applicable and can be replicated across the Thames Valley, twelve months worth (July 2012 to July 2013) of recorded dwelling burglary offences (n= 6,239) were descriptively analysed to consider whether there was an observed increase in risk the closer the premises was to previously burgled dwelling. The study found a statistically significant relationship between an increased risk of victimisation the nearer the premises is to a recently burgled dwelling both in time and space. For example, dwellings within 100 metres of recently burgled premises were at a greater

risk of victimisation by a factor of 2.68 (or 268%) within the first 7 days after the trigger offence.

In order to address the increase in observed risk and to test the effectiveness of crime prevention tactics, a year long burglary dwelling crime prevention initiative - Operation Reacher – was implemented in three of the largest police areas in Thames Valley; Reading, Oxford and Milton Keynes. The operation required Police and Community Support Officers (PCSOs) to 'super-cocoon' or attend at least 26 houses (to the side, in front and to the rear), up to 400 metres from of a trigger dwelling burglary offence and within 48 hours of the crime being reported. Unlike previous studies, Operation Reacher required that PCSOs only visit the address once (to minimise the cost) resulting in only a proportion of householders being present depending on the time and day of the intervention. If home, the householder was informed of the recent nearby dwelling burglary offence (warn) and provided with crime prevention advice and information on local police actions to prevent further criminality and bring the offender to justice (inform). In the absence of an occupant, a card was left alerting to household to the recent offence along with simple advice.

Between July 2013 and July 2014, 33,120 houses were visited by PCSOs across the three Operation Reacher police areas (Reading n=10,183; Oxford n=6,686 and Milton Keynes n=16,251). Using a near repeat software tool, the frequency of dwelling burglary offences were analysed across time (0 to 7 days, 8 to 14 days, 15 to 21 days, 22 to 28 days and beyond 28 days) and space (1 to 100 metres, 101 to 200 metres, 201 to 300 metres, 301 to 400 metres and beyond 400 metres). A level 2 Maryland

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Scale evaluation compared the previous years frequency of offences (control period July 2012 to July 2013) against the results obtained during the intervention year (treatment period July 2013 to July 2014). The descriptive evaluation supported the assertion of an increased risk the closer the premises was to the trigger offence in time and space and, that within a small number of statistically significant parameters, a relationship could be observed between the super cocooning intervention and a reduction in observed offence frequency – an overall statistically significant reduction of 141 dwelling burglary offences.

Finally, in order to consider the cost effectiveness of super cocooning as a burglary dwelling reduction tactic an evaluation was conducted on the hours spent committed to the task by PCSOs and compared to the cost of burglary dwelling attendance to the police and the financial and social impact on wider society. The findings showed super cocooning to be an effective, efficient and economical tactic in reducing dwelling burglary victimisation in two of the three Operation Reacher areas (Milton Keynes police area failed to show a cost benefit), with an overall cost to benefit ratio across the three areas of 1:2.53. The study found that on average, for every £1 invested in super cocooning by the police area, Thames Valley Police saved £2.53.

The Weems thesis provides not one, but three, replications of the work done by his colleague Chris Rowley in Leeds. The Thames Valley test encompassed three different police areas, each of which had their own results. Table 17 below (Weems 2014: 63) reports the absolute reduction (minus signs) or increase in the number of burglaries after each burglary in the range of burglarized homes in financial year 2013/14 compared to the year before. The numbers in each cell display the differences in a different period of time in a different amount of distance from the trigger burglary report. All but one of the 20 cells (disregarding the row over 400m for technical reasons) show a reduction in repeat and near-repeat burglaries in the

treatment year, when PCSOs were to make one attempt to contact the neighbours in at least 26 homes nearby.

	0 to 7 days	8 to 14 days	15 to 21 days	22 to 28 days	> 28 days
1 to 100m	-10.00	-1.00	-10.00	-15.00	-117.00
101 to 200m	-15.00	-18.00	-23.00	5.00	-325.00
201 to 300m	-13.00	-11.00	-21.00	-22.00	-478.00
301 to 400m	-30.00	-33.00	-26.00	-39.00	-620.00
> 400m	-3955.00	-3905.00	-3836.00	-3891.00	-94282.00

Table 17 Difference in risk of near repeat dwelling burglary victimisation in Reading local police area 2013/14 compared to 2012/13

Table 27 displays the same test results as in Table 17, but for the Oxford local policing area. Once again, most of the differences are reductions during the experimental year rather than increases.

	0 to 7 days	8 to 14 days	15 to 21 days	22 to 28 days	> 28 days
1 to 100m	-1.00	-4.00	-5.00	1.00	-71.00
101 to 200m	-9.00	-11.00	-13.00	-12.00	-242.00
201 to 300m	-20.00	-29.00	-15.00	-18.00	-388.00
301 to 400m	3.00	-2.00	-26.00	-20.00	-451.00
> 400m	-3198.00	-3624.00	-3460.00	-3024.00	-75552.00

Table 27 Difference in risk of near repeat dwelling burglary victimisation in Oxford local police area 2013/14 compared to 2012/13

Table 37 displays the same data for a third police area, Milton Keynes. Here again, there are consistent reductions. Combined with the initial findings from Leeds, this makes a total of four findings of similar before-after differences.

	0 to 7 days	8 to 14 days	15 to 21 days	22 to 28 days	> 28 days
1 to 100m	-4.00	5.00	-5.00	-3.00	-32.00
101 to 200m	-19.00	3.00	1.00	-5.00	-22.00
201 to 300m	-10.00	-13.00	8.00	-4.00	-83.00
301 to 400m	-16.00	-14.00	-7.00	-3.00	-92.00
> 400m	-1231.00	-1333.00	-1010.00	-1423.00	-22973.00

Table 37 Difference in risk of near repeat dwelling burglary victimisation in Milton Kevnes local police area 2013/14 compared to 2012/13

Yet what makes the Weems analysis even more valuable is that he includes a comparison to the rest of the Thames Valley Police jurisdiction. What Weems found is a clear reminder of why this report adopted a higher standard of evidence for testing than neighbour warning studies have met: a conclusion based on a clear comparison to similar residential areas that did not receive the innovative police tactics. By comparing these near-neighbour trends to the same analyses in 11 other areas that did *not* provide the neighbour warnings, Weems found that there were similar drops in those areas as well. Thus the question of whether neighbour

warnings are actually successful in preventing burglary still remains open. While his conclusion that there was a net benefit from using PCSO time in this way is plausible, the issues of rival explanations led Weems to recommend further research that would apply an RCT design to the question. In the long run, RCT designs may actually save money over simple pilot tests, since they provide more definitive answers to the question of what works. That is what the West Midlands Police did, with some success, in using an RCT design to test a similar kind of tactic, in which PCSOs gave neighbours of burglary victims both warnings about recent burglaries *and* crime prevention kits to prevent more burglaries.

4.2.5 RCT of police delivering prevention "kits" to victims and near-neighbours.

"Operation Swordfish" was an RCT conducted by West Midlands police in 46 police areas over 30 weeks in 2012-13 in Birmingham, the second largest city (1.1 million) in England. The results tend to support the before-after conclusions of the Leeds and Thames Valley tests, but not without confounding the effects of warnings with the effects of handing out free burglary prevention kits.

The Swordfish RCT assigned 23 of the 46 areas to receive preventive interventions with both burglary victims and their 8 nearest neighbours (Johnson et al (2017). Over a 30-week period in 2012-13, police in the 23 target areas delivered an enhanced service after each burglary to the nearest nine households. Alex Murray, a local commander and graduate of the Cambridge Policing MSt. Programme (who had founded the UK's Society of Evidence-Based Policing) worked in partnership with criminologists at University College, London. Together they designed "Operation Swordfish" to reduce both repeat burglary victimization as its primary outcome, and neighbourhood burglary rates as the secondary outcome.

"Swordfish" was the most substantial police experiment against burglary reported in the research literature to date. It required a Chief Inspector to supervise, and was delivered by 23 neighbourhood police teams (each consisting of about 8 constables and Police Community Support Officers [PCSOs]) as part of their standard duties. These ~180 officers delivered burglary prevention kits to 5140 households at an equipment cost of £115,000, at an average cost of £12 per household served. This cost was allocated differentially, with a "gold" treatment to 648 households, a "silver" treatment to 2395 households, and a "bronze" treatment to 2097 households. As the research article (Johnson et al 2017: 510) explains it:

[B]urglary victims were given a "gold package". This comprised LED units that shone light against the window creating the appearance of a television being on, electronic timers, door and window chimes, a crime prevention sticker, and details of neighbourhood watch schemes in the area. The four closest neighbours of victims received "silver packages" and their subsequent four neighbours received "bronze packages". The silver packages contained the same items as the gold, but without LED units and stickers, and bronze packages were the same as silver but without door chimes. The sticker consisted of a silhouetted image of a guard dog to discourage opportunism.

Included in this substantial test was a careful tracking system. This allowed the authors to report that in 29% of the 907 burglaries in the presenting cases of the treatment group, there

was no record of anyone visiting any household. This means that in 259 burglaries X 9 households, a total of 2,331 households were never visited. Nonetheless, it also means that 71% of the cases received at least some of the treatment that was intended. In experimental practice, this delivery rate lies above a conventional threshold of treatment integrity (Neyroud 2017). The mere fact that it was tracked helps to make Swordfish a high-quality RCT. Nonetheless, certain problems remain in accepting the study's cautious conclusion that the results were modest and not consistently statistically significant.¹

The effect of this reactively allocated service was tested in an RCT that used separate random assignment procedures for lower and higher crime areas. That "blocking" on the area context was useful to identify an important difference: the program only worked in low crime areas.

While the 166 burglaries in the treatment group of 5140 households was 37% lower than the 260 burglaries in the equal-sized control group, the difference was not statistically significant (Johnson et al 2017). This analysis was possibly over-cautious, as well as misguided, since the households were not randomly assigned; only the neighbourhoods were. It is a fundamental statistical principle to analyze as units are randomized in controlled experiments, but it is a principle widely violated by social scientists (as in this case). A truly conservative way to analyze the Swordfish data would have been to compare the 23 district averages, but the analysts did not report those results—which may actually have been statistically significant across all properties. But they did something else that proved interesting and important.

The key finding from this RCT, as reported, is that the effect of the prevention kits depends on the crime rate of the area. As Figure 5 from the published article shows (Johnson et al 2017), the percent of addresses surviving from the date of random assignment without a burglary for up to 700 days was not very different between the treatment and control groups in the *high* crime areas (trend lines on the left hand side of Figure 5). Yet the survival percentage was significantly (p=.002) and consistently lower in the *low* crime areas (trend lines on the right hand side of Figure 5).

¹ Full disclosure requires that the author report being consulted in advance on the research design of this experiment. My advice, which the authors declined to accept, was against using areas as the unit of analysis. Instead, I recommended using individual burglary cases as the unit of analysis. That is how the data were, in the end, actually analyzed—even though the cases were not randomized on that basis. My recommendation for all future studies of preventing repeat victimization is to randomly assign hundreds of burglaries to two different treatments. That is the research strategy that would yield the most statistical power to reveal the true effect of these tactics on repeat burglaries and near-misses.



Fig. 5 Survival rates for all treatment properties in high-crime areas (left-hand graph) and low-crime areas (right-hand graph)

Exactly *why* the effect depended on (or "interacted with") the local crime rate is not clear. But the important lesson from these findings is applicable to all research for evidence-based policing: what works in policing may vary across contexts. Rather than providing a "one-size-fits-all" solution to a crime problem, research may help make policing more precise. It may suggest that police can do different things in different neighbourhoods to get the best results.

Another way to specify the impact of police-provided prevention kits is to compare the effect of different kits to the same prevention targets in low and high-crime areas. As seen in Figure 7 from the study (Johnson et al 2017) presented below, the effect of the devices on preventing near-neighbour burglaries is minimal in high-crime areas, but (once again) it is substantial in low-crime areas. For every thousand of the 8 nearest-neighbour households to a burglary victimization, there were about 30 burglary victimizations in the control group, but only 10 in the treatment group, over the 700 days after the initial burglary occurred—a reduction in risk of burglary by about two-thirds.



Fig. 7 Survival rates for silver and bronze treatment properties in high-crime areas (left-hand graph) and low-crime areas (right-hand graph)

These interactions between police tactics and local crime rate raise the key question of how high the crime rates were in these two kinds of areas. Unfortunately the study does not define the measure they used, except to say that all burglaries were tracked for repeat and near-repeat victimization in two groups: those in the top half of the 46 neighbourhoods ranked by burglary "rates" (Johnson et al 2017: 508), and those in the bottom half. Whether the burglary rates were based on households or population is unclear. What is clear is that future studies should follow the good practice of block random assignment based on well-

specified burglary rates, and continue making contributions about the difference that burglary rates make.

A final outcome analysis to report on Operation Swordfish is not about repeat victimization, but overall burglaries in the 46 neighbourhoods. While the authors did not report a direct comparison in raw numbers between burglary rates in the experimental and control sites, they did provide statistical models that took into account how many homes in the 23 targeted areas had received their prevention kits. The more homes with such kits, the lower the burglary rate became in those areas, relative to the control areas. This finding was statistically significant in two but not all models. Moreover, it was not an RCT analysis, but rather a descriptive analysis of dosage as delivered. Nonetheless, it employed a well-matched comparison group, and meets the standard for this report: in a comparative before-after analysis, Operation Swordfish *did* reduce household burglary rates.

4.2.6. Police management of first-offender burglars

Given the difficulty of catching burglars, it seems important for police to ask what would be optimal to do with them. In the recent "Turning Point" experiment with 414 first offenders that included burglars, the West Midlands Police found a large, statistically significant reduction in the crime harm of repeat offending among those offenders diverted (by random assignment) to a deferral of prosecution in favour of a voluntary, policesupervised program of rehabilitation (Slothower et al 2017). This program took advantage of the large range of social services available in Birmingham, from drug treatment to anger management. By making offenders attend these services, the diversion (or deferral) of prosecution actually imposed more consequences on the offenders than prosecution did. Deferred from a slow prosecution process to an immediate appointment with a police offender manager, their consequences were imposed far more swiftly, and with greater certainty, than any sanctions resulting from prosecution. By a combination of deterrence and rehabilitation, there may be many ways to prevent first offender burglars from repeat offending.

While this kind of project can be difficult to launch in systems giving police less discretion than they have in England, the value of the approach is suggested by a systematic review of experiments in diverting from prosecution offenders under age 18 (Petrosino, et al 2010). That review, including over 20 RCTs, concluded that diverting young people (including first offenders) from the criminal justice system made them *less* likely to commit crimes—including burglary—in the future.

The original theory of the diversion experiments, dating back to the 1960s, was to protect juveniles from getting caught up in a criminal subculture. If they were let off with a warning, the evidence suggested, it would deter them from taking any further risks of punishment. The theory of the Turning Point experiment in Birmingham was to deter them not by threat but by action: imposing immediate burdens on their freedom, but without going to jail. Nonetheless, the police retained the legal power to prosecute them for up to four months after their deferral. This power was regularly used (in about 25% of cases) in Birmingham to sanction first offenders who failed to attend their rehabilitation programs. The Turning Point Project focused so heavily on crime prevention that the victims of the

treatment group offenders were much more satisfied with the police actions than were the victims whose offenders had been prosecuted.

While the idea of deferral may be impossible for adults, it is often the case that people under age 18 may be eligible for more flexible punishments. The moment of first arrest and potential imprisonment is indeed a key "turning point" in anyone's life. Using that "teachable moment" in a different way may prevent hundreds of burglaries. Given the many years of potential offending at stake, it seems worth considering how to best manage that crucial decision—and what evidence would be needed to produce a clear answer.

4.3. Catching Burglars

4.3.1. Covert surveillance: serving warrants and 'stinging' burglars and others

ROP: Repeat Offender Project. In a test of targeted apprehension of active offenders wanted on warrants or recently released from prison--including burglars--the Washington, DC police found a massive increase in arrests of offenders randomly assigned to the treatment group, when compared to the control group (Martin and Sherman 1986). The offenders caught in the act by this intelligence-led treatment were much more likely than offenders arrested by other means to be sentenced to prison, and to get longer prison terms.

The social scientists who developed the experiment (Martin and Sherman 1986: 159-60) described the project as follows, and its policing tactics for offenders targeted either on outstanding warrants for their arrest, or based solely on intelligence.

Wanted on Warrants:

"The primary task in apprehending warrant targets was locating them. That task ranged from simple to complex. When a squad had a current address, all that was required was to wait at that location and arrest the target. But often the officers did not have a good address. To find the target they usually reviewed police and other records or contacted persons likely to know the target's whereabouts. Some contacts were straightforward, such as a call to the target's parole officer. Others involved deception. For example, a target's relative might have been told that the target had just won a prize he or she should collect or was being considered for a job and needed to be reached. Most of ROP's warrant targets were wanted in Washington, D.C., as fugitives from justice in neighboring jurisdictions or on felony bench warrants for violation of probation or parole or failure to appear in court.

Not Wanted on Warrants:

To arrest persons who were not wanted, ROP officers had to develop evidence about a specific crime in which they participated. This involved a variety of vice and investigative activities such as buy-and-busts, cultivating informants and investigating their "tips," surveillance of targets, and linking stolen property found in the possession of a target back to its rightful owner. Several prolonged investigations involved penetration of fencing operations and arrests of both the target and his or her criminal associates. Analysis of ROP apprehension activities and their outcomes indicated that there was no consistent formula for or primary tactic associated with arrests."

Yet from a police resource standpoint, the most important statement may have been this one:

"Most of ROP's arrests were made quickly (80% within one week of targeting) and did not involve extensive investigative efforts."

The ROP experiment was conducted as a modified RCT with pairwise matching. Whenever officers were available to take on a new case, two potential cases were presented. The senior social scientist (long before the Internet) would then flip a coin to see which one would be chosen. The other one became the control suspect in the pair. Figure 1 (Martin & Sherman 1986: 163) shows the result of being placed in the Experimental Group for ROP attention: fully half of the targets assigned to ROP were arrested by ROP, with another 8% arrested by other units, for a total of 58% arrest. The control group, in contrast, had under 4% of its 212 cases arrested. Thus ROP targets were 14 times more likely to be caught.



The ROP experiment also found significantly more convictions and sentences to incarceration in the experimental group compared to the control group. Taken in combination with the Modus Operandi profiling used in Boggart Hill and in the Florida test, it may be possible to envision using ROP-style covert tactics on targets who are selected on the basis of a large string of undetected burglaries.

4.3.2. Modus Operandi profiling

The most systematic test of the effect of LCAP methods to develop MO profiling was conducted in four small cities in Florida (Fox & Farrington 2015). Using the targeting tactics described in Section 3._._ above, for most of calendar year 2012 one Florida police

department rolled out the MO profiling tactics for every burglary they investigated. In a comparison between that single treatment department and three other Florida police departments that remained unchanged (see Table 1 below), the test showed that detections almost tripled when LCAP was introduced, while detection rates in three neighbouring agencies remained unchanged (see Figure 1 below).

Fox, Farrington / EXPERIMENTAL EVALUATION OF BURGLARY PROFILES IN THE FIELD 163

Department	Location	Officers to citizens	Burglary rate	Burglary arrest rate (%)	Condition
A	Central coast	1:186	131	11.9	Treatment
В	Central	1:313	148	12.8	Control
С	Central coast	1:239	102	15.9	Control
D	Gulf coast	1:188	94	18.7	Control

TABLE 1: Test Characteristics of Participating Police Departments

Note. Characteristics calculated using the average values for the 4 years preceding the start of the experiment.

The researchers described how the new method of reactive identifications searched a proactively developed data base on the offense-offender profiles (Fox & Farrington 2015: 164-165):

"Using the offense-offender links identified for each of the four behavioral profilesthe organized, disorganized, opportunistic, and interpersonal style burglariesdepartment wide training sessions, "how to guides," and one-on-one field training sessions were conducted over a 3-week time frame for all officers and property crime detectives in the treatment agency. This training consisted of a seminar on the purpose and uses of the burglary profiles, an in-depth explanation and description of the burglary profiles, the intended Fox, Farrington / Experimental Evaluation of Burglary Profiles in the Field use of the profiles in investigations, and the limitations of the profiles so no expectations or legal boundaries were violated in this experiment. Field training on how to apply the profiles was also provided to the detectives so they would know what elements to look for at each crime scene to correctly identify a burglary as a specific style of offense. Specific examples of each burglary profile (i.e., an organized burglary scene, disorganized scene, etc.) were also illustrated to the detectives so they could recognize and classify similar scenes by identifying the key characteristics, and determine the most common traits found among offenders committing each style of crime.

Additional training was given to the sergeant of the property crimes unit, the police chief, the deputy chief, and the captains in the treatment group to oversee the continued use of the burglary profiles. The crime analysts were briefed on how to apply the profiles to their electronic databases to generate suspects and limit potential leads, once detectives classified a crime scene into a specific offense style. For example, the burglary profiles suggest that disorganized burglaries are statistically more likely to be committed by young adult offenders who began their criminal careers very early in life (often in childhood), commit a high rate of offenses ranging from vandalism and drug offenses to more serious crimes like violence and burglary, and likely do not have any connection to the victim. Using the details of the profile,

the crime analysts would search the database of past offenders who fit these criteria and draw up a list of potential suspects for the detectives to consider pursuing for additional investigation. As always, additional evidence constituting probable cause must be established in each case for an arrest warrant from a judge to be legally issued against a suspect. Although the profiles are not considered legal evidence, and therefore cannot lead to the arrest of a suspect without sufficient hard evidence to constitute probable cause as required in all other arrests, the profiles are meant to benefit the police by prioritizing the most probable types of suspects for a certain style of offense, as shown in prior statistical analyses of offender traits and offending behaviors. That way, police will spend their time first investigating the offenders who are statistically most likely to have committed a certain burglary style and will not waste precious time looking into offenders who are statistically unlikely to have committed the offense."

The result of this thorough implementation plan was a 260% increase in detections for burglary in 2012 compared to 2011 (Figure 1). Monthly reporting from the nearby comparison agencies showed that the treatment department was an exception to a general downturn in detections across the other three departments. While the study lacked tracking data on how many suspects were considered under the old and new methods, the large increase in detections is strong cause to consider this approach. As the first field experiment to test the effects of any kind of offender profiling on detection rates, this study cannot be compared to any others. Nor should it be allowed to stand alone for very long. The value of replicating this study, or even improving on it with more tracking data, would be substantial.



Figure 1: Interaction of Experimental Condition and Testing on Burglary Arrest Rates.

4.3.3. More time spent at initial investigations

In a tightly controlled and well-implemented two-month RCT in 2014 with all 72 police forensic investigators in Brisbane, Australia, police achieved a 39% increase in burglary detections (Antrobus and Pilotto 2016). The test included 872 residential burglary

cases, about half of which were randomly assigned to 36 of the investigators, who themselves had been randomly assigned to special investigative training. Perhaps the most influential result of that training was that the experimental officers spent 69% more time at crime scenes, on average: a difference of 48 minutes per burglary in the control group compared to 81 minutes in the experimental group. The specially-trained officers spent much of that 69% more time having somewhat longer conversations with the victims. They also gathered more DNA samples and other forensic evidence.

The experiment was led by Andrew Pilotto, at that time an Inspector of Police (and later a student in the Cambridge Programme), who designed and implemented the training for the experimental group as well as the two-month experiment. The article reporting the study describes the training as follows (Antrobus and Pilotto 2016: 327-328).

"Experimental Condition

Experimental officers were provided with upskill training on the two component parts. First, officers were given additional training in general crime scene evaluation, including tactics for visual inspections in oblique lighting, the importance of recording quality information in the police database, and more training on DNA and fingerprint evidence collection, particularly related to alternative forms of fingerprint collection (such as fluorescent powdering). Experimental officers were also provided with additional resources related to their upskill training, including a magnetic fingerprint brush, magnifying glass, and a new flashlight. Most pertinently, experimental officers were permitted to take (if necessary) five DNA samples from homes per incident and were able to access a shoe print identification system (SICAR) during the trial.

Second, experimental officers received a brief training session and handout to highlight the importance and methods for interacting with victims in a procedurally just way; that is, treating people with dignity and respect, demonstrating trustworthy motives, being neutral and fair, and providing people with an opportunity to voice their concerns. As part of this procedurally just approach, during the trial, experimental officers were required to attend every case for which they received a work ticket, had less time restrictions during the trial than in normal routine activity, and were asked to spend as much time as was necessary at each incident. Experimental officers were reminded and encouraged that the goal was to demonstrate to residents that the police treat every complaint as important.

Control condition

Control officers were asked not to alter the way in which they interacted with victims and to conduct business-as-usual. As per standard procedures for volume crimes in this jurisdiction, control officers were not required to attend every incident and assessed whether they needed to attend specific incidents, whilst also being mindful of their time. Control officers continued to collect the standard number of DNA samples per incident (two samples) and did not have access to the additional forensic resources."

The result of the training was a clear difference in how much time the forensic officers spent at residential burglary scenes, and how much they got out of that time.



As Andrew Pilotto's graphic illustrates above, there were very large and clear experimental effects on the amount of forensic evidence collected. And as Table 6 of the article shows below, there was a strong impact of the increase in forensic evidence on the detection rate in the cases. Finally, it is important to recall that this experiment was accomplished with no additional personnel. The only human resource cost was in the brief training time needed to produce this substantial increase in detected burglaries.

	Control	Experimental	<i>p</i> -Value
Solved	102	111	_
% of all incidents (incl. NFA)	18.58 %	25.87 %	0.006
Attended incidents solved	93	107	_
% of all incidents attended	19.75 %	26.68 %	0.016
Solves (total) where forensics used ^a	22	42	_
% of attended incidents solved	23.66 %	39.25 %	0.023
Solves where fingerprints used	14	29	_
% of attended incidents solved	15.05 %	27.10 %	0.040
Solves where DNA used	9	15	_
% of attended incidents solved	9.68 %	14.02 %	0.389

Table 6 Details of solved incidents in experimental and control conditions

4.3.4. More officers at initial investigations

In a descriptive analysis of the number of officers at initial investigations for "in progress" burglaries in the West Midlands, Blake and Coupe (2001) found that the presence of more

officers was strongly correlated with catching a burglar at the scene. This correlation may be an artefact of more officers arriving after a burglar has been caught, so it does quite not meet our standard of evidence. Yet while only 9% of burglaries are reported to that police agency while they are in-progress, arrests made in those cases formed almost half (43%) of burglary arrests in Dr. Timothy Coupe's larger West Midlands study.

His research was conducted in an area of 2.6 million people, with 7,000 police officers. This is how the sample for the number of officers study was described (Blake & Coupe 2001: 383):

"A sample of 441 cases was drawn from the 9 per cent of [all] burglaries [that were] reported while 'in-progress' between July and December 1996. This consisted of 116 cases where one or more suspects were caught in the act, and 291 cases where nobody was caught. Data were collected using a questionnaire survey of police patrol officers, surveys of burglary and police records so that the various aspects of the crimes and their investigation could be related on the basis of individual incidents. An officer from each patrol attended an incident was asked to complete a questionnaire. The overall response for the officer questionnaires was 84%"



FIG. 2 Burglars caught in the act by number of patrols units attending. The single incident where eight patrols attended has been excluded

The analysis stressed the contingent relationship between the reporting of a burglary and the chances of police catching the burglar. As common sense might suggest, the sooner the

burglary was reported, the better the chances were of catching the burglar. The authors supported that hypothesis with precision (Blake and Coupe 2001: 384)

If burglars were reported entering the dwelling, this police more time to reach the scene before they had left, while if they were spotted at work inside the dwelling, there was still a good chance of success. However, there was little if any chance of catching burglars reported while leaving the dwelling or when they were in nearby streets. Hence, 19 per cent of burglars reported while entering dwelling were caught, compared with 11 per cent inside the dwelling and only 2 percent spotted while leaving or when in nearby streets. Burglars were over three times be caught at incidents reported by neighbours than those reported by the victims themselves, while additional suspects and an available suspect description improved chances of success by 80 per cent and 40 per cent respectively.

This finding may have important implications for dispatching policy, especially if there is a possibility of sending more police cars to a burglary in progress. Yet the study also suggests it is important to consider travel time, for which any time over ten minutes may be simply too long to make a difference (Blake and Coupe 2001: 383):

"Catching burglars in the act was strongly influenced by the strength and speed of the police response. Quicker responses enabled burglars to be caught more often, so that there were almost twice the successes (15.3 per cent caught in the act) when the police got there within four minutes of the alert being sounded as when they arrived after six minutes (8.2 per cent). No burglars were caught at the 5 per cent of incidents where responses took longer than 10 minutes."

Nonetheless, at least in the urban setting of the Birmingham metropolitan area, catching burglars in progress at or near the scene formed the largest portion of all burglary arrests in the West Midlands sample (Coupe and Griffiths 1996: 6). In combination with the second most common tactic, interviewing witnesses or victims at the scene in the immediate aftermath of the burglary (34%), the total proportion of all burglary detections generated from in-progress burglaries was 77%. Managing police responses to "in-progress" burglary reports may thus be a crucial part of managing a burglar population--even when the detection rate is as low as 6% (as it was at the time of Coupe's study).

The fact that no studies are available that test different ways to enhance "in-progress" detection rates does not mean that they cannot be done. The tracking research by Coupe and others identifies key opportunities for designing innovations in *reactive* policing, which remains central to understanding, as well as deflecting, the burglar population in any policing area.

4.3.5. DNA Collection & Analysis

In a five-city multi-site randomized controlled trial in the US, Roman et al (2008: 140) found that analyzing DNA evidence in 2,160 cases tripled the identification of a named

suspect, and doubled the rate of arrests (see Figure 9.1 below). These data combined results from separate RCTs in Denver, Topeka, Phoenix, Los Angeles, and Orange County (CA).

	Treatment	<u>Control</u>
Suspect Identified	31%**	12%
Suspect Arrested	16%**	8%
Number of Arrests	173	86
Case accepted for prosecution	19%**	81/0
Sample Size	1,079	1,081

Table 9.1. Suspects identified, arrested, and prosecuted in all sites

Source: Urban Institute. Notes: Data are reported at the case level. Significance testing is based on independent sample t-tests comparing each treatment group to the comparison group. Some sites considered the issuance of a warrant to be a case accepted for prosecution. The use of John Doe warrants – where the suspects name is not know, is also included in this total. Significance: * p < 0.05, ** p < 0.01

The 5-city RCT (Roman et al 2008: 143) also concluded that DNA evidence was more likely to lead to an arrest than fingerprint evidence, even when the latter is checked with a computerized AFIS (Automated Fingerprint Identification System). Table 9.5 and the text that follows described how in their sample, fewer fingerprints were recovered when DNA was found, but even when they were recovered they had less value in producing evidence needed for an arrest. Suspects were twice as likely to be identified by DNA as by fingerprints, and were arrested at 3 times higher rate from DNA.

	Percentage of cases where evidence collected	Percentage yielding identification of suspect	<u>Percentage</u> <u>yielding an arrest</u>
Biological Evidence	100%	16%	9%
Fingerprint Evidence (all cases)	33%	3%	1%
Fingerprint Evidence (cases where fingerprints collected)	100%	8%	3%

Table 9.5. Effectiveness of biological and fingerprint evidence

Source: Urban Institute

We find that in cases where biological evidence was collected, fingerprint evidence was collected only one-third of the time. In all cases, a suspect was identified by biological evidence in 16 percent of cases. Individuals were identified by fingerprint in only three percent of cases. An arrest was made following CODIS identification in nine percent of cases. An arrest was made following a fingerprint identification in one percent of cases. When considering only those cases where both fingerprints and biological evidence were collected, suspects were identified by CODIS (16 percent) at twice the rate they were identified by AFIS (eight percent). Suspects were arrested following a CODIS hit at three times the rate (nine percent) they were arrested following an AFIS hit (three percent).

How much value DNA evidence has for identifying burglary suspects, of course, depends how many offenders have their DNA profile in police records—which may be proportionately smaller in Denmark than in the US. Yet the value of DNA depends more directly not on the overall *size* of the data base, but on on the *proportion* of the active burglars who are included in a DNA data base. Even if a burglar has never been identified, it is still possible to associate a unique DNA profile with an M.O. profile. The value of that association, as Armstrong (2017) demonstrates, is the potential for identifying the suspect in a large number of cases if the offender can be caught. That, in turn, emphasizes the value of giving high priority to 'in-progress' burglary reports, which may offer (in Denmark as in Birmingham) the highest odds of catching and identifying a burglar.

4.3.6. Post-arrest case enhancement by investigators

Once burglars are caught, and police can prove a case, one view is that the police role is terminated. Yet many police share a commitment to crime prevention. There is little point to convicting burglars absent a hope that they will commit fewer crimes in future. While some might say that rehabilitation is the job of the courts and prisons, not police, there is still a way that police can contribute to prevention.

This issue is quite complex, given the Dutch finding that the first time an offender is incarcerated it increases the number of offenses per year they commit after they are released from prison (Nieuwbeerta et al 2009), at least up to age 25; after that age there is apparently no effect of imprisonment on future offending rates. Yet at any age, incapacitation (in prison) is a means of preventing a burglar from committing burglaries. As the Case Study (Section 2)

suggests, the value of incapacitation of high-rate burglars can have measureable reductions in an area's burglary rate. Hence the research on whether police can increase incarceration of burglars is relevant to the question of burglary reduction.

The Phoenix ROP Test. One such test is available for discussion: the 1987-88 Phoenix, Arizona Repeat Offender Program. In a large RCT of this police-initiated strategy, the RAND Corporation (Abrahamse et al 1991) found substantial increases in the proportion of repeat offenders, including burglars, receiving longer prison sentences. The 473 targeted prolific offenders were nominated by a screening committee of police and prosecutors, and then randomly assigned (with minor adjustments) into a treatment group of 270 and a control group of 203 offenders.

Using six detectives assigned to work half-time with prosecutors devoted to ROP cases, the ROP team conducted supplemental investigations *after* arrest. These included a variety of measures designed to increase rates of conviction and incarceration (Abrahamse et al 1991: 150-152):

"Postarrest Enhancement Activities

After an ROP target was arrested and an ROP investigator was notified of the arrest, he notified the ROP [prosecutor] in turn. The [prosecutor] was informed of the arrestee's known criminal activities and prior convictions. The merits or weaknesses of the case were discussed, and a strategy was planned. The ROP investigator determined whether any further information was needed and provided it as soon as possible. The [prosecutor] was kept informed of any new or newly found charges that might develop during the investigation, such as additional file stop calls or checks of outstanding warrants. The ROP [prosecutor] requested further information by telephone rather than through the traditionally slow paper route. In this way an answer could be obtained or additional investigation could be made quickly: the traditional communication has an average turnaround time of **30** days, the ROP inquiries took between an hour and a day, depending on the complexity of the request.

The ROP [prosecutors] and detectives worked as a team in prosecution. In many instances, the ROP detective walked a warrant or additional charges through the system to the judges in order to obtain a higher bond to ensure that a target was not released. Occasionally the detective went to trial with the [prosecutor]. Often the detective sat in the gallery of the courtroom so as not to appear conspicuous. In this way the detective could observe the jury for reaction during various parts of questioning by prosecution or defense. He or she observed the jury's reaction to points made or items of evidence presented, and then pointed out to the [prosecutor] the issues about which jurors probably were confused.

ROP detectives usually did not have contact with victims or witnesses, but in a few instances they provided emergency babysitting or transportation.

Input to the Presentence Report

Once a ROP target was convicted, by either a pretrial agreement, a guilty plea, or a trial, a ROP detective contacted the person at the Adult Probation Department who was assigned to write the presentence report. Generally the ROP detective already had

researched the target's prior record, and thus could be a significant influence on this report. Normally this contact between the police department and the probation department is severely neglected because police officers work at different hours from presentence investigators."

The effect of these activities was clearly demonstrated by the difference between the court outcomes for offenders assigned to ROP and the control group. As Figure 1 (Abrahamse et al 1991: 157) shows, with the right-hand bar in each pair indicating the ROP group, there was significantly higher likelihood of ROP offenders becoming incapacitated at every step of the criminal justice process. Overall, 80% more offenders received long prison terms in the ROP group than in the control group.



Figure 1. Falloff of Dispositions, ROP and Control Groups

The authors concluded that the Phoenix ROP had indeed shown its effectiveness at increasing the incapacitation of prolific offenders (Abrahamse et al 1991: 165):

"Average sentence length for ROP offenders [compared to the control group] increased by 18 months (from 73 to 91). If we assume that the average inmate

serves about 60 percent of his prescribed term, the effect of the ROP unit on sentence severity translates into an additional 10.4 months per inmate or 222.5 years for the entire sample of 257, a significant incapacitation effect resulting from the work of only six police officers."

This finding, like many cited in this report, may be unwelcome in a different culture or philosophy of justice. Yet as noted from the Case Study onward, any society that wishes to reduce burglary may at least wish to be aware of the role that imprisonment may play.

5.Tracking Policing and Burglary

Given the limited development of tracking in evidence-based policing, this section is more aspirational than documentary. There are some examples to offer of systematic tracking of policing, but almost none that tie the tracking of policing actions to the behaviours of the burglars—let alone to burglary rates. The section is more a "selective discussion" than a systematic review, but it may also serve to increase the choice of items on the menu of actions Danish police could take against burglary.

5.1. Tracking Police Response Times: "In-Progress" Burglaries Only

Given the potential importance of the response times to in-progress burglaries (Blake & Coupe 2001), there may be good reason to track the average time for these calls. In some areas, in-progress reports may be too infrequent to compute meaningful average times from call to arrival—except perhaps on a three-to-six month basis. But where there are weekly occurrences of such calls, it could make a difference to detection (and MO identification) of burglars if the speed were increased. Even better, systematic testing of that hypothesis in Denmark might help to reveal whether or not it is important here.

5.2. Tracking Targeting Implementation

The question of what happens when an implementation plan is rolled out has been identified in both the Pegram and Weems studies discussed below. The challenges are substantial, with measurement often the least difficult to achieve. Obtaining compliance by all operational personnel remains an area in which more management research is needed on what works to gain successful implementation—even when you can pinpoint just who is failing to do the job. But a precursor to taking action is often neglected: were the intended targets identified and reported to the assigned officers as planned? While the Pegram and Weems studies tracked the actions for cases that were targeted, apparently no study to date has audited whether each reported burglary actually generated a list of addresses that should be visited. For that, even automated or electronic systems can be referenced against other data fields, to check very quickly for any gaps or "misses" that may have occurred. Just because it is "computerized" does not mean that it always happens, as many computer owners know.

5.3. Tracking Prevention Actions

5.3.1. Tracking Neighbour Warnings

Two studies illustrate how tracking can be done, relentlessly and precisely, to insure that neighbours are notified as soon as possible about a nearby burglary. These two are by Pegram (2016) in Greater Manchester Police, and Weems (2014) in Thames Valley Police.

Pegram (2016) demonstrated that even with a formal tracking process, Police Community Support Officers (PCSOs) were unlikely to complete all of their assigned notifications of neighbours of recent burglary victims. His descriptive study showed how he used trial and error to increase the rate of compliance with these assignments. He not only used a paper form, he also required that PCSOs provide body-worn video footage with time and date stamping to show that they had actually visited the addresses surrounding each burgled property. That measure was further confirmed by the GPS device in the camera, which created a map tracking their PCSOs movement across the area from house to house. Here are some excerpts from the reports generated with the forms and systems illustrated below (Pegram 2016: 42-43):

"Of the 248 properties that both existed and were occupied that could have been super cocooned [visited], 230 of those properties received a first in person visit by a trained PCSO. While not all of these visits resulted in a successful contact with the targeted resident, this figure shows a first visit attempt compliance rate of 92.7%. In total, 121 of those 230 first visits resulted in a face to face contact. These 121 successful face to face first visit contacts did not require a second visit, leaving the total number of possible second visits at 109. The number of properties that received a second visit was 90.. this shows a second visit attempt compliance rate of 82.6%.

The number of properties that received no treatment at all was 31 which represented 12.5% of all potential properties which could have been cocooned. These properties that were not cocooned all fell on days when there was no sergeant present at the police station to identify the burglary and give out the tasking for super cocooning."

Pegram (2016: 45) also tracked the time these visits took, in order to insure reasonable speed:

"The time it took to attempt to initiate the super cocooning treatment was as follows: 17% (n=39) of the 230 properties visited were attempted within one day of burglary being reported to the police. 44.3% (n=102) of the 230 properties visited were attempted within two days of the burglary being reported to the police. This shows that 61.3% (n=141) of burglaries reported to the police during the period of the study in Gorton North and South received an attempt to super cocoon within two days. Conversely, this meant that 38.7% (n=107) of burglaries reported to the police did not receive attempted super cocooning treatment within the first two days."

The following materials illustrate the way his tracking system was operated by a neighbourhood police sergeant:

[PCSO Super cocooning paper log form]

Burgled Property Address: _____

Property	House number	Date of 1 st visit	Date of 2nd visit	Face to Face Contact	PCSO attending 1 st visit	PCSO attending 2nd visit	Time attended address (1)	Time left address (1)	Time attended address (2)	Time left address (2)	Notes e.g multiple occupancy or address does not exist
Left 4											
Left 3											
Left 2											
Left 1											
Burgled Property											
Right 1											
Right 2											
Right 3											
Right 4											

If unsuccessful with face to face contact at 2nd visit leaflet is to be posted. BWV is to be turned on from arrival at the location until leaving the location.

Tracking tools HETADATA DOWNLOAD ASSIGNED TO Pagram Roger (12011) Marcelby/2011 (paperherithmescom) on 19 Sep 2016 2016-08-25 T14:20:422 AXON BODY 2 X81006463 RECORDED ON 25/08/20% 120 PM +0100 UPLOADED ON 25/08/20% 4.59 PM +0100 UPLOADED BY Peoram Roper (12011) DELETION SCHEDULED FOR 25/09/2016 5 20 FM +01:00 FRE SIZE 281.88 KISCASE REFERENCE CRIME REFERENCE +C.5 Silvi (n) () (1 0 00.42/0100 SOURCE

Body worn video (BWV) Global Positioning System (GPS)



Burgled Property Address (form completed)

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Property	Date Visited	House	PCSO	BWV	Face to Face Contact	Leafiet	Time 1 ton oress (1)	left address (1)	Time address (2)	Time left address (2)	Notes e gimultiple oci address does not
Loft 4	25/08/16	3	65032	Y	Y	Y	15:39	15:47			
Left 3	11 Il	S	1.1	Y	Y	Y	15 32	15 35	20:30	20 110	
Left 2	1.1	F	s. 1.	Y	Y	Y	15:31	15 31	20.35	20 40	
.sft.1		9	5.5	Y	N	Y	15:30	15.50	20.33	10:30	
Burgled	11	11	1.1	Y	Y	Y	15:15	15:30	1		
Right 1 Right 2	End house										
Right 3				-	-		-			-	
Right 4			14		1.	-	10	-	1	-	1

(fffM

Weems (2014: 77) analyzed reports from PCSOs required to attempt contact with 26 homes near each burglary. His analysis, presented in Table 7 below, showed that only one of the three police areas documented the average number visits that complied with the assignment. But the analysis also showed reasonably high levels of compliance. The tracking also allowed the analysis to check what difference, if any, the "dosage" of homes contacted made for the reductions in burglary (see Section 4._._ above).

Police Area	Offences 2013/14	Houses Super Cocooned	Average number receiving super cocooning visits per offence
Reading	497	10183	20
Oxford	402	6686	17
Milton Keynes	637	16251	26
Total	1536	33120	22

Table 57 Detailing number of offences, total houses receiving super cocooning visits and mean average per Operation Reacher police Area

5.3.2. Tracking Burglar Warnings

Two studies discussed in this report included tracking data on police warnings to burglars: Santos & Santos (2016) and Englefield & Ariel (2017).

The Port St. Lucie (FL) experiment reported by Santos and Santos (2016) included detailed measures of detective contacts with the suspected burglars targeted for police warnings, preferably at their homes. This tracking was reported in summary form for the entire experiment, but could have been monitored on a weekly basis.

Table 5 Results of detective contacts	Type of contact	Frequency	% of total	
	No contact made	212	22.77 %	
	Face-to-face at home	567	60.90 %	
	Face-to-face family	167	17.94 %	
	Incarceration follow-up	140	15.04 %	
	Arrest by other	17	1.83 %	
	Contact with PO	13	1.40 %	
	Arrest by detectives	11	1.18 %	
	Arrest by PD	6	0.64 %	
	Telephone	5	0.54 %	
	Face-to-face at work	2	0.21 %	
	Face-to-face PD	2	0.21 %	
	Face-to-face hospital	1	0.11 %	
	Total	931	100.00 %	

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Englefield & Ariel (2017) reported that only 62% of targeted offenders could be contacted by the uniformed officers assigned to do so. Since the targeted offenders in Sacramento were "recruiters," and hence were somewhat more chronic and influential offenders than in the Port St. Lucie experiment, they may just have been harder to find (more successful in avoiding police contact). Yet the detailed data on contacts has not been published. The details provided in Santos & Santos (2016) remain a model of how to track such actions.

5.3.3. Tracking first-offence burglars

The Turning Point Project in Birmingham put substantial efforts into tracking the first offenders deferred from prosecution. Both Neyroud et al (2015) and Slothower et al (2015) describe in some detail the ways in which the quality of police offender management, as well as the research design of the experiment, was improved by the continuous quality improvements that resulted from what ongoing tracking provided: relatively rapid detection of problems in the implementation of the program.

Once the program reached its final phase for the RCT of 414 cases, the overall tracking of the deferred prosecution cases provided important descriptive information on what they were compelled to do (by their consent) in order to avoid prosecution. One set of these items is as follows:

• F	 Restoration/Reparation 65% Compensation 40% Community Payback 36% Letter of Apology 20% 	 Movement Constraint 33% Exclusion Zone 27% Not to Contact Victim 15%
● F	 Rehabilitation 58% SMART Team 36% Employment 16% Mental Health 11% Housing 5% Anger management 2% Debt 2% Drug Search 2% 	 Requirement to comply with contract and stop offending under threat of prosecution

More typically, Turning Point also used tracking to measure failures of program compliance. While the compliance rates of custody sergeants had initially been low, re-training and restarting the RCT solved that problem in over 90% of cases. What remained problematic was the extent to which offenders breached their promises to seek rehabilitation, and were therefore referred to court for prosecution. The following summary of the first half of the experiment displays these results (which were comparable to failure rates of offenders assigned to court immediately after arrest):



5.4. Tracking Detections Per Officer-Hour

One key point about tracking the ways police spend their time is the need to measure time itself. This is particularly important for the measurement of burglary detections. If the goal is to detect more burglaries with available investigator resources, it is essential to use a denominator of time per case. This point is only made because previous studies have looked at detections per investigator. Yet unless there is an adjustment made for caseload, it is impossible to tell whether more cases can be detected with one system compared to another.

The ideal solution is to do what lawyers and accountants do: to track their time by the case on which they are working. In Kent Police, the practice is to call the dispatcher at the Force Control Room and report the case number on which they are about to invest their time in an investigation. When they end their work on that particular case (including travel time), they notify the dispatcher that the time period has ended—and they move on to another case. This kind of precision will allow tracking to estimate the number of cases solved per 100 investigator-minutes. That metric creates a fair comparison across different ways of selecting cases as "solveable," as well as other tactics police may use.

5.4.1. Tracking overall detections per offense

The practice of computing an overall detection rate is widespread, but perhaps not so useful. In the UK a case is not considered detected unless there is a criminal sanction imposed on a person's record—a "sanctioned detection." Yet in many cases a suspect has been identified, but the victim or another key witness refuse to provide testimony. If a more nuanced series of indicators can be used in place of a single "solved" measure, there would be more clarity and transparency of what police are actually accomplishing. Swedish Police, in particular, have been confronting this issue. A single Nordic standard might be a very useful development for professional development on evaluating what works—by a meaningful standard.

5.4.2 Tracking crime harm index values

The use of a crime harm index is also a valuable tool, not just in tracking investigative outcomes, but even in tracking the allocation of investigative resources. Some burglaries result in terrible injuries or sexual violation of the victims; other result in a bicycle disappearing from an unlocked garage. There is great value in a weighted index of harm to provide an objective basis for setting priorities (Sherman et al 2016). The development of two different Danish versions of such an index, in addition to a Swedish index, all developed at the Cambridge Police Executive Programme (see Summary above), should give ample tools for apply a crime harm index to burglary investigative choices.

Using such an index would allow police to systematically invest time in hard-to-solve cases on the same basis they already do, but subjectively so: the most serious cases receive substantial resources, regardless of whether or not they are solvable. Using an index would not change that; it would reward it. By using a metric that shows more time is spent this year on more serious cases than last year, police would attract more public support than the single focus on a detection rate provides.

Burglarizing Occupied Homes. One prime example of this point is the crucial distinction between daytime burglaries of (usually) unoccupied dwellings vs. night-time burglaries of occupied homes. In the latter cases, there is a further distinction between burglars who enter the bedroom of sleeping householders and those who do not. Clinical observations in the US by the author suggest a correlation there between bedroom entry and more serious crimes, including subsequent murder of occupants during stranger burglaries. While such serious burglaries may be a small part of the current burglary problem in Denmark, it could develop. Like a rare disease, it is something that should be tracked from the minute it is first detected in Denmark.

The best way to insure that is to include digital fields for reporting every burglary to guarantee ease of access to data on the key questions: 1) was the home occupied at the time of the burglary? 2) did the burglary occur after dark? 3) did the burglar enter a bedroom, or any room, where someone was sleeping? 4) did the burglar touch or injure the occupant in any way? These questions might allow the development of a burglary-specific harm index, with appropriate legal guidance reflecting the different punishments prescribed with and without these *digitally recorded* behaviours.

5.4.3. Tracking year-on-year detection trends by District and local area

Whether the metric is cases solved per 100 investigator hours, or CHI value per 100 investigator hours, or even estimated CHI value of burglaries prevented, there is great value in tracking and comparing trends within Districts and across their local areas. Examined in parallel with burglary trends, tracking the outputs and outcomes of anti-burglary strategies could provide more clarity about the effectiveness of different ways of working towards this goal. Linked to a framework of trends in targeting, as well as implementation or outputs to prevent and detect these crimes, this kind of tracking could be light-years ahead of the so-

last-century annual reports on a few summary statistics. Updated tracking of detection trends could also help to identify good practice, so that it can be understood, tested, and replicated.

6. Pathways to Fewer Burglaries: A Research & Development Smorgasbord

This report presents a long list of possible projects for police to consider for reducing burglary in Denmark. Some people reading this report may already have decided which project offers the best "fit" for the situation they face in their own workplace; they know where to begin. Those people need read no further in this report. They would be best advised to read the sources cited on the project that interests them, and then design a plan of action.

Other people reading this report may still be undecided, wondering "where to begin?" For those people, the key issue may be whether to take on just one of the three Ts, or to plan a full Triple-T project like the Case Study in Section 2. As a practical matter, however, there may be little difference between those choices. Any attempt to conduct a test, for example, will require targeting and tracking. Any attempt to target will require data from tracking, and could be aimed at one or more possible tests.

The aim of this final section is to provide some examples of how to begin with one of the three Ts with a view—but not final decision—on where that first step might lead. Its method is, again, to illustrate the principles to be applied. By giving some concrete examples of the interdependence of the evidence from all three Ts, this section may give readers more clarity about where they can begin. These examples are called "pathways," to emphasize two points. One is that they are just the start of a long journey, in which the destination may not be clear at the origin. The other point is that there are many possible pathways that can arrive at the same destination—in this case being a Denmark with fewer burglaries.

6.1 Targeting

The most important fact about targeting presented in this report is the heavy dependence targeting may have on catching burglars at a crime-in-progress. Even if a burglary profile is identified from DNA samples at unsolved crime scenes, there is no way to link those crimes to the burglar until the person is arrested and DNA-tested. If such tests are legally problematic in Denmark, there are still many things that can be done. But for many reasons, starting with the globally-low detection rates for burglary, it is likely that catching more burglars in progress may be a turning point for targeting prolific burglars.

More Cars for Burglaries in Progress? The importance of catching more burglars *at least once* is that it allows their DNA to be recovered from all future burglary scenes. Highly selfdisciplined burglars may, of course, succeed in keeping their DNA out of burglary scenes. Yet the Florida research (Fox & Farrington 2012, 2015) suggests that many burglars lack discipline. While most burglaries are undetected, there is no evidence on the *percentage of burglars who escape detection completely*, especially after hundreds of burglaries. The smaller that percentage, the more accurately police can target their resources for testing a variety of prevention strategies. For all these reasons, it seems appropriate to abandon the high standards of evidence used in this report to pursue a data-driven hunch:

PATHWAY #1. Given the evidence in one UK study that more burglars are caught after "in-progress" burglary reports than by any other method (at least before DNA

evidence was in widespread use), and that arrests are more likely when more police cars respond to such calls, Danish police could a) confirm whether both facts are true (in at least one part of Denmark) and then b) target "in-progress" burglaries for dispatching more police cars, at least in a small experiment, to test whether the targeting would raise the rate of successful arrests of burglars.

6.1.1. Targeting Burglars Proactively

The report has described several methods for targeting burglars proactively. Most of them rely on previous apprehensions of those targeted in this way. How many burglaries would be preventable by such targeting is something that Danish police could calculate if they are allowed to take DNA samples of all burglars. They could even do it with fingerprints alone, although that would be less effective given the lesser value of fingerprints compared to DNA (Roman et al 2008). The initial question is what percentage of active burglars have ever been caught. Answering that question is yet another place to begin.

PATHWAY #2. Danish police can use biometric evidence left at burglary crime scenes to identify all unique burglars, and compute the percentage who have no biometric record of prior arrest. Among the cases with known biometrics, the "power few" burglars who commit the most offenses can be identified by rank-ordering them on the number of burglaries at which each burglar's biometrics were discovered. That would provide sound evidence, however limited, on the extent to which burglary is concentrated. The conclusion could then lead to next steps that either would, or would not, target repeat burglars proactively.

If Pathway 2 were taken, it could lead directly to a third pathway, one discussed in this report at length: the M.O. profiling that limits the number of suspects for any burglary. While the Fox and Farrington (2015) test shows that this method seemed to triple the detection rate, it did not show *why* the detection rate went up. Specifically, it remains unknown what percentage of the increase in detected crimes came from using the new method of M.O. profiling to identify the suspects. That is a question that could be answered if Denmark went even further down the same pathway.

PATHWAY #3. Danish police could replicate the M.O. profiling analysis from Florida and Durham, identifying distinct lists of burglars known to fit the profile of distinct M.O.s at burglary crime scenes. If such patterns were found, Danish police could then implement an RCT to test the rate at which the M.O. profiling led to arrests compared to not using the profiling.

6.1.2 Targeting Burglaries Reactively

It is not clear whether practices in responding to burglaries vary across the 14 Police Districts of the Danish Police. Some locations, at least, may be likely to send investigators as second responders to burglary scenes after uniformed officers have left. Whether that is a more cost-effective use of time than targeting burglars proactively is an important question, given low detection rates. The pathway for
answering the question is well-established from prior studies. Where it may lead is to increasing total detections by conducting fewer followup investigations. This apparent paradox is still unproven, but an RCT to do that is being tested with minor violent crimes in Norfolk England. Denmark could be the first to go further down this pathway than previous solvability studies have done.

PATHWAY # 4. Danish police, with digital records on key elements of forensic evidence at the end of the preliminary investigation of each residential burglary, could 1) develop a solvability forecasting model that would assign a probability of the case being solved, the 2) set a threshold (such as 50% odds of detection) below which no case would receive a followup investigation, and 3) then create an RCT in which two investigative teams, with equal numbers of investigators, would either use the forecasting model, or not, to manage their workload, thus revealing whether concentrating resources on fewer, but more solvable cases would lead to a higher total of convictions per investigator hour than trying to investigate large numbers of less-solvable cases.

Using a seriousness criterion rather than solvability, a similar pathway could be developed to focus on "bedroom burglars."

PATHWAY #5. Trawling digital data, if possible, to identify burglars who enter bedrooms at night while occupants are present, Danish police could 1) estimate whether that conduct is a strong marker for causing injury to householders (or others), and if so, 2) target any burglar who is reported to have displayed such conduct for an intensive investigation, both before and after arrest, to seek incapacitation of highly dangerous offenders (if they are).

6.2. Testing

Whatever the state of targeting may be, there are ample opportunities to use targeting for RCTs or other tests of burglary prevention. Given a reportedly low rate of repeat victimizations in Denmark, it may be unwise to target the prevention of such burglaries. But there may well be parts of Denmark in which near-repeat burglaries constitute a substantial problem. Thus any police area could use Professor Jerry Ratcliffe's free online software for calculating the near-repeat concentrations (see http://www.jratcliffe.net/software/) to determine how big that problem is. If they decided it was worth pursuing, they could follow the next pathway.

PATHWAY #6. Danish police could replicate Operation Swordfish, but in a more rigorous way than it was done in Birmingham. They could submit each burglary report to random assignment to either treat the near-neighbours with warnings and/or crime prevention devices, or not. Then by tracking the delivery of the treatments with methods reported in Thames Valley and Greater Manchester, the RCT could compare the rates of burglary across all eligible nearest neighbours for burglaries treated in the two different ways.

6.3. Tracking

There are many things police could track about burglaries in Denmark that are not being tracked at present. Perhaps the most rewarding pathway for tracking is to develop a continuous capacity to identify the whereabouts of every burglar ever arrested in Denmark. If such a capacity is currently available, Denmark would be one of the few (if not only) places on earth where it is. If it is not, then following this pathway could give operational police officers a very good reason to think about the value of applying research to burglary reduction. Such a system could be expensive, but it might be justified by any findings from Pathway 3 above. It could also be tested, once established, since the major costs to the system would be ongoing labour expenses—at least until links to other digital systems could be established.

PATHWAY #7. Danish police could establish a national computer system for updating the last known residence of everyone who has ever been arrested (or, alternatively, just convicted) for burglary in Denmark, or is known to have committed burglary in other countries. The system would be updated daily with the kind of information crime analysts laboriously compiled in Port St. Lucie (FL), including such elements as

- Currently in prison?
- Current address (since what date?)
- Date last released from prison.
- Under pre-trial release in community?
- Last and next court appearance
- Date of last known burglary.
- Total prior burglaries credited
- Known co-offenders & date of birth of each
- Total criminal convictions by crime type
- Current employment (if any)
- Domestic situation (partner, children, parents, dormitory)
- All M.O. patterns in prior burglaries (unique signatures?)
- Mental health status
- Under any current court orders? Compliance?

The value of such a tracking base is multidimensional. It could be used for many kinds of targeting analysis, for example, especially in forecasting offenders' likelihood of committing future burglaries. It can also be used to generate a list of suspects from anywhere in the country for any burglary, with great speed, so that investigators can concentrate on most likely suspects and eliminate quickly many who could not have done the crime. But the highest use of such a data base would be to *test* it, with matched pairs of districts, so that in each pair the system is rolled out in one district 6 months before it becomes available in the other district of the pair. That method of comparison should not generate much debate, since it is normal for new computer systems to be made available in stages.

References

RELEVANT STUDIES FROM FIRST REVIEW²

- 1. ANDRESEN, M. A. & LAU, K. C. Y. 2014. An evaluation of police foot patrol in Lower Lonsdale, British Columbia. *Police Practice and Research*, 15, 476-489.
- 2. BRAGA, A. A. and BOND, B. J. 2008. POLICING CRIME AND DISORDER HOT SPOTS: A RANDOMIZED CONTROLLED TRIAL*. *Criminology*, 46: 577–607.
- 3. BRAGA, A. A., WELSH, B. C., & SCHNELL, C. 2015. Can policing disorder reduce crime? A systematic review and meta-analysis. Journal of Research in Crime and Delinquency, 52(4), 567-588.
- 4. CHENERY, S., Holt, J. & PEASE, K. 1997. Biting back II: Reducing repeat victimisation in Huddersfield. Vol. 2. London: Home Office Police Research Group.
- 5. DONNELLY, P. G., & Kimble, C. E. 2006. An evaluation of the effects of neighborhood mobilization on community problems. Journal of Prevention and Intervention in the Community 32.1-2: 61-80.
- 6. ECK, J. & WARTELL, J. 1998. Improving the Management of Rental Properties with Drug problems: A Randomized Experiment. Crime Prevention Studies. 9, 161-185.
- 7. FOX, B. F. & FARRINGTON, D. P. 2015. An Experimental Evaluation on the Utility of Burglary Profiles Applied in Active Police Investigations. *Criminal Justice and Behaviour*. 42:2, 156-175.
- 8. GROVE, L. 2011. Preventing Repeat Domestic Burglary: A Meta-Evaluation of Studies from Australia, the UK, and the United States. *Victims and Offenders*, 6(4), 370-385.
- 9. LINDSTROM, P. 2013. More Police Less Crime? The Relationship between Police Levels and Residential Burglary in Sweden. *The Police Journal: Theory, Practice and Principles.* 86: 4, 321-339.
- ROSENFELD, R. & FORNANGO, R. 2014. The Impact of Police Stops on Precinct Robbery and Burglary Rates in New York City, 2003-2010. *Justice Quarterly*, 31, 96-122.
- Rowley, C (2013). A level 2 outcome evaluation of a police intervention aimed at reducing future burglary dwellings in the immediate vicinity of a burglary dwelling. Unpublished Master's thesis, Institute of Criminology, University of Cambridge.
- WILCOX, P., MADENSEN, T. D., & TILLYER, M. S. 2007. Guardianship in context: Implications for burglary victimization risk and prevention. *Criminology*, 45: 4, 771-803.

ADDITIONAL SEARCH - COMPLETE RESULTS

Studies included in review

1. ANTROBUS, E. & PILOTTO, A. 2016. Improving forensic responses to residential burglaries: results of a randomized controlled field trial. *Journal of Experimental Criminology*, 12, 319-345.

² (Sherman, L.W., et al, MOBILISING CIVIL SOCIETY AGAINST RESIDENTIAL BURGLARY: THE EVIDENCE . Somersham, Cambridge, UK: Cambridge Centre for Evidence-Based Policing 2017.)

- 2. BANDYOPADHYAY, S., BHATTACHARYA, S. & SENSARMA, R. 2015. An analysis of the factors determining crime in England and Wales: A quantile regression approach. *Economics Bulletin*, 35, 665-+.
- 3. BERNASCO, W., JOHNSON, S. D. & RUITER, S. 2015. Learning where to offend: Effects of past on future burglary locations. *Applied Geography*, 60, 120-129.
- 4. BLAKE, L. & COUPE, R. T. 2001. *The Impact of Single and Two-Officer Patrols on Catching Burglars in the Act: A Critique of the Audit Commission's Reports on Youth Justice,* The British Journal of Criminology, *41: 2, 381–396.*
- 5. BOND, J. W. 2007. Value of DNA Evidence in Detecting Crime. *Journal of Forensic Sciences (Wiley-Blackwell)*, 52, 128-136.
- 6. BOND, J. W. 2009. The value of fingerprint evidence in detecting crime. *International Journal of Police Science & Management*, 11, 77-84.
- 7. BOND, J. W. & SHERIDAN, L. 2007. The relationship between the detection of acquisitive crime by forensic science and drug-dependent offenders. *Journal of Forensic Sciences*, 52, 1122-1128.
- 8. BOND, J. W. & SHERIDAN, L. 2008. A novel approach to maximising the detection of volume crime with DNA and fingerprints. *International Journal of Police Science & Management*, 10, 326-338.
- 9. Braga, A. A., & Weisburd, D. L. (2012). The effects of focused deterrence strategies on crime: A systematic review and meta-analysis of the empirical evidence. *Journal of Research in Crime and Delinquency* 49: 323-358.
- 10. BURROWS, J. & TARLING, R. 2004. Measuring the impact of forensic science in detecting burglary and autocrime offences. *Science & Justice*, 44, 217-222.
- 11. CEREZO, A. 2013. CCTV and crime displacement: A quasi-experimental evaluation. *European Journal of Criminology*, 10, 222-236.
- 12. Conan Doyle, A. (1890) The Sign of the Four. Philadelphia: Lippincott's Monthly Magazine.
- 13. COUPE, R. T. 2016. Evaluating the effects of resources and solvability on burglary detection. *Policing & Society*, 26, 563-587.
- 14. COUPE, T. & GRIFFITH, M. (1996). *Solving Residential Burglaries*. London: Home Office, Crime Detection and Prevention Series Paper 77.
- CHAPMAN, R., SMITH, L. L. & BOND, J. W. 2012. An Investigation into the Differentiating Characteristics Between Car Key Burglars and Regular Burglars. *Journal of Forensic Sciences (Wiley-Blackwell)*, 57, 939-945.
- 16. Eck, J. E. (1979). Managing case assignments: The burglary investigation decision model replication. Washington, DC: Police Executive Research Forum.
- 17. Eck, J. E. (1983). Solving crimes: The investigation of burglary and robbery. Washington, DC: Police Executive Research Forum.
- 18. ECK, J. E., & SPELMAN, W. (1987). Problem-solving: Problem-oriented policing in Newport News. Washington, DC: Police Executive Research Forum.
- 19. Englefield, A. (2012). MSt Thesis, University of Cambridge.
- 20. Englefield, A. and Ariel, B. (2017). Presentation, Cambridge Police Executive Programme, September.
- 21. FOX, B.H., & Farrington, D. P. (2012). Creating burglary profiles using latent class analysis: A new approach to offender profiling. *Criminal Justice and Behavior*, *39*(12), 1582-1611.
- 22. FARRELL, G., CHENERY, S., & PEASE, K. (1998). Consolidating police crackdowns: findings from an anti-burglary project. London: Home Office for England & Wales/ Research, Development and Statistics Directorate/Policing and Reducing Crime Unit.

- 23. GOLDSTEIN, H. (1979). Improving Policing: A Problem-Oriented Approach. *Crime & Delinquency*.
- 24. GOLDSTEIN, H. (1990). Problem-Oriented Policing. NY: McGraw-Hill.
- 25. JOHNSON, S. D., Davies, T., Murray, A., Ditta, P., Belur, J., & Bowers, K. (2017). Evaluation of operation swordfish: a near-repeat target-hardening strategy. *Journal of Experimental Criminology*, *13*(4), 505-525.
- 26. MILLIE, A. 2005. Reducing burglary by crackdown and consolidation. *Policing-an International Journal of Police Strategies & Management*, 28, 174-188.
- 27. Neyroud, P. (2015). Evidence-Based Triage in Prosecuting Arrestees: Testing an Actuarial System of Selective Targeting. *International Criminal Justice Review*, *25*(1), 117-131.
- 28. Neyroud, P. (2017). Learning to Field Test in Policing: Using an analysis of completed randomised controlled trials involving the police to develop a grounded theory on the factors contributing to high levels of treatment integrity in Police Field Experiments. Ph.D. Dissertation, University of Cambridge.
- 29. Nieuwbeerta, P., Nagin, D. S., & Blokland, A. A. (2009). Assessing the impact of first-time imprisonment on offenders' subsequent criminal career development: a matched samples comparison. *Journal of Quantitative Criminology*, 25(3), 227-257.
- 30. Pegram, R. (2016). Tracking the implementation of super cocooning in preventing near-repeat burglary: a phase one test in Greater Manchester." MSt Thesis, University of Cambridge.
- 31. PFUHL JR, E. H. 1983. Police Strikes and Conventional Crime. *Criminology*, 21, 489-503.
- 32. REISS, A.J., Jr. (1971). The Police and the Public. New Haven: Yale University Press.
- ROBINSON, A. & TILLEY, N. 2009. Factors influencing police performance in the investigation of volume crimes in England and Wales. *Police Practice & Research*, 10, 209-223.
- 34. ROMAN, J., S. Reid, J. Reid, A. Chalfin, W. Adams & C. Knight (2008) The DNA Field Experiment: Cost-Effectiveness Analysis of the Use of DNA in the Investigation of High-Volume Crimes. Washington DC: Urban Institute.
- 35. SANTOS, R. & SANTOS, R. 2016. Offender-focused police intervention in residential burglary and theft from vehicle hot spots: a partially blocked randomized control trial. *Journal of Experimental Criminology*, 12: 373-402.
- 36. JOHN F. SCHNELLE,' ROBERT E. KIRCHNER, M. PATRICK MCNEES, AND JERRY M. LAWLER (1975) SOCIAL EVALUATION RESEARCH: THE EVALUATION OF TWO POLICE PATROLLING STRATEGIES JOURNAL OF APPLIED BEHAVIOR ANALYSIS 83: 353-365.
- 37. Sherman, L. W. (1990). Police crackdowns: Initial and residual deterrence. *Crime and justice*, *12*, 1-48.
- 31. Sherman, L. W. (2013). The rise of evidence-based policing: Targeting, testing, and tracking. *Crime and justice*, *42*(1), 377-451.
- 32. Slothower, M., Sherman, L. W., & Neyroud, P. (2015). Tracking quality of police actions in a victim contact program: A case study of training, tracking, and feedback (TTF) in evidence-based policing. *International Criminal Justice Review*, *25*(1), 98-116.
- 33. Slothower, M., Sherman, L., Neyroud, P. et al (2017). Philadelphia: Presentation to the American Society of Criminology, November.
- 34. TONKIN, M. & WOODHAMS, J. 2017. The feasibility of using crime scene behaviour to detect versatile serial offenders: An empirical test of behavioural

consistency, distinctiveness, and discrimination accuracy. *Legal and Criminological Psychology*, 22, 99-115.

- 35. WEEMS, J. (2014). Testing PCSO Cocooning of Near Repeat Burglary Locations. MSt Thesis, Cambridge University.
- 36. WARREN, J., HOGARD, E. & ELLIS, R. 2007. "SAFER HOMES": AN EVALUATION OF A REORGANIZATION TO DEAL WITH DOMESTIC BURGLARY WITHIN A UK POLICE FORCE. *Crime Prevention & Community Safety*, 9, 167-178.