

Implementing Information Science in Policing: Mapping the Evidence Base

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Abstract In many disciplines there is a wealth of primary evaluation research on what works, and systematic reviews that synthesize that evidence. This is, of course, extremely positive. However, the sheer scale of the information and the way in which it is indexed and presented can mean that it is difficult for practitioners to locate the best available evidence. For this reason, in health, education, and other disciplines, using techniques from Information Science, researchers have systematically assembled databases such as those hosted on healthevidence.org and educationendowmentfoundation.org which bring together the most reliable evidence. Hitherto, no such database has existed for crime and criminal justice interventions. This article sets out some of challenges and early findings of one exercise which aims to produce such a database, being completed as part of the What Works Centre for Crime Reduction (WWCCR) initiative in collaboration with the College of Policing.

Introduction

It is undeniable that the process of, and the pressures upon policing have changed considerably in the last decade. This age of policing, driven by budget cuts following the recession and increased interest in the role that technology can play in making public services more efficient, has seen an increased interest in evidence-based policing (EBP; Sherman, 1998; Lum and Kope, 2014). EBP relies on the supply and consumption of reliable information and speaks to the 'what to do' question. It shares many of the principles of problem oriented policing (Goldstein, 1979), and is founded on the premise that by using reliable information on what is known about crime patterns and what has

previously been shown to reduce crime (using an appropriate evaluation design), operational policing can focus on defined problems and implement the most appropriate, promising solutions to them.

EBP approaches are dependent upon a number of key factors. First, is the availability and quality of the information arising from evaluation research or crime analysis. Secondly, is the celerity and ease with which this information is available. Thirdly, is the availability of police resources to act upon this information over an appropriate time-scale. Fourthly, is sufficient buy-in from those on the front line of policing to ensure that the evidence is applied. Fifthly, is sufficient understanding of the quality, generalizability, scalability, and

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limitations of any evidence or intelligence that is used by those responsible for implementing action on the basis of it.

Many of these factors can arguably act as substantial obstacles to the implementation of any form of policing. In this article, we focus on some of these challenges as they relate to EBP. In particular, we aim to identify the current shape of the evidence based on which practitioners might draw to inform their decision making. We do this by systematically searching the existing literature to provide a map of what is currently available. We discuss the evidence within the context of the current use of evidence synthesis and Information Science in policing and lay out some requirements necessary for future developments in EBP that should ultimately aid the crime reduction enterprise.

Evidence synthesis

In terms of policy evaluation, what the 'best available evidence' actually is, is a widely-debated issue. Primary research studies can be conceived of and executed, along a continuum of rigour (e.g. Campbell and Stanley, 1963; Sherman *et al.*, 1997) and can answer questions of different kinds—how much crime was reduced, how was a reduction actually achieved (e.g. Pawson and Tilley, 1997), and so on. Studies concerning the impact on crime of interventions may produce misleading results due to chance (i.e. statistical fluke) or through the use of a poorly conducted evaluation. For example, the sample may be unrepresentative of the population of interest, or the research design may be weak and susceptible to various confounds (e.g. other interventions may interfere with patterns observed) that renders conclusions unreliable (e.g. Campbell and Stanley, 1963). Further to this, individual primary studies are constrained in scope and context, in part depending on the available funding to evaluate an intervention (which itself may bias the findings, see Pawson, 2006).

Moreover, what works at one time/location may not in another (perhaps because it was implemented differently or it targeted a different population, and so on—for a discussion, see Tilley, 1996). Studies may also lack the statistical power to allow impacts (positive or negative) to be reliably identified even if they exist.

While important, it is not our intention to discuss the potential issues associated with primary evaluations any further here, so we refer the interested reader elsewhere (e.g. Tilley, 2000). Instead, suffice it to say that the shortcomings of primary evaluation studies have been known for many decades. Moreover, while primary studies can (and should) inform decision making, it can be difficult for practitioners to make sense of the evidence if numerous primary studies exist on a specific topic, particularly if those studies report different or conflicting findings.

Consequently, methods of evidence synthesis have been developed to mitigate (at least some of) the issues discussed above. The 'gold standard' in evidence synthesis is the systematic review, which is 'a review of research literature using systematic and explicit, accountable methods' (Gough *et al.*, 2012, p. 2). The strength of systematic reviews is that they integrate known evidence on a topic, and aim to report balanced findings, taking into account the reliability of the primary studies on which they are based and any contextual variations between studies. Some, but not all, systematic reviews use an approach referred to as meta-analysis (Glass, 1976) to aggregate quantitative measures of outcome across studies. Meta-analysts use specific statistical methods to aggregate findings across a series of studies for which comparable data have been collected. One major benefit of meta-analytic techniques is that they increase statistical power, which means that if an intervention has a reliable effect on crime, this is more likely to be detected. Simpler approaches such as (vote) counting the number of studies that show reliable positive (or negative effects) are sometimes used but

this approach is known to produce unreliable results (e.g. Hedges and Olkin, 1980) and hence is generally (and should be) avoided.

Well-conducted systematic reviews are, therefore, ideally positioned to summarize information on what is known about the effectiveness of interventions implemented to improve social outcomes, and should be attractive to policymakers and practitioners for these reasons.

Information Science

In evidence synthesis, searching for primary study evidence is akin to the data collection phase of a research project, and this needs to be completed in a way that minimizes the possibility that the identified set of studies on which conclusions are to be based is in some way biased. The explicit and systematic methods used by evidence synthesists for this purpose draw heavily from the field of Information Science (Rubin, 1998), which has become a keystone in high-quality research. Information Science is concerned with the properties and flow of information, and studies the means of processing it for 'optimum accessibility and usability' (Borko, 1968, p. 3). Although allied to computer science and library studies, Information Science is considered a discipline in its own right, with a broad field of study and a multi-disciplinary focus.

With a view to highlighting some of the important principles, in this article we begin by considering some of the empirically validated methods used by information specialists to search and retrieve information relating to evaluation research. We then discuss how these methods were applied to identify existing systematic reviews concerned with crime reduction, and then provide some summary statistics about the reviews identified. We also discuss the degree to which the role of information synthesist should be taken on by academics and by the police themselves.

The principles alluded to above have been widely adopted by evidence synthesists across many social and biomedical sciences (White, 1994; 2009). At their heart, they advocate—and specify a means through which—a carefully crafted search strategy can be established to locate relevant evidence. A judicious search strategy targets a variety of sources from which studies might be identified. In principle, all possible sources (e.g. in different languages) should be searched but this may be impossible and this is typically constrained by the scope of the research question and the resources available to complete the review.

Electronic reference databases (e.g. PsychINFO, MEDLINE) that hold millions of research article details are typically the main source of 'leads' to potentially relevant studies. These databases can be searched using search strings that combine keywords, index terms, and other characteristics of the documents (i.e. date, publication outlet, language, document type to name a few). Before using these, researchers engaged in systematic reviews typically consult with experts to ensure that the best terms are used and that important ones are not omitted. For transparency, researchers make these syntaxes publically available so that they might be scrutinized and used in replication studies if desired.

Unfortunately, not all academic journals are indexed by scholarly databases (Lee *et al.*, 2012), and not all types of literature are indexed in academic databases. Consequently, the database searches are supplemented with other search tactics, such as the manual searching of publication outlets and conference presentations, specialized registers, and repositories of prospective studies. For thoroughness, the reference lists of any identified studies are also usually checked for studies that have not yet been identified. Similarly, studies that subsequently cite already identified studies (or key studies) can be searched for. These forms of searching, known as backward and forward searching, respectively, thus use identified studies to locate

further studies that might otherwise be missed. Experts in a field are also contacted to track down studies that might be of relevance to the synthesist. Depending on the research question, a search strategy might return many thousands, or tens of thousands, of potential leads to candidate studies, all of which need to be checked against a set of 'inclusion criteria' to assess their relevance. The inclusion criteria are specified before the literature is searched, and again should be subjected to expert review and—for the purposes of transparency—made widely available.

Because the number of studies identified in a typical search strategy can be very large, information specialists play a central role in the systematic search for studies in an evidence synthesis (Reed and Baxter, 2009; Hammerstrøm *et al.*, 2010; Brunton *et al.*, 2013). It is the information specialists' role to optimize the search strategy so that a high proportion of all relevant studies are identified, while the number of studies that do not meet the inclusion criteria that have to be assessed is minimized—referred to as the precision and sensitivity of the search strategy, respectively (e.g. Lee *et al.*, 2012).

While information retrieval is undoubtedly a specialist skill, the general principles from information science can be adopted by anyone carrying out appraisals of the evidence base. In the UK, the College of Policing (CoP) have been conducting 'Evidence Base Camps' whereby police officers and police staff are guided through an abridged version of the search strategy process to swiftly sift and organize the evidence on a topic.

Not adopting the meticulous searching techniques outlined, can lead to researchers locating a biased set of studies that do not truly reflect what the existing evidence suggests about a particular issue. A classic example includes the need to search for those evaluation studies that are part of the 'grey' (or 'gray') literature of unpublished studies (Auger, 1998). That is, studies that do not appear in books, journals, or other academic

publishing outlets, but that nonetheless can provide important information about the impact (or lack thereof) of particular interventions. Such literature can be particularly important as research indicates a clear publication bias associated with academic journals, such that studies that report program effects are more likely to be published than those that do not (Greenwald, 1975; Lipsey and Wilson, 1993; Rothstein and Hopewell, 2009). For this reason, an appropriate search strategy will specifically target the grey literature through the interrogation of databases such as PsycEXTRA, the National Criminal Justice Reference Service, ProQuest Theses and Dissertations, alongside complementary internet searches, and consultation with experts.

A related concern is language bias, whereby studies with larger effects are more likely to be published in English (e.g. Egger *et al.*, 1997). Ideally, the assessment of studies that are published in languages other than English is, of course, important for other reasons, as different effects may be observed in different countries. However, the costs (time and financial) associated with translating texts written in languages other than English may realistically preclude their consideration in search exercises.

Scoping the evidence base: the appliance of (information) science

As emphasized above, one of the key factors in implementing EBP is the availability and quality of evidence on what reduces crime. In this regard, techniques from Information Science can be used to assemble databases of systematic reviews of 'what works' for a particular domain, which can then be made available to practitioners. However, while such exercises have been conducted in disciplines such as Public Health (Lee *et al.*, 2012), as far as we are aware no such exercise has been conducted for

the field of crime reduction.¹ This is problematic as there are potentially thousands of reviews and studies on which practitioners could draw.

For at least three reasons, the lack of a central evidence bank presents a challenge for busy practitioners who wish to consult the evidence. First, locating studies that are relevant to their questions may be a substantial task, and sifting through the located studies can take a long time, even when search strategies are developed to maximize precision and sensitivity. Such lengthy activities can mean that practitioners do not have the time to engage in this type of activity, or give up in frustration. Secondly, not all studies are equal, with the conclusions of some being more or less reliable than others. Unfortunately, establishing the reliability of the conclusions of a particular study is time consuming and requires the relevant expertise. Thirdly, systematically locating studies is not simply a matter of conducting an internet search as is clear from our discussion of the principles of Information Science above.

To illustrate the complexity of the process, and to scope what evidence is available, the research reported in the remainder of this article, describes our efforts to date to assemble a database of systematic reviews of what works to reduce crime. This work represents one part of a program of research recently funded by the Economic and Social Research Council (ESRC) and supported by the CoP to identify and develop the evidence base for crime and criminal justice interventions. The work will contribute to the WWCCR that is hosted by the CoP (<http://www.college.police.uk/wwc>), and involves a consortia of universities including University College London, the Institute of Education, the London School of Hygiene and Tropical Medicine, and Surrey universities ([\[www.college.police.uk/en/20825.htm\]\(http://www.college.police.uk/en/20825.htm\)\). Some of the primary objectives of the Centre are to:](http://</p></div><div data-bbox=)

- identify the best available evidence on approaches to reducing crime and the potential savings to the police service, their crime reduction partners, and the public;
- draw the evidence together, and rate it by quality, cost and impact, to identify which practices and interventions are likely to be most effective; and
- present the resulting evidence base in a way that makes it accessible to practitioners and to encourage use in practice.

As a core part of this research, the present authors designed a method for systematically searching for reviews of the evidence concerning crime reduction. To ensure that the method used to locate the evidence was systematic, transparent, and replicable, we first created a review protocol that outlined the procedures to be used to search for the literature (Bowers *et al.*, 2013). This was reviewed by staff at the CoP and a panel of external experts. To briefly summarize the protocol, for a study to meet the inclusion criteria, it needed to meet two specific criteria: (i) that it was a systematic review and/or a meta-analysis; and (ii) that the outcome measure summarized in the review was a quantifiable impact on crime. Hence, reviews that examined the impact of interventions on other (intermediate) behaviours or outcomes—such as an increase in school attendance, or a reduction in aggression—but that did not ultimately measure crime reduction outcomes were not included.

In keeping with the methods of Information Science, we articulated an explicit search strategy including: (i) keyword searches of electronic databases; (ii) a review of reports of professional

¹ Databases of primary studies in policing and criminal justice have been assembled before. For example, the Registry of Randomized Criminal Justice Experiments in Sanctions (Weisburd *et al.*, 1990); the University of Maryland for the Washington State Joint Legislative Audit and Review Committee (JLARC) (MacKenzie and Hickman, 1998), and the current efforts by Lorraine Mazzerole and colleagues to amass studies for the Global Policing Database (GPD). To our knowledge, no database exists of evidence syntheses in crime reduction to date.

research and policing organizations; (iii) forward and backward reference searching tactics; and (iv) a review of known lists and collections of systematic reviews on crime prevention. Additionally, the protocol documented over a dozen identified databases that were to be searched for reviews and the explicit Boolean search terms employed, referring in this case to study type (e.g. systematic review), crime measurement (e.g. domestic violence), and outcome (e.g. reduced crime or re-offending).

The initial database searches yielded a list of over 15,600 research articles, with a further 1,500 studies found through the other search tactics. An extensive screening process was then employed, resulting in the identification of 337 reviews that met the inclusion criteria. To enable us to produce a ‘map’ of the available evidence, these were then ‘light coded’ to yield basic information about each review. More detailed coding is currently underway, but the initial coding allows us to draw general conclusions about the general nature of the available evidence (including how many reviews there are, the types of interventions considered, and so on), which we will now describe.

Initial findings—taking stock of the evidence base

In the tables presented below, descriptive statistics are provided regarding some of the characteristics of the 337 reviews identified. These provide insight into both what we currently know and what we do not know. In Table 1, for example, a summary is provided about the types of interventions considered in the reviews. The reader should note that individual reviews often included evidence on more than one category for each characteristic (in the case of Table 1, the type of intervention), and consequently the total number of interventions enumerated (for example) exceeds the total number of reviews. The reader should also note that for some reviews information was unavailable

Table 1: Intervention types considered across the systematic reviews (the total number of reviews considered was 330)

Intervention type	<i>n</i>	Percentage of coded reviews citing intervention
Correctional interventions	156	47
Sentencing and deterrence	93	28
Educational interventions	79	23
Other	79	23
Community interventions	50	15
Policing and partnership	52	16
Developmental and social prevention	47	14
Drug treatment interventions	48	14
Situational prevention	34	10
Restorative justice	12	3
Publicity	7	2
Total	657	

for some characteristics, and so the total number of reviews under consideration in each table is sometimes less than 337.

Considering Table 1, for seven reviews, the intervention type was unclear or missing and, hence, information from these studies is omitted here. To illustrate the information shown in Table 1, for 28% of the reviews for which information was available, sentencing and deterrence was cited as one element of the interventions reviewed. Put differently, 93 of the 330 reviews contained an intervention that could be classified as sentencing and deterrence. Educational interventions were examined in 23% of coded reviews and situational measures were considered in 10% of them. Publicity and restorative justice were least likely to be mentioned. As can be seen from the total shown in the final row of Table 1, many reviews addressed more than one intervention. For example, the review on ‘Police programmes to prevent drink driving’ includes random breath testing, sobriety checkpoints, road watches, photo radar, red-light cameras, and mixed programmes. Other reviews formulated their research question so that interventions aimed at a sub-group of offenders or victims were the focus.

In fact, of the reviews only identified approximately 65 examined a single intervention².

The totals in Table 1 hint at a noticeable bias towards reviews of what can be classified as tertiary crime prevention (Brantingham and Faust, 1976). That is, those interventions that target offenders after an offence has occurred. This includes sentencing, drug treatment, and correctional interventions. Considering all of the interventions assessed across all reviews, these tertiary interventions constituted 45% of all interventions that were assessed. Secondary interventions, which target 'at risk' groups, include community interventions, developmental and social prevention, and educational interventions. Collectively, these comprised 27% of the (657) interventions assessed. Finally, policing and partnership, publicity and situational prevention are often categorized as primary interventions; that is, they aim to identify and manipulate conditions of the environment that are conducive to crime³. Such interventions made up only 14% of the (657) interventions assessed.

What this overview suggests is a strong emphasis and research interest on offenders rather than offences. In particular, it reflects a greater focus on what happens after offenders are caught in terms of sentencing, incarcerating, and providing them with corrective treatment. The relatively modest proportion of reviews focusing on policing and partnership interventions suggests that there has been less research focus on policing strategies (and presumably policing) that focuses on prevention.

Table 2 summarizes some key features of the methods and data employed in the reviews. To meet the inclusion criteria, the reviews had to have a systematic search strategy, provide key terms and/or a list of databases to be searched, or

adopt meta-analytic methods. A large number of the reviews were best described as systematic reviews; with reviews of reviews (or meta-reviews) that synthesize systematic review evidence being the next most common type. Rapid Evidence Assessments (REAs) were also present. REAs are a less exhaustive form of review than a systematic review. They do not (usually) involve any form of meta-analysis, and the search process is typically much less intense and complete than in the case of a systematic review. Despite these limitations, which must be acknowledged when conducting or using the findings from them, REAs can provide useful overviews of what is known about a particular topic. Their strength (and, in terms of their completeness, weakness) is that they can be completed much faster than a systematic review and with fewer resources.

The influence of the inclusion criteria used here to identify studies is further reflected in the type of analytical technique used. Of the 240 reviews for which information was available, most (184) used meta-analytic techniques, whereas a smaller percentage used synthesis methods (such as vote counting or reporting a summary of the findings published by the authors of the individual study) or mixed methods (where both quantitative aggregation and qualitative synthesis was used)⁴. Note that some reviews used more than one type of method. Overall, most of the reviews coded used at least some quantitative data. Qualitative information was also used as evidence in a number of the reviews, but less frequently. The adoption of realist methods of evidence synthesis (e.g. Pawson and Tilley, 1997), which consider how variation in local conditions (context) can impact upon the way in which an intervention works (mechanism)

² This is an approximation because it is calculated based on title and abstract. In our experience, some reviews that appear to be on one intervention in the abstract may, in fact, cover more in the main body of the review.

³ We acknowledge that these classifications can be problematic, and that some forms of crime prevention arguably span more than one category. They are presented here simply to assist descriptive analysis.

⁴ Please note that there was flexibility in the way in which 'mixed-methods' could be coded. For example, checking 'narrative' and 'meta-analysis' might also reflect this type of approach. Again, the prevalence of such reviews will become easier to identify after full 'EMMIE' coding.

Table 2: Characteristics of the reviews

Type of review (<i>n</i> = 265)	<i>n</i>	%
Systematic review	236	89
Review of reviews	22	8
Rapid Evidence Assessment	10	4
Narrative	7	3
Multi-site evaluation	3	1
Realist approach	1	0
Analytical technique (<i>n</i> = 240)	<i>n</i>	
Meta-analysis	184	77
Synthesis	61	25
Mixed method	7	3
Type of data integrated in the review (<i>n</i> = 172)	<i>n</i>	
Quantitative information included	152	88
Qualitative information included	36	21
Primary data	36	21
Secondary data	13	8

and how this may impact upon outcomes, were identified in only one review.

Table 2 demonstrates a general emphasis on quantitative methods of evidence synthesis. From a policing point of view, however, it is perhaps more interesting to compare how policing and partnership interventions differ (or not) in method from other types of intervention. It appears from Table 3, which cross-tabulates intervention type by analytical technique, that meta-analysis dominates in reviews of correctional interventions and sentencing and deterrence. Reviews of the effectiveness of policing and partnership, and situational approaches also rely heavily on meta-analytic methods, but in addition other types of synthesis approaches are a little more common. This might reflect the variation in the methodological approach taken in the primary evaluations contributing to the reviews.

These tables raise some issues worthy of exploration. Evidence syntheses including meta-analysis have traditionally focused on ensuring that the quality of the evidence, in terms of the primary research, is high (Sherman *et al.*, 1997). In fact, many meta-analyses of corrections and sentencing

have exclusively examined evidence from randomized-control trials (RCTs). Such evaluations are billed as the ‘gold standard’ in terms of the internal validity of the research design; that is, they are equipped to rule out rival explanations for any effect of treatment, including many forms of bias (e.g. regression to the mean, selection bias, attrition, etc.). However, it is important to note that RCTs have a risk of bias associated with them (Higgins and Green, 2011).

From an experimental perspective, evaluations of situational crime prevention and many policing and partnership interventions might be considered the poor cousins of corrections and sentencing studies. However, there is a good reason for this as these interventions often focus on places rather than people. This can make experimental designs that employ random assignment difficult to implement. That is, the areas chosen for intervention are often selected because of the problems they face, and so the randomization of areas to conditions—where the intervention is tailored to the specific problem faced in an area—will often make little sense. This differs from (for example) correction interventions that use individuals as the unit of analysis and typically test more generic treatments. With area-based interventions, there is also the complication of physical proximity between those receiving and not receiving the treatment, which increases the risks of contamination. Hence, there are many examples of synthesis exercises for place-based interventions (e.g. Welsh and Farrington, 2008) but few exclusively using randomized-control trials (exceptions include Braga and Weisburd, 2012, in their review of focused deterrence strategies).

If readers are willing to accept that there are particular gaps in the evidence base at the level of the systematic review for policing and partnership interventions, it follows that to encourage more reviews it will be necessary to either improve the standard of the (primary) research on which reviews are based, or to alter the evidence culture to accept and use evidence of different forms, while

Table 3: Cross-tab of intervention type against analytical method

	Community interventions	Correctional interventions	Developmental and social prevention	Drug treatment interventions	Educational interventions	Policing and partnership	Publicity	Sentencing and deterrence	Situational prevention
Meta-analysis	24	92	21	29	46	22	2	61	16
Synthesis	12	25	14	8	14	16	0	9	10
Mixed-method	4	1	2	0	4	2	1	2	2

understanding the caveats associated with doing so. Pursuing both aspirations is perhaps likely to be the most fruitful. It also follows that engaging the practitioner in the pursuit and use of reliable evidence is likely to have significant benefit.

Encouraging and enabling the use of evidence tools

The preceding section naturally segues into a discussion of two more of the key factors identified in the introduction as necessary for EBP. That is, how to ensure sufficient buy-in from the front-line police officers responsible for implementing crime prevention strategies, and ensuring an adequate understanding of the evidence or intelligence that underpins such action. In other words, encouraging the use of techniques from Information Science—specifically, to avoiding making inferences about the evidence base on a biased sample of studies in everyday policing decisions. Of course, these two factors—encouraging and enabling use—are not unrelated.

One way to examine evidence use by practice is to consider the history of the commission of systematic reviews in policing. Such time-series analysis has been used in other crime policy areas to identify significant events in evidence synthesis on a particular topic. For example, Wells (2009) documented the historical trend of the application of meta-analysis to criminal justice topics (not exclusively crime reduction). He found that meta-analysis of correctional interventions was most common before 1990, but during this decade a shift occurred towards tests of theories of criminal or antisocial behaviour. Wells further noted that meta-analyses in policing studies only appeared in noticeable frequencies after the millennium.

One purpose of mapping events in this way is that it can be used as a barometer to gauge the ‘appetite’ for evidence on a particular type of crime prevention strategy over time. Here we assume that increased activity means that there

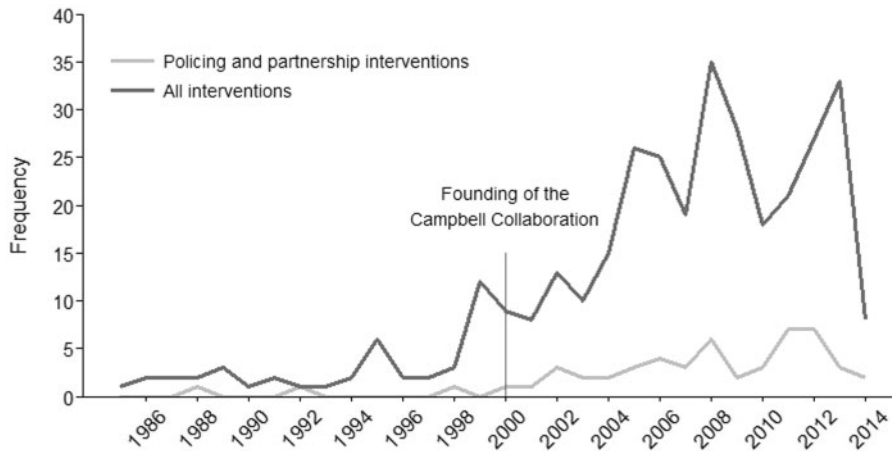


Figure 1: Frequency over time of systematic reviews and meta-analyses in policing, compared to all reviews on crime prevention topics.

are academics or other policy evaluators with an interest in the subject, and that the policy climate is conducive to such evaluations—through an increased number of interventions to evaluate and perhaps increased government funding to support these activities. Figure 1 illustrates the trend over time for reviews of policing interventions plotted against that for all crime reduction reviews as a comparison. It shows that—consistent with Wells (2009)—numbers were quite unremarkable before the millennium, with a steady increase following in the subsequent years. Two peaks are noticeable in policing intervention reviews, one in 2008, the other 2011–12. Examining the reviews conducted in these particular years reveals an increase in grey literature over the period (i.e. literature not published within academic publishers, often comprising government reports), and a rise in reviews on crime prevention and the harm it causes from a public health perspective. This perhaps indicates that there was an increased interest from government and non-academic funders during these periods. In 2012, it is noteworthy that several of the reviews were conducted under the auspices of the Campbell Collaboration (see Petrosino *et al.*, 2001 for information on this organization). This

demonstrates a push in terms of evidence gathering in this area—an exercise that was coinitiated and part-funded by the then National Policing Improvement Agency (Telep and Weisburd, 2014). This illustrates the impact that institutions and the funding they provide can have on developing the evidence base.

This apparent increase in the number of available reviews of policing interventions may reflect a higher level of interest. Where funding has made the reviews possible, this certainly suggests they are a priority for the agencies providing the funding. However, this does not necessarily reflect enthusiasm at the grass roots level of policing. We are unaware of a detailed consultation exercise to gauge these levels directly. However, there is evidence of a current desire to encourage engagement at all levels of policing practice. For example, in the UK, the newly established CoP have been running ‘evidence base camps’⁵ that bring police officers and police staff together with researchers to conduct hands-on rapid evidence assessments on priority topics. This is part of the College’s strategy to raise awareness of, and to embed evidence-based thinking across the police service. Such reviews are less detailed than systematic reviews but employ some of the same techniques

⁵ See <http://www.college.police.uk/en/21049.htm> for details.

from Information Science, and in addition to providing a useful summary on a topic, help to determine whether sufficient evidence exists to inform a (time consuming) systematic review.

One of the challenges faced by the WWCCR is how engagement can be encouraged at the different levels of policing. Academic standards and jargon (for example) could well discourage engagement with research in practice. Thus, one of the principles employed by the CoP is to encourage the police to 'own' what is done in terms of producing evidence for policing.

One of the most significant efforts to support police practitioner engagement with the evidence base was the work of the US-based COPS office (Community Oriented Policing Services). Commissioned and published by the Center for Problem-Oriented Policing, POP guides synthesize evidence on a particular topic. There are three different kinds of guides. Problem-Specific Guides for police that summarize knowledge about how the police can reduce the harm caused by specific crime and disorder problems. Response Guides that summarize the collective knowledge from research and practice about how, and under what conditions, certain police responses impact upon crime and disorder. Finally, Problem-solving Tool Guides explain how various analytical methods and techniques can be applied to improve understanding of crime and disorder problems. An important element of all the guides is that each is informed by a thorough review of the research literature and reported police practice, and each guide is anonymously peer-reviewed by a sworn police officer, a police executive and a researcher before publication.

The problem-specific guides (www.popcenter.org) cover many topics including drug dealing in privately owned apartment complexes, spectator violence in stadiums, and financial crime against the elderly to name just a few. The guides are written for police practitioners who need to address the specific problem covered. The advice in the guides emphasizes that it is essential to address the

location–situation interaction and consider the particular nature of the local problem. A further interesting aspect of the guides is that they rely on responses that other police departments have used and/or that researchers have tested, meaning that they draw upon practical information concerning the way in which measures have been implemented in the field. Sadly, although popular with the police in the USA, at this time the Center for POP is unfunded and, therefore, there are no plans to expand the library of reports available. This leaves a sizeable gap in what is communicated about policing interventions in a digestible way. Part of the activity of the WWCCR will aim to fill this gap.

There remains a significant shortage in terms of available training to assist police practitioners to engage with and contribute to the evidence base. One remit of the WWCCR is, therefore, to develop a training package for police professionals on the use and misuse of evidence. The establishment of the Society of EBP (<http://www.sebp.police.uk>) represents another important step in this direction. The society aims to increase the awareness and use of the best available evidence amongst the police, the production of new research by practitioners, and the dissemination of that evidence.

Making the evidence base accessible and useable

Even the most motivated and best-trained police practitioners will not use the evidence base if it is not both easy to access and useful. Consequently, the way in which it is made available and the ways in which it can be interrogated are of paramount importance. These are two factors currently being considered in the design of a web-based tool to make the evidence base accessible to practitioners. Just as searching was fundamental to the process of identifying those studies that contribute to the evidence base, it will be vital to those using the web-based tool. Users may want to interrogate the information in numerous ways and the tool is intended

to accommodate this. For example, users might want to be presented with evidence that specifically relates to property crime. The physical design of the web-based tool is one issue but it is important to consider another—what is required to ensure practitioners have the best chance of implementing the most effective strategies in their local conditions.

In the ongoing work of the WWCCR, recognition of the importance of local conditions is a key philosophy behind the presentation of the evidence. With respect to this, various scholars (e.g. Knutsson and Clarke, 2006; Ekblom, 2010) have argued that evidence regarding the crime reduction impact of interventions alone will provide insufficient information for practical plans for police action. For example, research demonstrates that for social interventions, strategies can work in different ways under different conditions (Pawson and Tilley, 1997; Pawson, 2006). Hence, CCTV in a car park might usefully deter crime by raising an offender's perception of risk, whereas in a town centre it might increase detections. One of the intentions of the tool is, therefore, to provide advice about contextual variations in a way that enables practitioners to consider their local conditions and how these might impact upon outcomes. Further, it seeks to provide practitioners with available advice on implementation. This is because some interventions are difficult to realize in practice. Some require the coordination of multiple agencies for example, or the individual consent of many members of the public before installation (e.g. Johnson and Loxley, 2001). These considerations may mean that the cost of implementing a scheme locally outweighs any potential benefits. We are, therefore, working towards a tool that speaks to all of these needs by bringing together evidence, and an assessment of evidence quality, on five separate factors: effect, mechanism (how it works), moderators (the conditions in which it works), implementation (what effort is required to make it happen), and economics. We refer to this evidence tool as 'EMMIE' (Tilley *et al.*; manuscript under review 2014). The underlying principle of this tool is to

encourage police engagement with evidence by making what is presented *locally relevant*.

Conclusion

In conclusion, there now exists a considerable corpus of literature on what works to reduce crime. The scale of the literature is encouraging, but for busy practitioners it is important that it is accessible and organized in a way that separates the wheat from the chaff. The evidence scoping exercise reported as part of this article maps out the research that speaks to what we currently know, and ongoing work will organize this material and rate it as to its reliability to aid practitioners in their decision making. However, there are gaps in the evidence base, and some of these are 'unknown' unknowns (Rumsfeld, 2011). Hence, a priority for future research and practice will be to identify the gaps in the evidence base, and to assemble the material to answer those questions. Some of the latter will require the use of techniques from Information Science to conduct REAs or systematic reviews.

Some of the techniques developed in the field of Information Science are specialist, skilled, and complex. The degree to which police practitioners could get involved in the more academic practices of transparent searching, quality appraisal, and meta-analysis may be limited (although it is by no means unheard of). However, it is important that the police act as intelligent consumers of the available research and that they liaise and exchange ideas with information scientists and evaluation experts. There is evidence that police have and do engage in this way (see e.g. Braga and Davies, 2014). It is also probably true to say that it is by no means the case that practitioners always consult, or understand the evidence base before they make resourcing decisions. We suggest the way forward is to encourage use of the evidence base by making it accessible, transparent, and locally relevant. Further, we would advocate teaching of at least basic evidence skills as part of core professional training. Finally,

police involvement and support in primary evaluation exercises, particularly where the current evidence base is lacking, should be encouraged.

Acknowledgements

The research reported in this article was funded by the Economic and Social Research Council (ESRC) grant ES/L007223/1, and the College of Policing. It was undertaken as part of the Commissioned Partnership Programme: The What Works Centre for Crime Reduction. As this is delivered by a large consortium partnership in which ideas are freely exchanged, we would like to thank all our colleagues that have assisted with this research. The opinions stated in this article are solely those of the named authors, and are not necessarily shared by other academics or organizations (such as the College of Policing).

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