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Implementing a Hot Spot Targeting Alarm System

A Participant Observation Case Study

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1 RESEARCH CONTRACT

Thesis Title:

Implementing a Hot Spot Targeting Alarm System: A Participant-Observation Case Study.

Key Research Question:

What were the key features of the Hot Spot Targeting Alarm System ("the system") as designed that were implemented with greater and lesser success, in Bedfordshire Police, in the period 2019-2021?

Sub Research Questions:

a) What is a Hot Spot targeting alarm (HSTA)
b) What was the role of the author as a participant in this project, and how did the author manage any potential role conflict between objective observation and subjective participation?
c) What was the technology of geo-fencing, geo-measurement, data collection and other functions that was planned for the project, and what was implemented
d) How was that initial tracking data fed back, if at all, to frontline officers and through what channels of communication?
e) What were the major "critical events" of training, launching, feeding back, celebrating, mourning, personnel changes or any other elements of the story of implementation of the project?
f) To what extent was oversight of the project integrated with ongoing force-wide performance management, with what chief officers playing what roles at that inter-face?
g) How did the project align with the vision for the Bedfordshire Police as articulated by the new Chief Constable from his appointment in late 2019?
h) To what extent was the external consulting agency a visible issue, if any, and with what specific dimensions?
i) Given all of the evidence above, to what degree was the project implemented in a way consistent with the plan and purpose of the funding? To what degree can any shortcomings be used to draw lessons for implementation of future projects of a similar nature in Bedfordshire Police or other police agencies?

Research Design:

A Participant Observation Case Study, observing the implementation of a Hot Spot Targeting Alarm Tool, with particular focus on the implementation of an RCT

Unit of analysis, data set size and time period:

Unit of analysis: Bedfordshire Police

Data set size: 1 police agency

Time period: 2019-2021

Key Findings

There were a number of elements to the Hot Spot Targeting Alarm Tool including, training of analysts, identification of technology to track officers and identifying what officers should do when patrolling Hot Spots. These elements needed to be reviewed to enable a tool to be developed, that would support tasking officers to Hot Spots. Several of these elements were tested in Bedfordshire using an RCT (Operation Rowan).

The RCT was completed and compliance was sufficient to enable the results to be evaluated and inform the Hot Spot Alarm Targeting tool. Several other areas of the Hot Spot Alarm are in progress. A number of findings relating to challenges and enablers to implementation were identified. These findings were grouped into the following categories; COVID-19, Technology, People and Processes.

The key findings related to capacity and support for ICT development, resource capacity, leadership and embedding of learning and EBP in Bedfordshire. Processes were also reviewed, including briefing and information Sharing.

Policy implications Statement

There are a number of local process and policy implications identified. The principle implications are that, ICT development needs to be better managed regionally and nationally. Change increasingly links to new technology and local ICT teams do not have sufficient capacity to support them all.

Learning and embedding Evidence Based Practice is key to implementation. The force needs to understand why and how practices are delivered, to better enable buy in and support.

Standard processes that support this introduction of EBP need to be reviewed and updated to better support working with academic partners and the implementation of programmes within the timeframes required.

2 ACKNOWLEDGEMENTS

Balancing study with work was always going to be a challenge and adding in a global pandemic meant at times I was never sure when or how I would be able to complete this thesis. It definitely would not have been achievable without a cast of people including:

The Operation Rowan Project Team – David and Matt, your practical support and encouragement enabled us to implement an RCT given all of the challenges faced. Although the phrase "well it's all good evidence" was said many times, I am incredibly proud that we managed to complete the RCT and am genuinely looking forward to using that learning to move into the next phase of Operation Rowan (also grateful I don't need to write 18,000 words about it though).

My Supervisor Peter Neyroud, for helping me focus, this is an enormous topic and you stopped me losing myself down a multitude of rabbit holes.

My SMT, Tristan and Audrey for believing in me and supporting my application for the masters and my work on Operation Rowan.

My family and friends who have never stopped supporting and encouraging me.

My fellow colleagues from this course, including Simon, Gav, and Lisa, who have been at the end of the phone when I find myself in those rabbit holes, encouraging me to get out my room and do a HIIT session on the lawn or keeping me sane with a glass of wine or two.

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Assistant Chief Constable	ACC
Automatic People Location System	APLS
Automatic Vehicle Location System	AVLS
Bedfordshire, Cambridgeshire and Hertfordshire	BCH
Cambridge Centre for Evidence Based Policing	CCEBP
Digital Innovation Team	DIT
Evidence Based Policing	EBP
Police Constable	PC
Police Education Qualifications Framework	PEQF
Police Search Advisor	POLSA
Randomised Control Trial	RCT
Senior Leadership Team	SLT
Senior Responsible Officer	SRO
Serious Violence	SV
Serious Youth Violence	SYV
Thematic Analysis	TA

5 INTRODUCTION

Since joining Bedfordshire Police, the Chief Constable has been very clear on his vision for the force. One of the key areas within the force vision is learning, the Annual Delivery Plan for 2021 states, Bedfordshire should:

"Be a Learning Organisation with a workforce that thinks innovatively and seeks to continually improve how we operate" (Bedfordshire Police, 2020)

This objective is also part of the force's vision and mission statements. This contains a number of principles including the following in relation to quality of service:

"We will provide compassionate professional services to all by promoting innovation and we will implement evidence-based improvements, embracing new technologies, and making effective use of resources" (Bedfordshire Police, 2021)

This research details the journey and associated learnings of implementing a Hot Spot Targeting Alarm Tool in Bedfordshire Police, with a particular focus on a Randomised Control Trial (RCT). This focus on implementation enables the author to support Bedfordshire Police becoming a learning organisation, this learning will assist in a longer term move from the force making intuitive snap judgements to a more systematic analysis using evidence (Kahneman, 2011). This research can be applied for all change in Bedfordshire, not only supporting implementation of the Hot Spot Alarm, but evidence-based improvements and innovations for years to come.

Bedfordshire Police have been working on a number of ways to improve learning including embedding Evidence Based Policing (EBP). EBP is the practice of using the best available

research to implement guidelines and evaluate practices (Sherman, 1998). EBP is an approach supported by the College of Policing and a workshop was held in force in 2019 to determine where Bedfordshire Police sits on the College of Policing EBP maturity model (Figure 1). This work suggested Bedfordshire Police was at level 2/3, there was some evidence of EBP being completed, yet at times this was ad hoc and EBP is not widely embedded as part of force culture, therefore there is still work to do to meet the force objectives.

Figure

1 - EBP Maturity Model (College Of Policing,2021)

Level 5 Integrated	EBP is fully embedded
Level 4 Developed	EBP is established within working practice but development required to fully embed
Level 3 Defined	EBP has gained some traction
Level 2 Initiated	EBP is starting to be considered but is still in its infancy
Level 1 Limited	There is little or no evidence of development relating to EBP

Weisburd and Neyroud (2011) support the view that police should focus on learning, stating that embedding of evidence-based policy and police science is essential to support policing with budget reductions, while remaining legitimate. They discuss how over recent decades police have innovated rapidly, introducing new crime management strategies, technology

and management methods and how much of this work has been led by academics within universities. This ownership by academics may be due to two reasons, firstly the way research has been funded, with funding predominantly being made available for academic partnerships. Secondly, the lack of focus and effective training on science in policing, resulting in police officers being taught the law but not the theories behind it and the most effective ways to use it.

While supportive of academic partnership Weisburd and Neyroud (2011) discuss that ownership of academic work needs to shift away from academics and be owned by policing agencies. Police science must become part of the police mission and form part of police education. This shift in ownership means police agencies can focus research on the areas required, rather than where there is interest from academics. It also supports research being timelier, so results are available when needed rather than several months after, when results are published in academic journals. It ensures research reflects the realities of policing and not academics views of what they think policing looks like. Finally, it supports police leaders to challenge budget cuts or pressure to focus resources in particular areas, due to politics rather than evidence.

One area identified where EBP, new technologies and effective use of resources could be introduced in Bedfordshire was tackling Serious Youth Violence (SYV). Since 2014 virtually all police forces across England and Wales had seen an increase in knife crime, gun crime and homicide (The Serious Violence Strategy, HM Government, 2018). As part of the government's serious violence strategy a £100 million fund was established to bolster responses to SYV. As a result of the Home Office identifying Bedfordshire Police as one of eighteen police forces worst affected by violent crime, Bedfordshire were awarded £1.38

million in 2019 and £908,000 in 2020 to tackle violent offending. This funding is referred to as surge funding throughout this research.

Bedfordshire Police utilised this funding for a number of initiatives and there had been a 9% reduction in SYV in the year up to March 2020 (Bedfordshire Police 2020(2)). Despite this, Bedfordshire Police still ranked fifth highest nationally for robbery and knife crime and seventh for firearms offences, based on offences per 100,000 people. Bedfordshire Police was only just behind some of the largest metropolitan forces such as Merseyside and West Yorkshire (ONS, 2020). The vast majority of Bedfordshire's response had relied on this special grant funding, with approximately £560,000 utilised for overtime and £378,000 funding additional analysts and researchers. Given the short-term and finite nature of the funding it was acknowledged a proportion of the funding for 20/21 needed to be focused on building core skills in force and ensuring tactics utilised could be built into business as usual. This was an ideal opportunity to utilise EBP to identify theories and science that would enable Bedfordshire Police to tackle SYV more sustainably.

Bedfordshire commissioned the Cambridge Centre for Evidence-Based Policing (CCEBP) to support with development of a Hot Spot Targeting alarm tool. The tool would be developed in conjunction with a team within Bedfordshire Police who would ultimately own the work and take on the role of pracademics. A pracademic is someone who straddles two roles; being a practitioner who understands real-world problems with academic training that can measure, observe and test these real-world problems (Huey & Mitchell, 2016)

The Hot Spot Alarm focusses on EBP theory relating to targeting resource at the "power few" places (Sherman, 2007). Small places that account for a high proportion of crime. An early test in Minneapolis (Sherman et al, 1989) showed 3.3% of places accounted for 50.4%

of crime calls, further work in the UK including Op Savvy in Birmingham (Ariel, 2014) and Op

Beck on the London underground (Ariel et al, 2019) have shown that this targeting of Hot

Spots can also apply in the UK. More recently Massey et al (2019) applied this theory to SV

where the "power few" theory was used in London to identify Hot Spots for knife homicide.

The Hot Spot Targeting Alarm tool has a number of elements including, ensuring analysts

are able to identify and map SYV Hot Spots, identifying technology that can be utilised to

track when officers are in identified Hot Spots, and ascertaining what actions officers should

complete in the Hot Spots. This would lead to the creation of an alarm that will alert

relevant teams when Hot Spots have not been visited within an agreed timeframe and

would enable Bedfordshire Police to task officers to attend these Hot Spots (CCEBP, 2019©).

It was suggested that the theory behind this tool would be tested in Bedfordshire by running

an RCT. This was important, as often strategies developed in police agencies are

implemented with little reference to research evidence (Weisburd and Neyroud, 2011).

Evidence from an RCT in Perth suggested one patrol every four days appeared to reduce

crime (Barnes et al, 2020), subsequently it was proposed that the alarm would be built to

identify when an officer had not been to a Hot Spot for four days. The RCT would enable

Bedfordshire Police to test if this theory would work for SYV in Bedfordshire. To

operationalise the RCT it was implemented locally using the name Operation Rowan.

CCEBP developed an outline plan for the Hot Spot Targeting Alarm tool including a

CONSORT document detailing what was required from the RCT. Hot Spots were identified

based on crime data recorded by Bedfordshire Police between June 2018 and February

2020. The design originally focused on SYV, however when analysis was started it was

identified SYV numbers in the areas were small, therefore the scope was widened to identify

Serious Violence (SV) Hot Spots. For 90 days 21 Hot Spots would be randomly assigned to receive 15-25 minutes of foot patrol. These patrols would be tracked using GPS data and while not directly detailed in the CONSORT it was suggested compliance in the Hot Spots needed to be above 90% (E82) . The full CONSORT can be found in Appendix 1.

This research will detail the implementation journey for Operation Rowan ultimately answering;

> What were the key features of the Hot Spot Targeting Alarm System ("the system") as designed that were implemented with greater and lesser success, in Bedfordshire Police, in the period 2019-2021?

To support this, a number of areas of focus were identified. The main implementation challenges and enablers were grouped into the categories; COVID-19, technology, people and processes and these findings were then reviewed.

6 Literature Review

This thesis details the implementation of the Hot Spot Targeting Alarm tool, including an RCT in Bedfordshire. A variety of literature predominantly focused around implementation of change and learning has been reviewed to support this.

The literature review is split into a number of sections, firstly the author focused on research and theories relating to general implementation in the public sector. The next section then looks at literature relating specifically to implementation in policing. It is important to consider implementation in policing separately, as while general implementation research has enabled consistent frameworks for implementation to be built, it has been suggested that a critical question is how the innovation should be adapted to fit the host setting (Meyers et al 2012). The policing environment is complex (Kirby, 2013) and law enforcement are constrained by traditions, frameworks and law that do not align with research or scientific process (Lum & Koper, 2017). Following the review of what is known about implementation in policing, the next section focuses on literature specific to the Hot Spot Targeting Alarm tool. This includes learning related to RCT's and technology and literature related to learning organisations, what EBP is, and why its implementation is important in policing.   This literature review informed the design of the trial and themes identified formed the basis for the areas to be reviewed and coded within the case study.

6.1   GENERAL IMPLEMENTATION THEORY

While science relating to evidence-based practices improves, science relating to implementing these practices with fidelity and good outcomes lags behind. (Fixsen et al, 2005). This section looks at Implementation theory relating to implementing all change and is predominantly drawn from an analysis completed by Fixsen et al in 2005, this looked at nearly 2000 citations relating to implementation in the public sector. They reviewed 743 full texts, including 22 studies with an experimental analysis of implementation factors and found that there are common themes relating to implementation. This research completed by Fixsen et al (2005) resulted in the creation of a framework that identifies five key themes for implementation as shown in figure 2.

Figure 2 A Conceptual Framework for Implementation of Defined Practices and Programmes
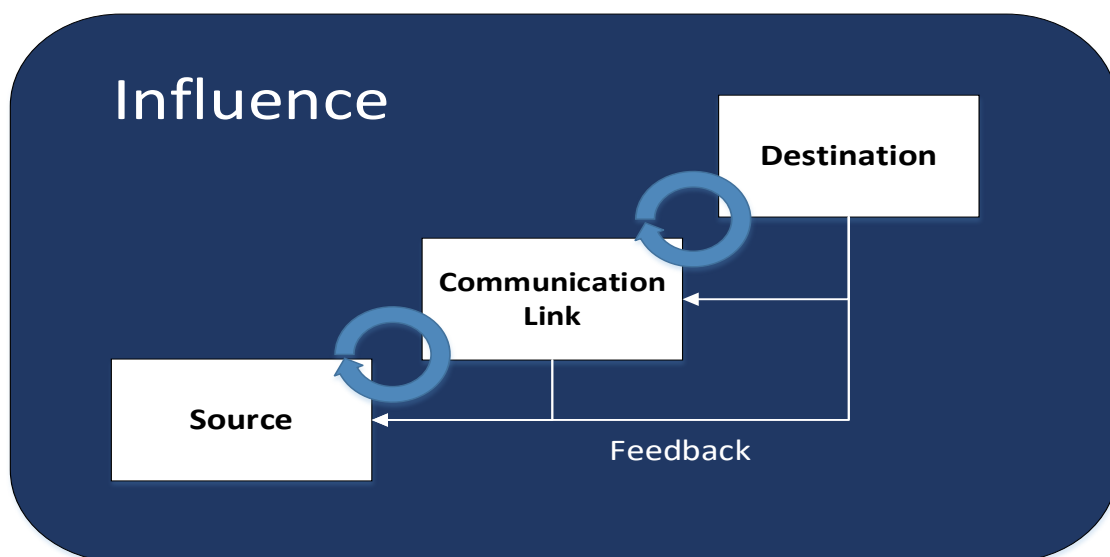
6.1.1 Source

The source is the programme or intervention to be implemented, ideally built from the best features of research or from a similar programme that has been implemented previously.

As well as identifying the core themes of implementation, Fixsen et al (2005) also looked at the stages of the process. The first stage that enables the programme to be developed is the exploration and adoption stage. This phase is pre-implementation and involves determining if the intervention will meet the required needs and if implementation should go ahead.

In this pre-implementation phase thought should be given to potential barriers to implementation such as staffing and funding. This pre-work should also include a pre-mortem. This involves main stakeholders reviewing the project before it begins to identify learning that can be applied as early as possible (Klein, 2007). The importance of this pre-work is reiterated by Meyers et al (2012). Meyers et al built on existing implementation research and developed a quality implementation framework consisting of a set of steps that should be followed. 10 of these 14 steps should be completed before implementation begins. This framework is shown in Figure 3.

Phase 1 – Initial Considerations regarding the host setting

1. Conducting a Needs and resources assessment
2. Conducting a fit assessment
3. Conducting a capacity / readiness assessment
4. Possibility for adaption
5. Obtaining explicit buy in from critical stakeholders
6. Building organisational capacity
7. Staff recruitment / maintenance
8. Effective pre-innovation staff training

Phase 2 – Creating a structure for implementation

9. Creating implementation teams
10. Developing an implementation plan

Phase 3 – Ongoing structure once implementation begins

11. Technical assistance/ coaching/ supervision
12. Process evaluation
13. Supportive feedback mechanism

Phase 4 – Improving future applications

14. Learning from experience

6.1.2   Destination

Destination relates to the organisation and practitioners that will adopt the programme.

Fixsen at al's (2005) implementation plan suggests that following the decision to go ahead with an intervention, the phases of program installation and initial implementation ensure the organisation is ready for change. Resources need to be identified and the structural components, in the form of policies, reporting frameworks and outcome expectations need to be agreed. Fixsen et al also identified these initial stages are where resistance to change and the complexities of implementing something new can be significant, with research identifying that many implementations fail at this stage.

6.1.3   Communication

Fixsen et al (2005) identified the need for an individual or group that act as "purveyors" of change to support implementation. Key roles such as leaders and enthusiasts are a theme running through implementation literature. Fixsen's work does not specify the activities that the purveyor role undertakes, however suggests having a consistent role and approach to implementation will mean purveyors accumulate experience, allowing them to learn from previous implementations. They can use this knowledge to put actions in place to prevent problems from developing further down the line. Nutley et al (2007) suggest to prevent implementation failing ownership is key, leaders need to support the change and enthusiasts need to be identified to champion any change delivered.

6.1.4   Feedback

Feedback relates to the need to have a mechanism that enables a reliable and regular flow of performance information, that can be used by purveyors and other key stakeholders. This flow of information enables purveyors and those involved to identify if an implementation is working, provides opportunities to refine the programme, and identify any drift from the required outcomes as soon as possible.

Fixsen et al's (2005) work also looks at how information should be shared. They advised practitioners should receive appropriate coaching, training, performance assessments and feedback. It was suggested sharing information electronically or in paper form alone is not effective and neither is using training in isolation. They suggested a combination of methods delivered the best outcomes.

6.1.5   Influence

The final theme overarches all areas discussed and clarifies that these requirements need to operate within a domain that reflects the economic, historical, psychological, social and political factors that may impact on the programme. Fixsen et al (2005) identified these factors are key to initial implementation and must also be monitored when implementation is complete, to ensure the programme remains effective and is sustainable in the long term. They identify having funding and policies in place to create a suitable environment for implementation and the programme to operate is crucial. This includes ensuring there is funding for all start-up costs and infrastructure, funding to enable purveyors to complete all the required implementation services, and funding that will support the ongoing infrastructure of a programme, e.g. ongoing training and support.

6.2   IMPLEMENTATION IN POLICING

Implementation is a relatively neglected area in academic literature relating to police practice (Kirby, 2013). Sherman et al (2014) reflect that for Hot Spot policing, despite the body of research on Hot Spots, there is no theory or evidence on what actions police leaders should take to create and maintain a successful Hot Spot patrol strategy.

The recent response to COVID-19 indicates police can mobilise and implement changes quickly when required (Maskaly et al, 2021), however within the literature, failure relating to implementation in policing is well documented. Skogan (2008 pp23) stated policing innovations "often fall short of expectations" and (Weisburd & Braga, 2019) state police departments can be highly resistant to change and often experience difficulty in

implementing change. The literature available has highlighted the following significant factors.

6.2.1 Leadership

Lum and Koper (2017) identify that police chiefs are unlikely to feel compelled to listen to research and for them to bring research into the decision-making process it needs to be; legitimate and factual provided by "experts", useful to strategies and tactics, worth the time, effort and money required to complete and provide answers that police need.

Police leaders are often managing a variety of conflicting priorities. Skogan (2008) suggested balancing these priorities can be even more difficult due to the limited resources available in policing, therefore leaders have to balance resourcing new programmes with delivering existing services. Skogan states this can mean, leaders will try and implement programmes more cheaply with training often an area that gets cut. Enabling officers to attend training often requires removing them from existing duties or overtime so police forces are trying to deliver changes that revolutionise policing with little or no formal training.

Front-line officers can also see changes as fads and this is not helped by the links between change initiatives and promotion processes for senior leaders and the regular changes in senior leadership (Skogan, 2008). Skogan highlights that a great deal of time is spent speculating who is leaving or moving. Often the front line sees an initiative bought in and then there is a change in leadership and that initiative is no longer a priority, something else is proposed, as the new leader wants to make their own mark. If reforms are to survive changes in leadership and limited budgets, change managers need to ensure support is from across the board and not just from a single leader.

Skogan also found that a number of projects have failed due to revolts by mid-level managers, it was suggested this is particularly the case where initiative gave more autonomy to lower levels of the organisation. Skogan suggested middle managers saw this as taking authority away from them, they struggled with trusting rank and file officers and had concerns that an increase in misconduct may cost them their roles. This work suggested at times senior officers bypass these middle managers and create separate units to carry out initiatives rather than manage the resistance.

As well as mid-level managers Skogan looked at issues with resistance from front line supervisors. Skogan's work identifies Sergeants are pivotal in successful reform. Sergeants interpret the meaning of policies at street level, they have direct control on a day to day basis and have the ability to "kill" reform. Due to this it is important Sergeants believe in the training and fully understand what is required, as they will often be new to any changes and can be responsible for whether the required message is shared or not.

The importance of management is reiterated in a study of the implementation of "Hotspotting" in Thames Valley and Northumbria (Irving & Dixon, 2002) that identified a potential fundamental flaw that was blocking theory becoming practice. This being a lack of management and training, in particular that of middle managers who are crucial to implementing change. They identified middle managers need the skills and knowledge to support change programmes. They further identified that current middle management practices, in line with performance management do not encourage experimentation or challenges to accepted wisdom.

6.2.2   Front Line resistance

Skogan (2008) then looked at resistance by front line officers. He found that officers are sceptical about change for a number of reasons, mostly related to police culture. This includes resistance to anything that would change the way that they work and what officers perceive their role to be. Unlike workers in most organisations police officers have considerable discretion in determining the amount, quality and nature of sanctions provided by the force. This discretion cannot be entirely eliminated due to the nature of policing. Police officers work in situations too complicated to provide instructions on all possible outcomes, they work in situations that require responses to human interactions and use judgement relating to that specific situation (Lipsky, 1980). This discretion and the experience that it brings means police officers can overvalue experience and focus on the "craft" of policing rather than evidence (Lum & Koper, 2017).

Lum & Koper (2017) looked at police receptivity to research by surveying a number of officers in Sacramento. This research established few officers read academic research and found that when officers do look at information about the effectiveness of a tactic, this is often provided by their own agency. In the test in Sacramento 75% of officers agreed or strongly agreed that new ideas by commanders are a fad. Lum & Koper concluded that to increase officer's receptivity to change, forces own internal structures need to be used. They suggest this should be through formal systems such as training, briefings, meetings and through informal messaging using first line managers. As well as looking at receptiveness to research the work also looked at willingness to engage in research, this research reflects having the right leaders supporting change is key.

A further issue that may contribute to this resistance from front line officers is the perception that police experiments never fail, as there is reluctance to embark on research that may report adverse results. (Weisburd and Neyroud, 2011). Little thought is given to how outcomes of experiments are interpreted. If the results are not as expected, focus tends to be on quantitative data and limited data is gathered to understand the context or why the results were achieved and how lessons can be learned (MacQueen & Bradford 2017).

6.2.3   Communication and Feedback

Theory relating to receptivity to change in policing, ties into the need to have the correct communication link and the importance of feedback. Lum and Koper (2017) introduce the term translator. Translators within the police take external knowledge from researchers and convert it into information that can be used by officers through internal channels familiar to them.

Policing also has difficulties in relation to implementation, as it is not always easy to measure success. In most industries inputs like costs, outputs, such as parts made and outcomes including profits are more easily measured. What the police are for has been debated for a number of years (Kirby, 2013) and Skogan's work on why reforms fail (2008) discusses the difficulties of monitoring if officers' actions are effective. An example of this is when looking at problem solving, where clusters are looked at rather than individual incidents, which are harder to measure. A number of evidence-based initiatives focus on proactive work to reduce crime and it is difficult to conclusively measure if crime is reduced and if the action taken was the cause of the reduction.

The literature also looks at how information is fed back. A number of forces use a CompStat approach where focus is on providing crime statistics, numbers of crimes, calls answered, stops completed etc. Skogan (2008 pp29) suggests this approach "may be the most important obstacle to reform in contemporary policing". Braga & Bond (2015) propose a problem-solving approach to meetings is more beneficial than just using the traditional CompStat. They compared bi-weekly formal CompStat meetings consisting of a larger number of people sat at a U-shaped table facing a screen being given crime statistics, with a less formal monthly problem-solving meeting. The smaller groups sat around a rectangle table being given basic information about trends in a Hot Spot, using the SARA (Scanning, Analysis, Response and Assessment) model (Eck & Spelman. 1987) to discuss the problem. They found this problem-solving approach produced better results. The research acknowledged that CompStat does have some value so a combination of the two approaches should be used.

Whichever communication approach is applied, it has been proposed that tracking and feeding back to officers throughout a project to improve compliance and feeding back to managers to redesign policy and training can improve the quality of implementation substantially (Slothower et al, 2015).

6.2.4   Culture

As well as generic issues understanding the culture and key stakeholders in the force are essential. Each force has its own culture and identity, that effects the way staff relate to each other (Kirby, 2013). Part of this local understanding of culture should include identifying forces that will assist with driving change or blockers that are leading to resistance to change. Lewin (1951) developed force field analysis theory, suggesting that

when driving forces and restraining forces are equal, the status quo will remain and to force change this status quo needs to be upset. Understanding and making changes locally that will increase the drive for change, reduce resistance to change and will support this upset, enable a move to the new desired status quo.

In addition to understanding the force's drivers and blockers for change, it is also important to understand how experienced the force is when it comes to implementation. Neyroud (2017) raises the idea of "Novice Theory", suggesting three areas where research may be impacted by being a "novice". These are; the researcher having limited experience, whether the force has previously been involved in research and the volume of previous research available on the topic or intervention. Neyroud's research identified that treatment integrity for RCT's fell below required levels more often where one or more of these themes applied, and suggests that where forces or the intervention are "novice" this can be countered by access to support from an institution or experts with more experimental experience.

6.3   IMPLEMENTATION OF THE HOT SPOT ALARM

Four main categories of police innovation have been identified (Weisburd & Braga, 2019). Programmatic programmes establish new operational methods to use resource. Administrative programmes change how organisations prepare or account for work, such as changes to performance reporting or training. Technological programmes apply new equipment or software and strategic programmes look at changes to overall philosophy of an organisation. While this research is likely to touch on all four, implementation of the Hot Spot alarm predominantly focuses on the programmatic changes needed to implement Hot Spot policing and RCT's and the technological aspect required for the wider tool. The following literature looks at learning relating to programmes similar to these.

6.3.1   Programme Design

An issue related to these types of implementation is what is being deployed in the first instance. Programme design is key and there is a requirement to be flexible and adapt the programme to be implemented where required. This was demonstrated when looking at implementation of the Turning Point system for Out of Court Disposals (Neyroud and Slothower, 2015). Over the course of the three-year experiment it was identified providing training and guidance was not enough to successfully deliver the experiment, the project team closely monitored results and identified several points where officer decision making was not consistent or appropriate. At these stages rather than reiterating original guidance, tools were created to support decision making and improve results delivered during the test.

6.3.2   Training

Lum and Koper (2017) look at a theory relating to police experience becoming "overvalued" and officers challenging science and processes they believe may challenge their discretion. Lum and Koper suggest that in relation to policing Hot Spots further training, mentoring and guidance for officers is required so they understand why crime is concentrated and what tools they can use to address these Hot Spots. Officers may then be more bought in and feel empowered to use their experience when patrolling Hot Spots.

6.3.3   Tracking

The need to track and effectively monitor and feedback is demonstrated throughout research relating to RCT's and Hot Spots. In the Minneapolis Hot Spot experiment, (Sherman and Weisburd, 1995) there were 6500 hours of random observation of the control and

experimental sites to document dosage and keep practitioners "honest". In the London Underground experiment (Ariel et al, 2019), a number of monthly half-day meetings with officers, Sergeants, and senior officers were held to maintain motivation throughout. During these briefings the importance of treatment fidelity was communicated. Feedback was given to the patrol officers, relating to crime data from the previous month and treatment dosage. Due to the inability to use GPS underground, officers had to radio in to confirm when they entered and exited the treatment Hot Spots. Similar to in Minneapolis, Sergeants also conducted surprise visits to Hot Spots to ensure that officers were patrolling where they advised they were. Sergeants made themselves known during these visits and they were flagged during debriefs, so that patrol officers were aware this were happening. This experiment also tracked where dosage did not occur, in this case this was mainly down to practical blockers such as line closures and engineering, rather than decisions made by patrol officers.

A further finding that runs through research relating to Hot Spots is the importance of GPS. The "pen-and-paper" approach used for the London underground is archaic and unsustainable. It did not allow for accurate measure of attendance in the control sites and had GPS been available, the experiment would have been stronger (Ariel et al, 2019). Research completed in Birmingham (Williams & Coupe, 2017) identified further issues with ensuring officers completed the allocated patrols, finding that one of their biggest challenges was changing a culture where there was little feedback or accountability relating to patrol.

6.3.4   Technology

As well as general programme design tools that enable implementation are vital. When looking at technology in policing (Weisburd & Braga, 2019), Ariel highlights that modern crime prevention is dependent on technology, particularly in relation to place based interventions. The importance of technology to accurately predict where crime is more likely to take place, the ability to share information with officers and the ability to track officer locations has enabled many experiments to take place. Despite the central role that technology has, Ariel identifies "implementation failures" are greater than successes in relation to technology implementation (Weisburd & Braga, 2019 pp 486). One of the most recent examples of this is the replacement of the emergency services network. This is probably the biggest technological change policing has seen in recent years, as it looks to replace the current airwave radio system used across the UK. A report completed by the National Audit Office (NAO, 2019) identifies this project is now running 3 years later than planned, is expected to cost 49% over what was expected (an additional £3.1 billion) and at the end of this, benefits will be a time saving of 5 minutes a shift per officer. While this project is much larger than anything tackled locally some of the issues listed in the report are similar to those that are potentially faced locally. For example; user requirements do not match what police need, it is not clear how multiple pieces of technology needed will work together and it is not clear who will be responsible for the system once it is live.

The literature on implementation of technology confirms implementing technology is just like implementing other tactics and general guidelines around implementation apply (Weisburd & Braga, 2019). In particular the need for a feedback loop is discussed, usage of the intervention should be measured, this should be fed back to officers and praise or

corrections should follow based on the measurements. This literature also reiterates the importance of leadership, it identifies middle managers are not trained in this feedback and find it difficult to have these conversations. If officers are not complying and no feedback is provided this will hinder implementation (Weisburd & Braga, 2019).

6.3.5 Organisation and EBP

In addition to implementation of the Hot Spot Targeting Alarm, a focus for this research is how lessons from implementation can support Bedfordshire Police becoming a learning organisation. Senge (2006 pp 3) describes a learning organisation as organisations where;

"people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together"

Senge reviewed information relating to learning and established five disciplines that when developed together support the development of a learning organisation;

Figure 4 - Five Disciplines of a Learning Organisation (Senge, 2006)

1. **Systems Thinking**: Looking at the whole process or system, rather than focusing on isolated parts. Understanding how the individual parts impact the wider process
2. **Personal Mastery**: Encouraging every person in an organisation to commit to their own lifelong learning
3. **Mental Models:** Understanding ingrained assumptions and generalisations that impact how staff act
4. **Building Shared Vision:** Create a shared vision, including a set of principles and guidelines that foster commitment through people wanting to excel and learn rather than being told to comply.
5. **Team Learning:** Encouraging teams to think together and discover insights not attainable when working as individuals

This research also looks specifically at the use of EBP within Bedfordshire. EBP is important to police forces remaining efficient and legitimate (Weisburd and Neyroud, 2011). EBP uses

science to measure outcomes, identifying what works when implemented correctly and what results are achieved by applying research in practice (Sherman, 1998).

Literature relating to EBP is ever increasing, with policing gaining a greater understanding of "what works". However, testing of practices seems to remain limited to small groups of practitioners with a specific interest. Braga et al (2014) found that in a list of 126 authors of RCT research in the police, only 3 were police practitioners. Even with some of the most researched areas, where related studies demonstrate the strongest evidence of police effectiveness such as the use of Hot Spots (Weisburd et al 2016), these practices are not business as usual in police forces. An issue possibly linked to the limited use of EBP is lack of understanding of the practical steps needed to implement change.

Having observed these difficulties Sherman (2013) developed the "Triple T" framework to support implementation of EBP. This framework focuses on Targeting, Testing and Tracking. Agencies need to identify areas where they are facing the biggest risks or there are the biggest potential gains and target these areas. Once these areas have been identified they need to test policies and theories to identify what works for their agency. Implementation of these policies then need to be tracked to make sure that they are being completed and the benefits expected are being realised.

As much of the research is completed by academics, relationships need to be built with policing to enable this learning to be implemented. This is not always an easy relationship as those trained in research do not mind uncertainty and are often not invested in the outcome of research. Police feel less comfortable with uncertainty and are likely to be more invested. Researchers and police may have different expectations around what they want to achieve from any test and test protocols may also be difficult to stick to in the realities of

operational policing. Researchers and academics need to acknowledge these differences and work on maintaining good relations throughout to ensure there is a coalition that supports both parties needs (Strang, 2012). This link to academia also needs to be considered when working with the front line. Officers tend to see change as fads and can value experience over academics. Skogan (2008) identified officers may be sceptical of programs invented by civilians, especially if it leads to outsiders evaluating their performance. If academics are involved in the developments of the programme, how this is communicated and managed is crucial. This narrative fits with the need to move ownership of police science from the academics into policing (Weisburd and Neyroud 2011).

In summary the literature suggests that for successful implementation the core frameworks should be followed. Internal culture including the drivers and blockers for change need to be identified and the experience of the team implementing the programme needs to be established. In policing, repeated areas in the literature relate to the importance of leadership and communication. Senior leaders need to buy in to ensure that the project has appropriate resource allocated and then support is needed from middle and first-line managers to lead and embed the change. Communication to these leaders and to officers to ensure buy in is essential. Sufficient officer training and briefing from first line managers is required throughout, as is tracking results and ensuring these results are fed back in an appropriate way.

7 RESEARCH METHODOLOGY

7.1 RESEARCH OBJECTIVES

The aim of this research is to answer the research question;

> What key features of the Hot Spot Targeting Alarm system were implemented with greater and lesser success, and with greater or lesser speed in Bedfordshire Police, in the period 2019-2021?

The research will be a participant observer case study with a focus on implementation. A number of sub questions have also been answered throughout to help determine what successful implementation looks like.

This research is not testing the effectiveness of Hot Spot patrolling. The design of the RCT, identification of the Hot Spots and analysis of the results were predominantly managed by the CCEBP. Detail relating to this will only be commented on where needed to provide context. Details of the results of the RCT can be found in Appendix 2.

7.2 RESEARCH SETTING

This case study covers the implementation of an RCT within Bedfordshire Police. At 477 square miles and with approximately 664,500 residents, Bedfordshire is one of England's smallest (yet most diverse) counties. The force faces complex crime challenges more usually seen in large metropolitan cities. The force employs in the region of 1,191 police officers, 972 police staff and 50 police community support officers (Bedfordshire Police, 2021(2)).

The County is split north and south for the majority of operational policing functions. For the purposes of Community policing the county is split into 8 geographical hubs that align north,

south and central in line with the 3 unitary authorities in Bedfordshire; Luton, Central Bedfordshire and Bedford. The RCT implemented covered 21 Hot Spots, these Hot Spots were spread across all bar 1 (north rural) of the Community hubs. Due to this the research could not be focussed in a specific area and was applicable across the entire force.

7.3   RESEARCH TIMELINE

The concept of the Hot Spot Targeting Alarm was first introduced to Bedfordshire Police in August 2019; however, this study focuses on the 17-month period from January 2020, when the author was commissioned as the programme manager for the implementation phase of the project. The study's primary focus is on the implementation of the RCT (Operation Rowan) between October 2020 and February 2021. Commentary also details wider work to develop the ICT solution, to add context and further evidence to findings relating to the RCT.

7.4   RESEARCH METHOD

The principle methodology for this thesis is participant-observation case study. Yin (2018) defines a case study as an empirical method that;

- "investigates a contemporary phenomenon (the "case") in depth and within its real-world context especially when
- The boundaries between phenomenon and context may not be clearly evident."

Given the author's central role as programme manager for the implementation of the Hot Spot Targeting Alarm, the author is a participant observer, as directly involved in the case being observed. The participant observation element provides opportunities for the author

to gain access to a project that would not be possible to those observing from the outside and provides opportunities to manipulate minor events such as setting up meetings with key stakeholders (Yin 2018). This methodology also fits with the focus on implementation as the role of participant observer is excellent for studying processes, the organisation and relationships between people and events, (Jorgensen, 2011).

7.5   DATA COLLECTION

Data manipulation and analysis in the statistical sense was not applicable, and the majority of the findings are qualitative, the author collated evidence based on Yin's framework. This included documents such as all emails relating to Operation Rowan, risk and action logs, timelines, briefings and updates from CCEBP. Archival records including, budget records, crime data and the Hot Spot maps. Interview notes from meetings with key stakeholders and observation notes, including project board notes for meetings between the Superintendent acting as the project Senior Responsible Officer (SRO), the fellow from CCEBP and the author. The author also took notes at the Serious Violence Board (where the project was monitored) and at other associated meetings such as the pre-mortem with the Community senior leadership teams.

Throughout implementation the author retained all digital data in email folders, in a SharePoint library or as notes in Microsoft One Note. As the author was solely responsible for implementation, all this data could be stored in personal files. Where data was identified elsewhere, this was obtained and emailed to the author or saved in an appropriate drive.

Prior to analysis all emails were reviewed and organised, those that did not contain any evidence e.g. generic thank-you messages or those related to meeting timings were filed.

Those emails that formed part of a chain were only recorded once and all emails from officers detailing attendance and actions taken were saved in a single document by area. All remaining emails were then transferred into the One Note library. All entries in the One Note library were named and labelled with the date to enable them to be reviewed and cross referenced to the original documents and emails. A total of 909 emails, 50 sets of meeting notes and multiple project documents were reviewed and filed or catalogued. Where possible this data was uploaded into NVivo which is a qualitative data analysis computer software package, that enables users to organise and analyse qualitative data.

7.6 DATA PROTECTION / HUMAN SUBJECTS RESEARCH

Due to local ICT rules NVivo could not be downloaded onto any force computer and therefore data had to be transferred using university email and was then viewed outside of the force network . To limit any potential issues relating to this transfer of data, all personal information was removed before the data was exported and analysed, names were changed to initials or removed. Some sensitive notes were retained on force systems to be reviewed outside of NVivo as the information could not be sent outside of the network. A key kept by the author and the original One Note filing meant information could be tracked back to the original document if required.

As well as considerations of how the data was stored and shared for analysis, where interviews were held, participants were made aware that the discussion was to support research and comments may be shared as part of the analysis. Where parties were not directly aware of the research, permission was sought before anything was included.

7.7   Data Analysis

Once the data was collated in Nvivo, a framework was created to enable the data to be analysed. Thematic analysis (TA) was used to develop this framework. TA is a method for systematically identifying and organising themes across a data set (Braun & Clarke, 2017). There are two primary ways TA can be applied; firstly, there is an inductive approach to data coding that is bottom up and is driven by what is found in the data. Secondly there is a deductive top down approach where the author identifies a series of concepts that they expect from the data before analysis (Braun & Clarke, 2017). This research used a combination of both approaches. The research questions, literature and previous experience identified themes that were expected to be identified.

The final framework for coding was not confirmed, until the majority of data had been collated. This meant the framework could be checked to establish if these primary themes were in fact issues encountered and further sub themes identified through data collation could be included. The framework was reviewed throughout the coding process, using the following questions. Is this a theme? What is the quality of the theme? Does the theme identify something useful relating to the research question? What does the theme include and exclude? Is there enough meaningful data to support the theme or conversely is there too much data in a theme? (Braun & Clarke, 2017).

A number of ways to group the findings were reviewed, following the literature review, the author had planned to structure the findings using the implementation themes of source, destination, communication, feedback and influence. While the findings did align to these themes, several crossed over into multiple areas and became difficult to track. The author also looked at grouping issues into strategic, tactical and operational with similar issues.

After reviewing the majority of the evidence, the author settled on the categories of COVID-19, technology, people and processes and the framework detailed in Figure 5 was developed, to enable all of the evidence collated to be coded and evaluated in NVivo.

Figure 5 - Evidence Framework

Primary Theme	Sub Theme
COVID-19	• COVID-19
Technology	• ICT capacity • Trackers

People	• Leadership
	• Learning – EBP
	• Resource identification
	• Resource capacity
	  o Pre-planned abstraction
	  o Resource diverted
	  o Self-generated diversion
	• Overtime

Processes	• Briefing – capability and method • Proactive policing • Partnership working • Other process

The framework was also used to review and identify additional evidence in the documents that remained on force systems. Following analysis and identification of the main issues, further evidence was obtained where possible to triangulate findings. This additional evidence included demand data to highlight resourcing gaps or information requested from specific departments, not included in the original database.

7.8 Quality of the Research design and limitations

Research design can be judged using logical tests and for empirical social research there are four commonly used tests (Yin, 2018). Construct and internal validity relate to how well a test measures what you are intending to measure and how well the evidence can be linked to the effect suggested, by countering other possible explanations. External validity relates to whether findings can be generalised and may apply elsewhere and reliability relates to the ability for the study to be repeated. Throughout collation and review of the evidence, structures and tactics proposed by Yin were adhered to, to test against these principles and increase the quality of this case study.

The case study design, included an organised database of evidence that enabled the author to maintain a chain of evidence. All evidence in the database was accurately titled and recorded so that it could be confirmed where, when and how it was obtained. This database also allowed multiple sources of evidence to be triangulated to corroborate findings and reduce the likelihood of bias.

The framework used as the basis for analysis was also checked at several points with key stakeholders and aligned to the literature discussed in the literature review. This increased the construct validity by reducing the likelihood of false reporting or misrepresenting a perspective (Yin, 2018 pp 300).

While following the principles detailed there are limitations to this research. The author was able to avoid some of the pitfalls relating to bias, as was not directly responsible for the Home Office funding or the results from this funding. While not directly responsible for the outcomes, this project was funded by public money, therefore there is always a moral obligation to use it efficiently and ensure value is added wherever possible.

A further limitation relates to capacity, this was one of a number of projects being managed and there is always more time that could have been spent. The author, where possible, balanced this and when unable to observe key events or keep comprehensive notes, requested feedback by email. A number of additional focus groups with officers had been planned to triangulate evidence. However due to the volume of evidence obtained that will be discussed, these were not completed.

8 RESEARCH FINDINGS

This research predominantly follows implementation of Operation Rowan. Between 9th November 2020 and 6th February 2021, the RCT was completed in Bedfordshire. Compliance was sufficient to enable findings to be analysed and reported on and this has supported the wider work on implementing the Hot Spot Targeting Alarm tool. This chapter describes the findings from this case study and discusses the significant observations. These observations have been split into sections aligned to the headline themes of COVID-19, technology, people and processes. What these findings may mean and how they should be applied to policy is then discussed in the discussion chapter.

8.1 COVID-19

It would be impossible to discuss the findings of this case study without looking at the impact of COVID-19. In early March 2020 the author met with key stakeholders to start planning the implementation of the RCT. On the 11th March 2020 the World Health Organisation declared COVID-19 was a pandemic (World Health Organisation, 2020), On the 17th March the author and the majority of Bedfordshire's support services were asked to work from home with immediate effect. On the 23rd March the Prime Minister advised everyone to stay at home and businesses began to close and at 1pm on 26th March, the Health Protection (Coronavirus, Restrictions) (England) Regulations 2020 came into force (Gov.uk, 2020). Vast areas of society were upended, including policing, the police now became responsible for enforcing safety measures, such as lockdowns. There was a lack of clarity around what policing of lockdowns should look like and the balance between

enforcement and encouragement was not always clear, leading to concerns over legitimacy (Maskaly et al, 2021).

The immediate impact of this saw work on the Hot Spot Targeting Alarm indefinitely paused until the effect of COVID-19 on the force and SYV could be understood more (E6). The Hot Spot work was restarted in May 2020. Serious Violence was starting to rise again as seen in figure 6 and there was a general acknowledgment work could not stop until the pandemic was over (E8,E9,E10,E13).

Figure 6 - Serious Youth Violence in Bedfordshire 2020-2021
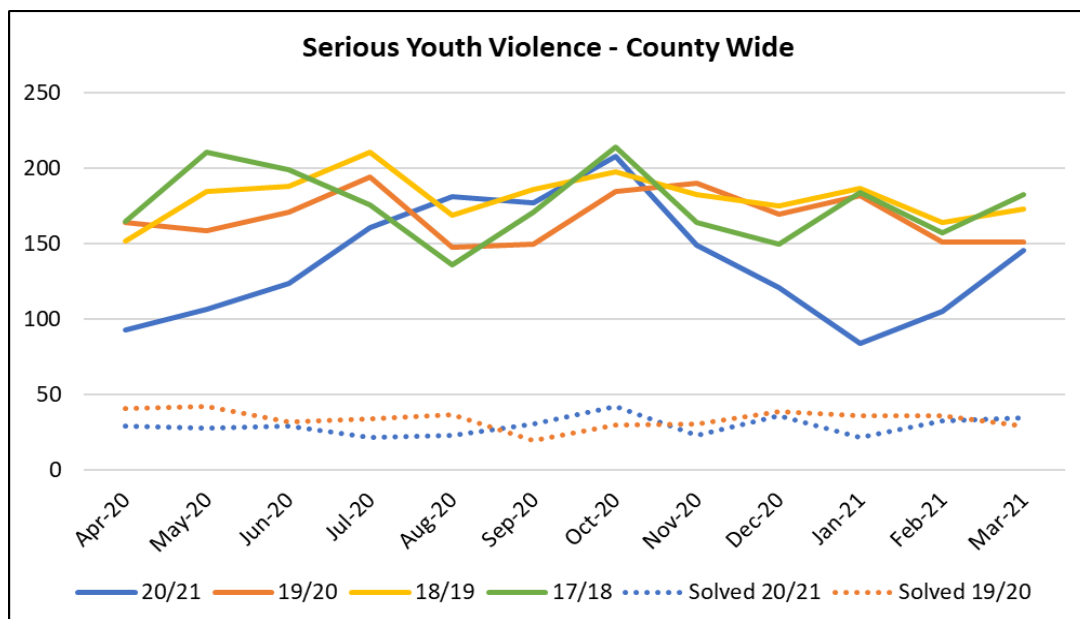
COVID-19 impacted almost every element of this research. The RCT started on the 9th November 2020 while England was in lockdown, meaning households were unable to mix and the majority of retail and leisure venues were closed. A number of these restrictions were lifted from 2nd December 2020 until the 6th January 2021 when the third national lockdown began. In the interim period restrictions varied as Bedfordshire moved between Tier 2 and Tier 4 (House of Commons, 2021).

8.1.1 COVID-19 Changing Crime Picture

Before the RCT could be implemented the data was revisited to confirm if the Hot Spots were still the same (E27). Following lock down crime rates initially dropped and calls for service changed. Figure 7 and Figure 8 show numbers of incidents and crimes recorded for March to June compared to 2019. They show there was a reduction in Fast incidents where immediate officer attendance is required. A significant drop in incidents where an appointment was booked for slower time officer attendance (Fixed incidents) and an increase in calls resolved without attendance. Crimes recorded dropped in all bar 3 categories.

Figure 7 - Bedfordshire incidents comparison between March-May 2019 and 2020

Response Grade	Incidents Per Day		
	01/03/19 to 01/06/19	01/03/20 to 01/06/20	% Change
Fast	232.3	210.0	-9.6%
Fixed	30.3	15.8	-47.9%
Resolved (w/o deployment)	84.5	109.6	+29.7%
Total	347.0	335.3	-3.4%

Figure 8 - Bedfordshire crimes comparison between March-May 2019 and 2020

Crimes Per Day		Recorded Crime	
Crime Type	01/03/19 to 01/06/19	01/03/20 to 01/06/20	% Change
Homicide	0.02	0.00	-100.0%
Death/Injury by Unlawful Driving	0.04	0.02	-50.0%
Violence with Injury	12.61	10.96	-13.1%
Violence without Injury	20.61	20.37	-1.2%
Stalking and Harassment	13.63	12.78	-6.2%
Rape	1.62	1.31	-19.2%
Other Sexual Offences	2.60	2.17	-16.5%
Robbery	2.29	1.25	-45.5%

Burglary - Residential	10.40	6.12	**-41.2%**
Burglary - Other	4.68	2.85	**-39.1%**
Vehicle Offences	17.00	16.12	**-5.2%**
Theft from the Person	1.77	1.03	**-41.8%**
Bicycle Theft	2.30	2.40	**+4.2%**
Shoplifting	11.97	7.13	**-40.4%**
Other Theft	15.14	9.43	**-37.7%**
Arson	0.66	0.57	**-13.1%**
Criminal Damage	13.41	12.42	**-7.4%**
Trafficking of Drugs	0.83	1.01	**+22.1%**
Possession of Drugs	3.59	4.53	**+26.0%**
Possession of Weapons	1.37	0.81	**-40.9%**
Public Order	14.06	13.55	**-3.7%**
Miscellaneous Crimes Against Society	2.67	2.49	**-6.5%**
Total	153.28	129.31	**-15.6%**

Several stakeholders from PC's to the ACC questioned the validity of completing an RCT during lockdown (E137,E172). This was considered and it was agreed to go ahead as SYV numbers were returning back to levels seen in previous years and the design of the RCT should counter the impacts of lockdown (M30). RCT trial design and the use of control and experiment Hot Spots increases internal validity (Sherman, 1998). Any changes in crime levels would still be attributable to additional patrol as lockdown would impact all the Hot Spots equally.

8.1.2 COVID-19 and ICT Support

ICT support requested for the alarm tool element was further delayed while ICT focused on keeping the force running. ICT in Bedfordshire is currently collaborated with Hertfordshire and Cambridgeshire providing a Tri-force approach. During the initial stages of COVID-19 with almost no notice, ICT had to mobilise to provide mobile technology for hundreds of

staff in Bedfordshire, Hertfordshire and Cambridgeshire and across the Eastern region to enable remote working at levels never before seen. Equipment had to be sourced, configured and distributed. The Office 365 roll out also had to be bought forward to support the policy decision that all meetings would be completed remotely. Networks had to be updated and maintained to support the huge increase in demand, as the majority of conversations that may have been face to face were now being completed by email, Skype or Microsoft Teams. (D1,D4)

8.1.3   COVID-19 and Briefing and Training

All training and briefings were impacted, all non-essential training was postponed or moved on line where possible. In a number of cases operational teams that remained working from police buildings were split across a number of rooms to enable social distancing. Briefings at the start of shifts were dependent on the weather allowing open air briefings or a suitable room and PPE being available to enable a shift or part of a shift to be briefed together (D1). Part of the original contract with CCEBP included briefings for staff involved and the team were keen to support this throughout. As national and Bedfordshire policy throughout the trial stated that only essential operational staff should attend police estate, face to face briefings and training for officers and staff by the project team was not possible (D1).

8.2 TECHNOLOGY

The impact of COVID-19 in relation to ICT has already been discussed however this only compounded issues already existing with ICT Support. The original plan for implementation of the RCT and for the development of the Hot Spot Targeting Alarm tool was to utilise Automatic Person Location System (APLS) data from police radios. This data is available, yet

is not routinely utilised for tracking officers. Fairly early on it was established that due to the sensitivity and size of the data available, dedicated ICT support would be required to enable this data to be accessible and usable for the RCT and the Hot Spot Targeting Alarm tool (D3).

8.2.1 ICT Capacity

Following discussions with ICT, a request went in for support in February 2020. A response was received advising the call could potentially not be resolved for over a year, giving a completion date of June 2021, two months after the funding and contract with CCEBP was due to end. The request was put on hold due to COVID-19 and following this, responses and updates were sporadic and a resolution to accessing the data was not identified (D4).

BCH have a Digital innovation Team (DIT) that work independently from ICT, focusing on technology change projects and innovations that support policing. This team have been engaged on the project and advised they have similar issues with ICT capacity, advising they have approximately 40 projects outstanding with ICT and they expected it to be years to be able to implement them all (M42). The DIT also advised, there was some funding available for ICT development, although there are a number of other projects in the pipeline and as both ICT teams are BCH, prioritising work is more difficult as a single force, buy in across the 3 forces is generally required (M30,M37) .

There was executive support for money from surge being utilised to recruit ICT resource to support (E9,E12), however given the time frames required to recruit and the lack of ICT capacity, particularly in light of COVID-19 (D4), it was decided standalone GPS trackers would be purchased to enable the RCT to be completed. A longer-term ICT solution linked to APLS would continue to be scoped in the meantime (M8,E11,E15,E19).

CCEBP proposed developing a third-party application (E253). This was discounted as would still need ICT support to ensure integration and enable the application to be upgraded as required in the future. Possible solutions to enable longer term GPS tracking have now been identified. The project team with the DIT looked at GoodSam and TuServ. These are platforms currently used by Bedfordshire Police that could be upgraded to support GPS tracking and tasking. Both of these are developed by external companies and would require investment not factored into the surge funding for 20/21. This has not yet been fully resolved and to date there has been limited support from ICT, therefore will continue being progressed by the project team.

8.2.2   Trackers

Scoping of suitable trackers was completed by CCEBP alongside Essex Police who were running a similar RCT and having similar issues identifying an ICT solution (E27,M7). An appropriate tracker was chosen (E19) and 12 Trackers and sim cards were procured by CCEBP and delivered to stations across the county. While this solution did enable the trial to be completed, issues and learning were identified.

It was anticipated officers may be unhappy about the idea of being tracked. This was reflected in the briefings (D5) with the messaging;

"The Trackers are only being used to monitor compliance within the Hot Spot. By Geo-Fencing the Hot Spot, we can identify the time you enter the Hot Spot and the time you leave the Hot Spot. This is to ensure the trial is correctly evaluated and has the necessary scrutiny in terms of results. All data will then be deleted and will not be used for any other policing purpose."

Despite this, concerns were still raised with Sergeants that officers and PCSO's felt they were not trusted (E86,E89). Sergeants were asked to reinforce the messaging that this was to monitor the exact minutes compliance in the Hot Spots and was not to track the officers (E119,E169).

Officers were also only turning on trackers to complete patrols, early in the RCT this caused issues as officers were confirming patrols had been completed and CCEBP were suggesting they had not (E163,E189,M27). Deeper analysis identified that as trackers were not switched on before the patrol was started, by the time the tracker connected to GPS several minutes of the patrol may have lapsed and the entry into the Hot Spot was not registered (E175). This was fed back and officers were asked where possible to keep the tracker on all day and the way the compliance was tracked by CCEBP was also amended to allow for this possible delay at the start of the patrol (E167,E175).

As well as the feedback relating to being tracked, using standalone trackers raised some practical issues. Several times officers advised patrols were completed however not tracked as trackers were not charged. Reminders had to be sent out when daily tracking identified that some trackers had low or no battery, so were turned off (E1,E102,E167).

Having a limited number of trackers also impacted the ability to resource patrols. If those that went out with the trackers were diverted, not only did alternative resource needed to be identified, they then needed to find a tracker. More often patrols were completed later than required due to the officers completing after they have finished the job they were diverted to (E2,E3).

Using these stand-alone trackers meant tracking of the control sites was also difficult. CCEBP could identify when officers allocated the tracker patrolled in a control areas, however there

was no access to general data to monitor wider patrol. This was countered in the experiment as it was expected business as usual would impact control and experiment Hot Spots equally and it was acknowledged that finding officers to patrol the experiment sites was proving difficult and therefore active patrolling of the control sites was unlikely (Bland et al, 2021).

Using this method of tracking was also time consuming, the CCEBP had to spend approximately an hour a day manually reviewing the tracking software to monitor compliance. The trackers were also bought in different batches so had different log-ons to track different areas (E79).

8.3 PEOPLE

A number of findings that were identified related to people, these included issues with identifying resource and capacity to complete the patrols. How leadership impacted the RCT and finally what evidence there was relating to learning and EBP.

8.3.1 Resource identification and Overtime

One of the crucial discussions throughout the RCT design and implementation was how the patrols would be resourced. The initial proposal was that they would be resourced through overtime using Operation Sparkler (D6,E31,E38). Operation Sparkler was an existing operation that had been set up to support the focus on SYV. Sparkler was led in Bedfordshire by the Boson guns and gangs' team and was predominantly resourced by overtime using surge funding. Early on it was identified this plan was not going to be feasible. Sparkler patrols normally only ran two to three days a week and were predominantly plain clothes (M12,E42). It was also felt there would be some push back as

Sparkler "deploy on knowledge and intel...not data" (E48). This model did not align with the need to have visible uniform patrols completed daily so several other options were discussed.

Using overtime over and above Sparkler was also considered, however it was acknowledged several areas were already offering overtime including Operation Chuba (COVID-19 Patrols) and take up for this overtime was inconsistent. Shifts were not always filled and overtime could not always be relied upon. The lead Superintendent for the project also decided that officers would not be directed to work if voluntary overtime was not taken (M21,M25,M36).

Bedfordshire Police's Resource Management Unit (RMU) mange overtime, sending out requests and updating the relevant systems to show who is covering the shift. They do not track overtime take up. Changes to the finance systems also meant tracking where overtime was spent was difficult (E262).

Overtime in isolation was further discounted due to the spread of the Hot Spots across the county. Due to the randomisation on a given day an area may have one or two Hot Spots, that could be completed in an hour and offering an hour's overtime was not practical. Having an officer cover all the Hot Spots for the county meant they were likely to have spent more time driving between areas than patrolling and this also seemed inefficient.

Having ruled out overtime solely, there were offers of support from across the force and wider Joint Protective Services (JPS), including Central Tasking, Armed Response, Dogs Unit and Local Policing functions. These options were evaluated looking at hours of coverage, uniform, likelihood of abstractions, management and access to trackers (D7). It was decided Community policing would resource the RCT, with the ability to offer overtime (D7,E29). The primary reasons for this decision was that Community have hubs covering all the Hot Spots,

they are uniformed and work the hours required. It was also acknowledged that as a Community function foot patrol and Hot Spots should form part of their problem-solving toolkit. This also aligned with the Chief Constable's vision to have an outstanding Community Function with a focus on force priorities (M14).

The RCT was commenced using Community policing on 12th October 2020 and it soon became clear that despite the pre planning and discussions with the SLT, Community policing did not have capacity to support, despite regular pushing with supervisor's compliance in the first 2 weeks hovered between 35-50% and the RCT was not viable. The RCT was stopped and the team went back to look at other options (M23,E136).

All of the original options were revisited and the option of a dedicated team was looked at. The force executive did not rule out dedicating resources, however to create a dedicated team would require at least 4 people to ensure 7 day a week cover and factor for sickness and leave (M32), given the lack of resource across the force, this was unrealistic to deliver approximately 2 hours foot patrol a day. It was proposed using dedicated teams such as Central Tasking also had too high a risk of abstraction, as other jobs may need to take priority over Operation Rowan if there was risk identified (M35).

For the second attempt at the RCT it was agreed north and south Hot Spots would be delivered by Response policing, as with the current student numbers they should have increased capacity and central patrols would be retained by Community policing, with Community and Response providing cover for each other as required (M25).

Once resource to complete the patrols had been identified there remained a number of issues with the resource capacity that impacted compliance. There were always going to be occasions where resource was abstracted, however this process identified how little capacity there was in Bedfordshire to support. Several times during implementation wording similar to how hard can it be to find someone to walk around an area for 15 minutes? (M26) was heard, nonetheless it turned out to be more difficult than expected.

A number of times the project team were advised that resourcing would be difficult as there were limited or no resources on the late shift (M26,E87), or the resources available were abstracted for pre-planned operations such as Halloween, bonfire night and support to roads policing operations (M26,E78).

These pre-planned gaps substantiated concerns relating to the use of overtime. Supervisors were advised that overtime was available and an overtime code was provided. Other than a very small amount in November, no overtime was claimed using the overtime code (E262) and supervisors confirmed that despite being offered take up was low (M26, E118).

As well as the pre-planned abstractions, it was expected there would be some occasions where resource would need to be diverted to other incidents or those patrolling would be diverted due to self-generated tasks identified while patrolling. Daily updates were not consistent, however over the course of the 90 days, there were 10 occasions where resource was diverted to other incidents, including arrests, concerns for safety, firearms incidents and 5 occasions where officers had to redeploy due to identifying incidents while patrolling. (E2,E3,E130,E224,E227,E228).

While some of these issues were expected, some things had not been considered, such as a police vehicle breaking down and the officers needing to be recovered (E2) and Bedfordshire experiencing extreme flooding leading to 1300 homes needing to be evacuated over Christmas, while the county was in lockdown (BBC, 2020).

Daily monitoring of compliance and the feedback being received highlighted the 90% compliance proposed for the RCT was not feasible. CCEBP acknowledged this and it was discussed whether the planned RCT should be stopped and alternatives to embed Hot Spot policing should be explored. CCEBP looked back at a similar experiment in Perth and determined this experiment also did not have 90% compliance. CCEBP reviewed the method and findings in Perth in more detail and determined that if it could be shown the experimental Hot Spots had been patrolled more than the control, then the RCT would remain feasible and results could be analysed (E,149,E213,E214,E258). It was also identified officers were spending above 20 minutes in the Hot Spots, this was also reviewed by CCEBP and it was agreed that as long as the patrol was over 15 minutes, the patrol would count towards compliance (M23).

8.3.3   Leadership

Prior to go live Sergeant single points of contact (SPOCS) in Community policing and the Community SLT were identified and Microsoft Teams meetings were held to brief them and enable them to ask questions. This was more difficult to complete with the supervisors in Response as there were 28 Sergeants and 10 Inspectors who may have needed to task Operation Rowan out. These supervisors work a variety of shifts and due to resourcing gaps, a number of these supervisors were also acting up or moving role during the course of the

RCT. Sergeants and Inspectors in Response were emailed specific briefings up to two weeks before, to enable queries to be raised.

For the majority of the RCT Sergeants were responsible for identifying resource and tasking the patrols. They were emailed the patrol areas required and they then tasked resources using a combination of face to face briefing and emails. It was raised not having Sergeants available due to sickness or alternative shift patterns impacted compliance (E92,E215, M26,M27), as Sergeants could not ensure patrols were completed (E182,M26).

Sergeants and Inspectors raised issues with resource (M27,E78,E87, E130,E224,E227,E228) and capacity and this appeared to match with relatively low compliance rates (D8). This was raised to the ACC as the ultimate responsible officer. The ACC was monitoring through the Serious Violence Board and was also emailing the project team directly to check on progress (E124,E180,M6). When low compliance was highlighted, the ACC ensured this was being pushed at Superintendent level. The ACC emailed and spoke to those responsible for chairing the force morning meetings and Force Tasking Group (FTTCG) to ask that this was raised and monitored daily at these meetings (E135,E151).

Compliance remained inconsistent (D8) and On 30th November the ACC advised the Chief Inspectors for Response and Community policing that they needed to provide an email daily confirming completion or the reasons why not and confirmed that the Chief Inspectors were now directly responsible for compliance (E199).

This was followed up by both Chief inspectors with the Response Chief Inspector advising that now he was being held to account, his team would be held to account also and instructing teams this was "now an order and not a request" (E200).

8.3.4 Learning – EBP

Over the course of the implementation there was mixed evidence of existing knowledge of EBP across the force. Bedfordshire Police had started work to introduce the concept of EBP. A number of officers and staff including the immediate project team are alumni of the Cambridge Masters and the analysts supporting with data collation had also received bespoke analytical EBP training (M1). Over the past 5 years CCEBP have delivered a number of two-day EBP courses to officers and staff in a number of areas and one Inspector updated that he remembered the "steamboat sailing" (E182) which was a theme in this training.

Despite these pockets, feedback received suggested EBP knowledge was limited. There was pushback to being tracked (E86), confirmation current patrols do not deploy on intel (E48) and the project lead was advised EBP approaches were not being utilised. There was no central process for identifying Hot Spots and providing a co-ordinated problem-solving approach (E52). Feedback was received officers do not understand why they were completing the patrols. Officers did not understand how foot patrol could impact crime for 4 days and advised that the briefings were unclear (E219,M26,M27). One PC emailed their Superintendent challenging the experiment, mentioning lockdown and the time of year and advising that "every officer allocated to this operation is one less officer able to keep Bedfordshire safe" (E172)

8.4 PROCESSES

As well as the information collated relating to people there were a number of potential learning points linked to specific processes identified.

8.4.1 Briefing

Briefings were impacted by COVID-19, however are also an ongoing issue within Bedfordshire, the wide pool of resources used and the inability to brief or train directly provided challenges. Utilising Community policing and Response meant Operation Rowan could be tasked or completed by any of 17 Inspectors, 36 Sergeants, 344 Constables and 40 PCSO's, located across 8 different buildings (D9). To meet differing demands these teams were also on different shift patterns. At the time of the RCT Community PC's had different start times to the PCSO's and Response work a 4 x 4 shift with splits so on any one day 50% of the resource are on a rest day and there are 4 different start times (D10). Even if CCEBP or the project team had been able to be on site to brief, finding a suitable time was logistically difficult.

Due to this the majority of briefings were completed by email. A PowerPoint briefing was completed detailing what Operation Rowan was, this briefing and the maps were sent out in email briefings to supervisors and staff (D5). This process evolved following feedback received. Figure 9 details the changes, including briefing Sergeants rather than officers directly and changing briefings from daily to weekly to enable Sergeants to plan and brief in advance.

While who the briefing went to and the timescales changed the content of the briefing remained fairly consistent. Despite these briefing being circulated regularly, these were not always followed. Officers were patrolling control Hot Spots (D8), patrols were completed at the wrong times (E185) trackers were not charged and turned on when required (E185,M26) and there was feedback relating to ASB, despite the trial relating to Serious Violence(E3,E4, E172).

Figure 9 - Timeline of Briefing changes

27th Sept 2020 Briefing sent to all Neighbourhood Supervisors advising requirements for Op Rowan
30th Sept 2020 Concerns raised re capacity – Go live date put back to give more notice to plan resource and allowing testing of trackers
2nd October 2020 Briefing with first two weeks of Hotspots circulated to Supervisors
12th October 2020 Go Live Date – Neighbourhood Officers emailed briefing Powerpoint, maps and Hotspots required – Emails sent daily
21th October 2020 Briefing process changed so Sgts only emailed with requirements for their Hubs a week in advance
30th October 2020 Compliance at 35% - RCT Stopped
5th November 2020 Briefing to supervisors advising that Rowan would be restarted
9th November 2020 Go Live Date – Op Rowan 2 Supervisors provided the next weeks Hotspots for their areas by the Sunday.
15th November 2020 Briefing changed to one email countywide to Supervisors provided the next weeks Hotspots for their areas by the Sunday
13th December 2020 Briefing template updated for the final time with reminder of 3 key points to remember

8.4.2   Proactive policing

Another process highlighted through this work was pro-active policing. It was identified

through the feedback that proactive policing has become a specialism. Due to some of the

briefing issues and to keep the process simple. The only instructions for the patrols were to

"Start foot patrol, remain visible and engage with the public for 15 - 20 Minutes" (D5)

there was no further guidance. Feedback received suggested some officers were

uncomfortable with these instructions and didn't know what it meant to be proactive

(E219,M26,M40).

8.4.3 Partnership working

Trial design, identification of the Hot Spots, monitoring of the trackers and analysis of the Hot Spots was all completed by CCEBP. One of the main issues associated with working with CCEBP related to information sharing. Again COVID-19 bought to the forefront, issues that were already present. To enable the CCEBP to determine the Hot Spots there was a lot of work required to be able to share the relevant data. There was debate over what was deemed as personal data, with a particular focus on addresses. Analysts appeared nervous to provide specific location information, in case it could be attributed to a person (E17,E22,E242). Not providing this information would have made it difficult to accurately identify the Hot Spots. This sharing had to be signed off by the SRO and pre-COVID-19, CCEBP attended site to access data on force systems (E22).

Attending site became impossible due to COVID-19 restrictions and part way through the project a data protection impact assessment (DPIA) had to be created and signed off. Delays with getting advice from Bedfordshire Information management and getting this signed off (E256) led to delays getting data to CCEBP. These issues with providing data and capacity of the force analysts meant no interim results were available through the trial. All crime and incident data was supplied after the full 90 days had been completed. On occasions the data also had to be sent in multiple documents as the data was too large to email across the force network (E62).

As the compliance tracking was completed by CCEBP there were also slight delays in compliance information being available. While not a barrier to completing the trial, when a senior leader was heading into a meeting, the project team were not always able to provide the compliance for the previous day (E153,E189,E238).

9 DISCUSSION

The findings in this case study identified a number of areas for discussion. This section summarises these findings and looks at possible explanations for some of the challenges and events that occurred. This chapter then discusses policy implications the findings support and details any further research required. Limitations of this research are also discussed.

9.1 COVID-19

COVID-19 impacted almost every part of policing. In relation to this study it had a particular impact on crime and demand, ICT support and the ability to brief and train. Hopefully implementation of future work will not have to be repeated under the conditions bought about by a national pandemic. The long-term impact on crime and demand is unknown and the impacts of COVID-19 on ICT and other resource will potentially no longer be an issue. Some of the changes in particularly in relation to briefing may be here to stay though. A recent study looking at the impacts of COVID-19 organisational change and police activity across the globe (Maskaly et al, 2021), identified that for a number of themes in this case study such as briefing, training, use of directed patrols and community-policing activities, over 75% of respondents had seen radical changes due to the pandemic. It suggested some of these changes have had positive benefits for policing, specifically the reduction of in-house training and the normalisation of on-line learning. Within Bedfordshire Police the programme managing COVID-19 recovery has been named Our Evolution as the force do not want to return to practices pre-COVID-19. A number of staff have been placed on working from home contracts and the vast majority of meetings will remain online (D1). Any

future work may need to be mindful of these changes and how this move to remote working fits with the literature that sharing learning electronically or on paper alone impacts implementation (Fixsen et al, 2005).

9.2 TECHNOLOGY

Two key issues were raised in the findings relating to technology. Support to implement a long-term ICT solution and issues that came about through using stand-alone trackers. The stand-alone GPS trackers enabled the RCT to be completed and while not proposed to be used long term, some of the learning identified from using them will support the wider goal of identifying a long-term solution.

Literature relating to successfully implementing technology suggests that simplicity to use and compatibility with other systems contribute to successful infusion with day to day policing (Weisburd & Braga, 2019) This was played out in the use of the GPS trackers. The officers already need to charge and manage work laptops, work phones and radios, consequently the GPS trackers added another complexity. If the long-term solution works with existing systems, the issues relating to making sure officers have trackers, making sure they charge them and then turn them on is likely to be less of an issue. Forces are also already using APLS and AVLS to track officer locations, utilising these existing systems may reduce the reticence to being tracked.

ICT capacity to support this project is likely to remain an issue, as detailed the DIT have approximately 40 projects outstanding (M42) and the number of national and regional projects such as the Office 365 roll out and the airwaves replacement project are not due to

end soon. Throughout this case study it became clear this is not a problem specific to this project.

Williams & Coupe's (2017) study in West Midlands into the effectiveness of Hot Spot Policing in 2015 proposed that an ICT solution to track officers was required, yet this still remains an issue. The other 18 forces that received SYV surge funding also highlighted that the majority of them have had similar issues unblocking access to the APLS data (D13), with a number looking at the standalone trackers utilised in Bedfordshire. 18 forces are independently looking at resolving this problem with a number of the forces ICT departments likely to have similar issues to Bedfordshire. A number of forces are also looking at paying private developers to create a solution for them. In Bedfordshire GoodSam is likely to be the preferred option to deliver GPS tracking and tasking. GoodSam is developed by a not for profit company so the costs of development and licences are lower than they would be from a commercial developer. To enable basic GPS tracking Bedfordshire have been quoted £20,000 and this has been added to the bid for the 21/22 Surge funding. To develop this further to enable all of the Hot Spot alarm functionality is estimated at £160k (D14). This amount is not feasible within the predicted surge funding; therefore, wider solutions are still being scoped. These issues mirror those that have been found in other technology implementation failures such as the emergency services network replacement, where effort and cost may not reflect the benefits that are perceived by officers and it is not clear how these solutions will work with existing technology or who will be responsible for this work in the longer term.

9.3 PEOPLE

There were a number of findings identified under the category of people. For the purposes of discussion these will be broken down into resource identification and capacity, leadership and learning.

9.3.1 Resource identification and Capacity

The issues identified with resourcing probably did not come as a surprise to those involved, and are potentially further evidence for the case that Bedfordshire has been making for a number of years, that the funding formula is not correct (Hansard, 2017). This research is not going to resolve the long-debated issue of police funding and it is expected the financial impact to the UK linked to COVID-19 may put increased pressure on policing budgets over the coming years (Maskaly et al, 2021). Research findings from this study have however identified learning that may support improving implementation given the current resource available.

The first learning related to the timings for the patrols. The briefing asked for Hot Spot patrols to be completed on a late shift (1400-2200), as that is when SYV occurs. Figure 10 shows the incident demand for the 90 days of the RCT, it demonstrates that the timings requested for the Hot Spot patrols coincide with when the incident demand is at its highest and therefore capacity to support patrols is potentially at its lowest.

Figure 10 - Bedfordshire average Incident demand 09/11/2020 - 06/02/2021

Day	0000	0100	0200	0300	0400	0500	0600	0700	0800	0:00	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Mon	12.6	11.5	7.2	5.9	4.2	4.4	5.7	8.9	14.5	22.3	23.6	25.4	28.2	26.8	28.2	31.9	31.3	28.5	29.4	23.7	22.7	22.9	18.9	15.0
Tues	9.9	8.5	6.8	4.8	5.1	3.8	3.6	9.5	14.8	22.0	22.4	21.8	23.8	26.2	30.1	30.8	31.4	29.3	26.5	27.8	24.3	20.8	19.8	14.8
Wed	11.5	8.5	6.8	4.7	4.5	3.9	4.7	8.4	12.1	18.8	24.4	25.5	25.5	27.9	27.8	32.5	30.8	23.2	29.5	22.3	20.9	21.4	19.1	17.4
Thurs	10.4	8.9	7.4	4.9	5.3	3.9	5.3	8.6	14.2	21.2	23.6	25.7	25.3	26.8	31.3	31.0	30.0	29.1	28.0	24.9	24.6	22.9	22.3	19.0
Fri	15.5	13.2	8.9	6.9	4.5	5.9	7.2	9.3	14.9	20.7	23.0	26.0	27.7	27.5	28.0	30.4	32.5	26.5	27.4	26.2	24.8	23.1	20.5	20.3
Sat	14.9	11.8	9.8	8.2	5.2	4.8	5.2	7.1	12.2	17.8	21.6	24.2	25.8	28.5	29.5	25.2	26.5	26.1	25.2	28.9	24.8	23.0	22.2	22.3
Sun	18.7	16.2	11.4	7.8	5.8	4.8	5.4	6.8	9.3	13.8	18.8	22.3	26.3	27.6	34.7	31.0	31.7	23.4	26.3	23.4	20.3	19.6	19.2	14.7
Tot	13.3	11.2	8.3	6.2	4.9	4.5	5.3	8.4	13.2	19.6	22.5	24.4	26.1	27.3	29.9	30.4	30.6	26.6	27.5	25.3	23.3	22.0	20.3	17.7

The force's shift patterns have also been modelled to meet this reactive demand. Figure 11 shows predicted officers available for incidents, this suggests that there is increased capacity for proactive work overnight rather than late afternoon when it was requested that the Hot Spot patrols were completed.

Figure 11 - Average Officers per incident 2020/2021

Hr	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Officers Available Per Incident							
00	1.62	1.41	1.28	1.29	1.23	1.42	1.28
01	1.61	1.81	1.66	1.81	1.61	1.70	1.58
02	1.66	1.19	2.32	2.33	2.07	1.50	1.36
03	2.20	1.62	1.55	1.53	2.64	1.93	1.90
04	2.00	2.09	2.02	2.00	1.78	2.67	2.77
05	2.55	2.61	2.39	2.52	2.42	2.08	2.05
06	2.57	2.88	2.31	2.57	2.43	2.31	2.44
07	1.97	2.06	1.96	1.92	1.85	2.00	2.22
08	1.42	1.31	1.35	1.34	1.20	1.65	1.72
09	1.02	0.88	0.95	0.96	1.81	1.12	1.23
10	0.77	0.72	0.71	0.73	1.43	0.82	0.86
11	1.28	1.33	1.17	1.22	1.18	0.66	0.95
12	1.11	1.15	1.06	1.04	1.05	0.60	0.80
13	1.06	1.03	0.99	0.99	1.03	0.56	0.73
14	1.01	1.00	0.95	0.98	0.97	0.49	1.08
15	0.90	0.92	0.89	0.90	1.28	0.90	0.98
16	1.30	0.85	1.07	0.83	1.20	0.84	1.18
17	1.29	0.83	1.34	1.25	1.18	1.19	1.26
18	1.07	0.82	0.85	0.84	0.77	0.78	1.07
19	0.89	0.83	1.04	1.26	1.19	1.17	1.26
20	1.38	0.89	1.36	1.31	1.22	1.19	1.34
21	1.40	1.47	1.45	1.39	1.24	1.21	1.40
22	0.98	1.02	1.00	0.96	1.26	1.16	1.16
23	1.13	1.09	1.02	1.01	1.31	1.15	1.31
Min			0.49		**Max**		2.88

Similar issues related to when officers were available were identified with the Community shift pattern. Sergeants suggested that not working the same shifts can cause issues with monitoring and supporting implementation (M26,M27). Moving forward any shift reviews should factor in capacity for proactive work and align supervisors to all sections where possible.

The findings related to capacity also identified that when designing programmes, overtime cannot be relied upon as a solution to resource it. Although, the exact reasons for this are unknown it has been suggested; this could be down to changes in regulations making

overtime less appealing (M40), it could also have been due to issues with childcare and officers and staff not needing the overtime, as they are not paying for holidays and other leisure activities during COVID-19, there is also the suggestion that officers are generally tired (M46) and do not want to give up their rest days.

The 20/21 Priority Based Budgeting (PPB) process forecast the force will have spent just over 3 million in overtime by the end of March 21, with over a million of that spent in Response and Community and another million in the crime functions. The PBB Process identified a lot of this is to cover vacancies and business as usual is complete (D9). If officers are having to work significant overtime to get their day jobs completed, can they be expected to come in and complete Hot Spot Patrols? Feedback also suggests those taking up overtime may be swayed by the type of overtime (M40). Are officers more likely to come in and complete Operation Sparkler, in plain clothes focussing on intelligence gathering rather than come in and do foot patrol in uniform? It would be useful for Bedfordshire to gain a better understanding of overtime to support resource identification in the future.

In future implementations more, detailed analysis is required to identify resource. Although this appeared to have been completed compliance was still relatively low. Ensuring the resource worked the hours needed was not enough. Understanding potential abstractions and the details of their shifts is also required, alongside understanding how resources are tasked and what supervision they may have. If trackers or other technology is required, checking there is ample access to this to cover abstractions is also needed. Similar projects are unlikely to able to counter for all eventualities, however some of the issues faced in this research possibly could have been predicted and countered.

When looking at demand and capacity, what went well should also be discussed. All of the emails and meeting notes are evidence of the amount of time put into the process by the project team, the CCEBP and key stakeholders. Without this commitment and the additional analysts that were recruited to support the wider SYV work this RCT and implementation would not have been possible. The constant review and assessment of the project was good evidence of the importance of a feedback loop (Slothower et al, 2015). The RCT design was built by CCEBP, senior stakeholders were bought in, time was spent identifying resource, pre-mortems were held, briefings and policies were developed and still the first RCT failed and the design of phase 2 had to be amended to enable it be completed. The author and the project team regularly reviewing and gaining feedback throughout so that policies and processes could be amended enabled issues to be resolved and the RCT to be completed. Should this work be repeated, in addition to identifying resource for the patrols, forces will need to ensure they build in analytical and project support to support the principles of Targeting, Testing and Tracking (Sherman, 2013) and the implementation frameworks identified in the literature (Fixsen, 2005 & Meyers et al, 2012).

9.3.2   Leadership

The findings in this research indicate leadership and supervisor buy in may also have been important to increasing and maintaining compliance for the RCT. It cannot be conclusively identified this was the primary reason for success, however the below evidence appears to show a link.

Figure 12 Shows how many of the seven Hot Spots were patrolled for the first 21 days. The days in orange are where the project team were specifically advised this had been pushed

by Superintendents at the morning meetings. This may have had some impact; however,

levels remained fairly consistent.

Figure 12 - Hot Spot Compliance first 21 days
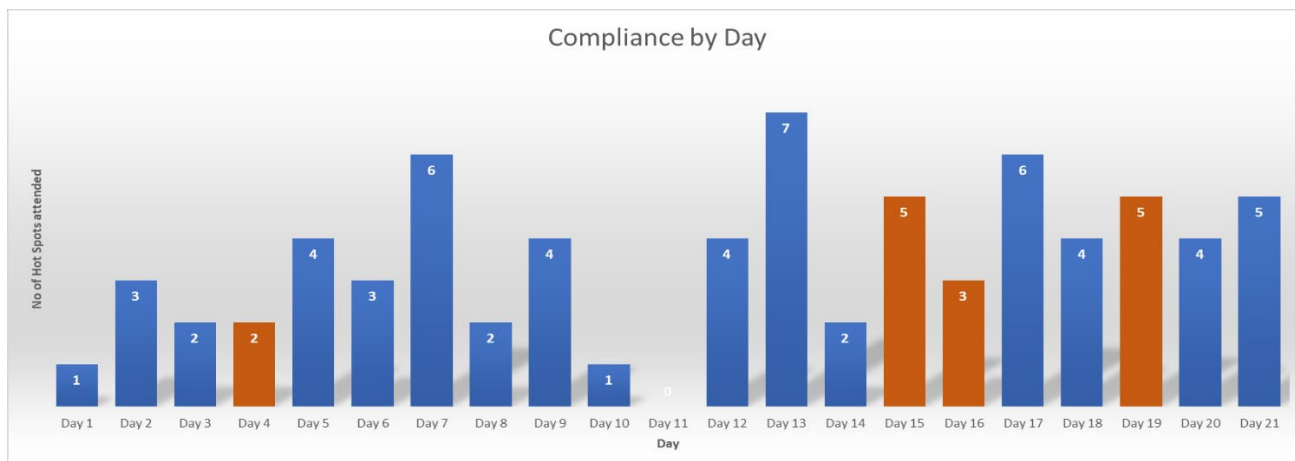
On Day 22, the 30th November, the ACC made the Chief Inspectors directly responsible for

compliance and the Response Chief Inspector asked for direct feedback from staff. Figure

13 and Figure 14 show compliance following this change, this appears to be consistently

higher following the request on the 30th and then becomes inconsistent again. Day 47

shown with the arrow was Christmas day and the period of flooding, the Chief Inspector also

had leave between day 50 and day 68. This change in focus and reduction in monitoring may

have led to compliance becoming more sporadic again.

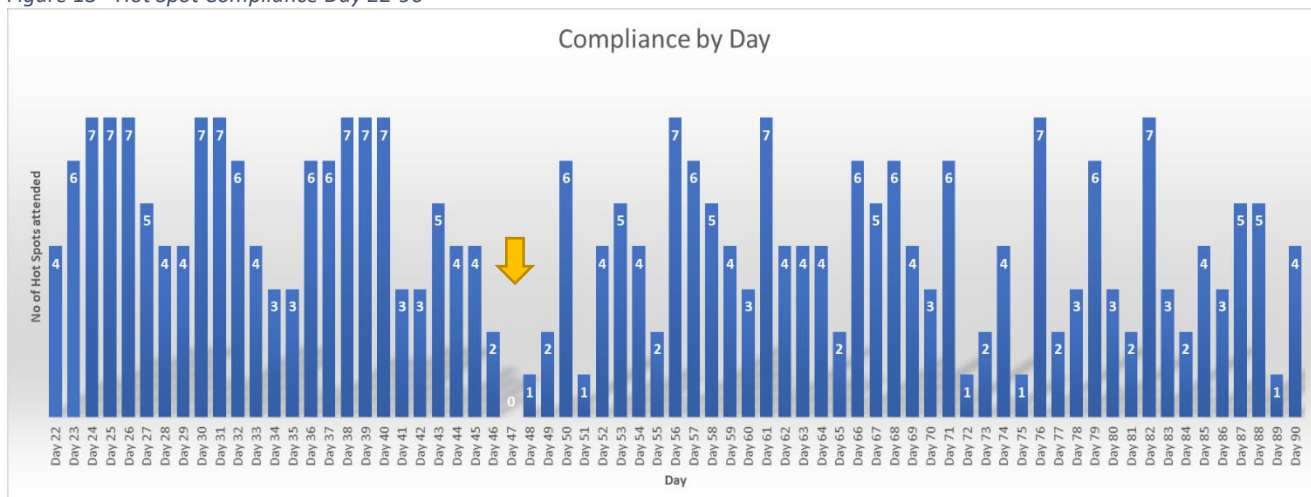*Figure 13 - Hot Spot Compliance Day 22-90*

Figure 14 - Average Hot Spot patrols by day of the week

	Average attendance pre 30/11	Average attendance post 30/11	Average attendance for the full 90 days
Monday	2.7	4.8	4.3
Tuesday	3.3	4.1	3.9
Wednesday	3	4.9	4.5
Thursday	2	4.6	4
Friday	4.3	4.4	4.4
Saturday	4.7	3.6	3.8
Sunday	4.3	3.3	3.6
Total	3.5	4.3	4.1

The breakdown by day suggests compliance was lower at the weekends. Figure 10 (section 9.3.1) showed that during the 90 days, demand was not particularly higher at the weekends, there was also no night time economy as pubs were closed, so there should have been additional capacity at these times. This may indicate that compliance was lower at the weekends as the Chief Inspectors were not on duty. Sergeants also identified they did not always work full weekends with the teams(M26,M27).

The Chief Inspector who was most active in tracking was based in the south of the county, which may have led to higher compliance in Luton as shown in Figure 15. This inconsistency in compliance in the different areas could have been for a number of reasons and the author was unable to identify clear evidence for why this might be. This is an area prime for further research, was this difference; fluke based on the randomisation? related to the supervisory support for each of the areas? linked to resource levels in the different areas? is this based on officer knowledge and experience? did south officers prioritise Luton 005A over Luton 021A as their professional judgement led them to believe this is where they would add the most value?

Figure 15 - Compliance for each of the 21 Hot Spots

Hot Spot	Attendence
Luton 005A	96%
Luton 009C	86.70%
Luton 009F	83.80%
Luton 018F	79.20%
Luton 009E	78.90%
Luton 018E	75.00%
Luton 003C	73.20%
Bedford 015C	72.00%
Bedford 010A	70.40%
Luton 003D	68.40%
Luton 021A	66.70%
Bedford 009A	65.80%
Bedford 018C	64.70%
C Beds 029C	64.30%
Bedford 012F	63.90%
Bedford 012D	61.30%
Bedford 012A	60.00%
Bedford 015B	57.10%
C Beds 028F	50.00%
Bedford 021A	48.30%
Bedford 014E	46.40%

9.3.3   Learning EBP

While not one of the biggest practical blockers to this implementation the lack of

understanding and buy in by the officers completing the patrols and the resultant lack of

ownership was bought up several times as an issue or a way this could be improved further

next time (E219,M26,M27, M50).

Officers completed patrols because they were told to (M50) and this appears to have

worked in the short term to get the RCT completed, however this approach goes against the

disciplines of a learning organisation. If officers do not understand their part in the process,

they will not be committed to their own learning, they will not understand the shared vision

and are not working as a team to find solutions. It also actively demonstrates some potential

learning disabilities as the team are only focussing on long term events and sudden changes and not understanding the longer-term picture or learning from experience (Senge, 2006).

This feedback and the literature around implementation suggest that by embedding EBP as part of being a learning organisation this should make future implementation easier.

EBP needs to become something everyone thinks off as part of their day job, it is not good enough to have individuals at the top working out the vision or strategy and expecting others to follow. There needs to be learning at all levels of the organisation (Senge, 2006).

This played out in some of the feedback with officers not seeing Hot Spot patrolling as part of their day job (M50). Suggestions were made throughout that this should sit with other teams, Response suggested it sat with Community (M50) and Community suggested that Response tasking cars could complete patrols (M27).

9.4 PROCESSES

9.4.1 Briefing

Briefing and how we share information with officers was another factor. Several issues were raised with the briefing and feedback, suggested a number of officers were not clear what the trial was, or why it was being completed. A review of the force briefing and tasking system showed a daily Response briefing with 16 slides, there was a further Community briefing with 28 slides and 12 further briefings for other operations, that ranged from 1 page to 47 pages (D12). Operation Rowan briefings were emailed on top of these briefings and it unknown how much other information was being sent directly to the officers involved. While some of these briefings are for reference and officers are not expected to remember all of it, it does suggest why there may be issues with briefing in Bedfordshire. If COVID-19

restrictions had not applied, the project team would have looked to have given more face to face briefings. Even if unable to attend all the shift briefings the team would have attended the relevant offices and been able to engage with the teams between incidents.

9.4.2 Proactive policing

It was suggested by a number of supervisors that due to the increasing demands on officers since austerity, particularly in functions such as Response, officers have become "slaves to the radio"(M26) and have become "Robots, they just do as they are told" (M50). During Operation Rowan, officers were only asked to complete foot patrol in uniform, therefore the impacts of this lack of proactive knowledge were possibly limited. This reactive response without an understanding of why tasks are completed or the potential impacts, are however further evidence of blockers to Bedfordshire becoming a learning organisation (Senge, 2006).

This lack of proactive skill has already been acknowledged by the force. Supervisors are actively working on how officers are tasked and trialling secondments for front line officers in specialist teams like Central Tasking to upskill officers in these areas.

Although this lack of proactivity was raised as a concern (M26, M27,M40,M50) and is possibly a barrier to learning, there is potentially a debate to be had as to whether this is a blocker to the Hot Spot Targeting Alarm specifically. Looking at what action officers are taking that impact SYV would be interesting further research, nevertheless the basis behind the alarm is to develop a tool that enables officers to be tasked to attend Hot Spots. If the system identifies the areas that need attending and officers are tasked instructions, is this proactive policing or could this be seen as an additional reactive task to be completed.

9.4.3   Partnership working

Trial design, identification of the Hot Spots, monitoring of the trackers and analysis of the Hot spots was all completed by CCEBP and the trial is unlikely to have been manageable without this support. The project team had no experience implementing an RCT and the force had limited history of this type of implementation so were "novices" (Neyroud, 2017). The regular communication between the project team and the CCEBP enabled the RCT to be monitored and amended. If the trial design had been set and Bedfordshire had been working to this alone, the RCT may have never been completed when it was identified 90% compliance was not achievable. The team formed a good coalition (Strang, 2012) with a mix of academic knowledge from CCEBP and practical knowledge from the project team, enabling most issues to be overcome.

Without the restrictions of COVID-19, CCEBP would have supported the project team with training and briefings and this may have reduced some of the issues with officers understanding what is required. Better information sharing and analysis of the crime data throughout this project may also have supported with ownership from officers involved. While officers were emailed regularly thanking them and advising the compliance levels, there was no feedback on the impact this was having on crime. This particular feedback may have supported increased buy in and would support with the ongoing messaging around the use of EBP.

Feedback loops are a theme in the literature, this worked well with the project team and CCEBP, yet feedback to the officers was not effective, as has been shown by the lack of understanding of what was needed and why .

9.5 POLICY IMPLICATIONS

Some of the findings identified cannot be easily resolved and events such as a pandemic or flooding are difficult to fully plan for. However, this study has identified policy implications relating to technology, people and processes that would better support implementation in the future.

9.5.1 Technology

Capacity in ICT is not easily fixed, better use of national or regional ICT infrastructures or centralised support from the Home office may however ease them. Issues with GPS have been identified across the 18 Surge forces and currently forces are independently scoping and potentially funding solutions. The project team are attempting to counter this by opening up conversations with other forces to share learning where similar systems are utilised. There is no formal infrastructure for this joint working and several forces have advised they will still be purchasing trackers, as they need to be able to demonstrate compliance to the Home Office to claim the surge funding. Confirmation of the funding is due in May 2021 and the funds will have to have been spent by March 22, this does not leave enough time to identify and develop a suitable long-term ICT solution. Those commissioning projects need to consider the cost, time and resource required to develop ICT solutions and make sure this is factored in. Where possible technological solutions should be developed across forces with similar infrastructure to reduce the requirements on local ICT and reduce the costs spent on development nationally.

9.5.2 People

Given the potential financial impacts of COVID-19 (Maskaly et al, 2021) and the short-term nature of the surge funding, it is unknown if resourcing capacity is going to change in the immediate future. There are some processes around overtime and shifts that locally may help future implementation, however the primary policy implication relating to people should be the continuation of embedding EBP and police science into Bedfordshire Police.

This is not a simple task, as difficulties with briefing have been highlighted and formal training for all of the front line would be difficult when balanced against capacity and other priorities. Thought will also need to be given to the move towards online learning as feedback suggested many officers do not watch videos or where mandated watch but do not engage with them (M50). Bedfordshire Police rolled out a number of EBP training courses to the front line and feedback was mixed, the work relating to the EBP maturity suggested a number completed the training and this did not help Embed EBP and feedback advised officers did not think that it was applicable to them (D15). Feedback received also suggested Response did not see this as part of their role and therefore were less engaged (M50).

There is not likely to be one silver bullet that can be applied and will embed EBP, it is more likely to require a series of smaller actions. Lum and Koper (2017) suggest EBP needs to become institutionalised so that operations informed by research become business as usual. They suggest evidence of research knowledge should be bought into areas such as training, rewards, promotions, and supervision.

Nudge Theory could be applied to support this (Thaler & Sunstein, 2009). Nudge theory looks at how a series of small changes to situations can affect people's behaviour. These

nudges could be incorporated into the areas suggested by Lum and Koper (2017) alongside a communications plan, so results are shared and the knowledge acquired is accessible. These nudges should also be aligned to the disciplines of being a learning organisation (Senge, 2006). The force needs to understand more about why the officers think what they do, support officers and staff to see the bigger picture and understand how their actions impact this. Teams need to be more involved in the planning of EBP so they have a shared vision and learn as a team.

Now may be the best time to focus on this, due to the national uplift programme and forces having to reverse the impacts of recruitment freezes, student officers make up a large proportion of the front line. In Bedfordshire Police 69% of local policing have less than five years' service and 37% are in their first two years (D11). While this may cause issues around experience, this also means they are less likely to have become cynical. PEQF, the new police degree apprenticeship programme has started to be rolled out, with Bedfordshire starting its first cohort in October 2021. PEQF will have a module relating to EBP and every student will have to complete an associated project. If Bedfordshire can ensure this research is properly supported, this is a real opportunity to embed learning and EBP from the ground up.

Bedfordshire cannot rely on this student training alone; these nudges need to also be heavily focussed at middle management. As per the proposal in Thames Valley and Northumbria, middle managers need to be given the skills to support change (Irving & Dixon, 2002). This should include Sergeants, Inspectors, Chief Inspectors and possibly tutor constables, as these roles will be supporting students. Supervisors will need to facilitate projects and could block progress and implementation if not engaged (Skogan, 2008).

9.5.3   Processes

A number of processes are specific to this implementation and learning can be applied locally or work is already being undertaken to resolve them. Developing a framework for implementation and concentrating on key processes within will support future implementation. The majority of projects will need resource, ICT and ideally involve partnership working. A framework for recruitment, procurement and information sharing would have removed a number of barriers faced in this implementation. This would also increase capacity to work with upskilling officers rather than unblocking back office issues and support better sharing of information with them.

9.6   RESEARCH IMPLICATIONS

This research has identified areas locally where greater understanding of processes such as overtime would be beneficial. The research into implementation of Hot Spots and the Hot Spot Targeting Alarm tool is not complete. The work relating to Hot Spots completed in Bedfordshire and Essex is being repeated and forms the basis for the 21/22 surge funding. This programme has been renamed Grip funding as the Home Office want the work already completed to be gripped and embedded. The Home Office have made £30 million funding available nationally that should be spent on implementing the policing of Hot Spots. (HM Government, 2021). The Home Office have requested where possible this focus on Hot Spots should include an RCT.

This continuation of the funding will enable Bedfordshire to continue the research started in Operation Rowan. It is suggested that theories should be tested in different areas to improve external validity (Sherman, 2013), however it is also important to replicate tests in

the same place to look at the impacts of things like culture, politics or time (Farrington et al, 2018).

Repeating Operation Rowan would enable Bedfordshire to determine if the results from the RCT can be repeated, considering some of the feedback received for the first phase. It is envisaged the next RCT will be run over the summer months, rather than the winter and all being well, the majority of COVID-19 restrictions will have been eased.

As well as testing against these time factors. It is proposed a researcher is aligned to the second RCT. This researcher will have capacity to complete patrols with officers and try and gain a better understanding of some of the issues and questions raised during this case study such as; why some areas were attended more than others? what officers understanding of EBP is? how officers should be briefed and trained? and what are the blockers to proactive policing?

The RCT could also be extended to look at what officers should be doing while they patrol or if the type of officers has an impact. This case study monitored 15 minutes of uniform foot patrol, further research could look at the impact of different actions such as stop searches or look at if there are differences in PC's PCSO's or armed officers completing patrols.

9.7 LIMITATIONS

Where possible notes and documents for all events during this case study have been recorded by the author. COVID-19 meant the author has completed this research almost entirely remotely. This has impacted the ability to observe and limited some of the understanding of why things were happening. All meetings were scheduled and completed utilising Microsoft Teams. Feedback from Community south was never completed as three

Teams meetings were set up and then had to be cancelled as the Sergeant was unable to attend due to daily business (E28). Pre-COVID-19 the author would have attended the offices of the relevant teams and possibly worked directly with staff to enable more opportunity to have open and honest dialogue and improve overall engagement with supervisors and staff.

10 CONCLUSION

When looking at "What were the key features of the Hot Spot Targeting Alarm System as designed that were implemented with greater and lesser success, and with greater or lesser speed in the Bedfordshire Police, in the period 2019-2021?" The picture may not initially look positive.

Local analysts have received EBP training and worked with CCEBP so should be able to identify serious violence Hot Spots. The majority of analysis was completed by CCEBP, so it would need to be tested, if they can support an RCT in its entirety. Although the project was unable to Identify and utilise technology in force that could be used to track when officers were in the identified Hot Spots, a short-term solution was identified and work is progressing on the long-term solution. The RCT also ascertained visible patrol had an impact in Hot Spots, however if other action should be completed while in the Hot Spots is still required.

The RCT element of the implementation was completed. The original trial design suggested that above 90% compliance would be required, yet this was unachievable. 57.3% of patrols were completed for the required 15 minutes or more, this rose to 68% when factoring in where officers attended and did not complete the full 15 minutes. In total Operation Rowan delivered 151 hours of proactive patrol across the 90 days.

Although this may not look like success, it must not be underestimated the challenges of delivering an RCT in the middle of a global pandemic, the fact that Bedfordshire managed to deliver an RCT at all is a significant achievement. The RCT completed was a successful experiment. The treatments were randomly assigned, foot patrol was delivered and these patrols were able to be measured using the trackers, leading to good internal validity

(Sherman, 2010). The fact this experiment factored in all the practical issues faced and was not too tightly controlled will also have increased external validity. This real-world application makes it much closer to the conditions that may be faced in reality elsewhere (Neyroud, 2017).

The RCT produced results suggesting Hot Spot Patrols work in Bedfordshire. Crime and harm were reduced in the experiment Hot Spots (Bland, et al 2021). These results are due to be published and this success now needs to be shared with the officers that completed the patrols and the wider force, another nudge towards embedding EBP.

Potentially more important than the success of implementing the Hot Spot Targeting Alarm, this case study has identified a series of key learnings relating to implementation in Bedfordshire. This research has increased the use of EBP in force and has started to introduce the idea to numerous officers and staff at all ranks across the front line. The author has already presented these findings to the Home Office and leads for other forces receiving surge funding, to support this research being replicated in other force areas in 2021/2022.

Bedfordshire Police will never fully achieve its ambition to be a learning organisation "The more you learn the more acutely aware you are of your ignorance" (Senge, 2006 pp10). There will always be more ways to learn and more ways to develop. This learning ethos needs to remain a long-term goal and remain consistent as the force executive changes (Skogan, 2008). True success will not only be implementing the Hot Spot Alarm Targeting tool, it will be building on this research, supporting the embedding of police science in Bedfordshire and utilising the learning from this study to develop Operation Rowan phase 2 and many future projects to come.

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D	5	Operation Rowan Briefings
D	6	Project CONSORT
D	7	Resourcing Options Paper
D	8	Compliance Record Phase 2
D	9	PBB Resource Data
D	10	Shift pattern data
D	11	Student Officer Stats
D	12	Briefing examples
D	13	Surge force Updates
D	14	ICT Solution updates
D	15	Author observations
E	1	Compliance Community
E	2	Compliance North
E	3	Compliance South

E	4	Compliance Central
E	15	Email from CCEBP
E	17	Email from Analyst
E	19	Email from CCEBP
E	22	Email from Analyst
E	24	Email re Dogs Unit
E	27	Email from CCEBP
E	28	Record of non-attendance
E	29	Email from DC
E	31	Email to CCEBP
E	34	Email with Project Team
E	38	Email from DC
E	42	Op Sparkler plan
E	48	Email from Analyst
E	52	Email from Guns and Gangs lead
E	78	Email from Community Chief Inspector
E	79	Email from CCEBP
E	82	Email from CCEBP
E	86	Feedback from Community Sgt
E	87	Briefing to Community Supervisors
E	89	Feedback from Community Sgt
E	92	Sergeant update
E	102	Briefing to Supervisors
E	104	Email from CCEBP
E	118	Email from Community Sgt
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E	136	Email to Community Supervisors
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E	149	Email from CCEBP
E	151	Email from ACC
E	153	Email to Community Supervisors
E	163	Compliance Feedback
E	167	Email from CCEBP
E	169	Email from CCEBP
E	172	Feedback from PC
E	175	Email from CCEBP
E	180	Email from ACC
E	182	Email from DC
E	189	Compliance Feedback
E	191	Compliance Feedback
E	198	Email to ACC
E	199	Email from ACC
E	200	Email from Chief Inspector

E	213	Email from CCEBP
E	214	Email from CCEBP
E	215	Sergeant update
E	219	Email from Chief Inspector
E	224	Compliance Email
E	227	Compliance Email
E	228	Compliance Email
E	238	Email to ACC
E	242	Email from Analyst
E	252	Email from DC
E	256	Email to Information Management
E	258	Email from CCEBP
E	262	Email from finance
M	1	Kick off meeting with DC
M	3	Operation Rowan Project Board
M	6	Serious Violence Board
M	7	Meeting with Essex
M	8	Operation Rowan Project Board
M	12	Meeting with Guns and Gangs lead
M	14	Meeting with CC
M	16	Meeting with ARV SLT
M	17	Community Pre-Mortem
M	21	Operation Rowan Project Board
M	23	Operation Rowan Project Board
M	25	Meeting with Response SLT
M	26	Feedback with Community North
M	27	Feedback meeting with Central Community
M	30	Operation Rowan Project Board
M	32	Operation Rowan Project Board
M	35	Meeting with ACC
M	36	Operation Rowan Project Board
M	37	ICT Scoping with DIT
M	42	ICT Scoping with DIT

Bedfordshire

Serious Violence Hotspots Experiment

CONSORT Statement

Principal Investigator: Dr Matthew Bland, Cambridge Centre for Evidence Based Policing Ltd.

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Background

Selected by the Home Office as one of 17 police forces to be given additional funding to tackle serious youth violence, Bedfordshire Police has identified an opportunity to test emerging evidence on hotspot policing. This protocol document supplies the details of this test, which takes the form of a randomised controlled trial. The treatment this trial seeks to assess is the assignment of targeted uniformed patrols to pre-identified hotspots at differing intervals up to seven days apart. The experiment relies on GPS tracking of assigned officers to determine compliance and dosage and is a replication of an experiment conducted in Western Australia.

In line with the principles of CONSORT, the widely accepted minimum standard for reporting randomised trials (www.consort-statement.org), this protocol sets out the specific elements of each aspect of the trial, including aspects of design such as setting, intervention and randomisation

procedure. The protocol also details the primary analytical methods that will be used to evaluate the outcomes of the experiment.

Experiment Summary

The Bedfordshire Serious Violence Hotspots experiment (henceforth BSVHE) will test the impact of targeted visible patrols in identified hotspots for serious youth violence. The principal investigator has identified 21 hotspots based on Lower Super Output Area geography from crime data recorded by Bedfordshire Police between June 2018 and February 2020. Within the RCT, officers from the *Operation Sparkler* programme, a temporary team which operates on overtime funding provided by Home Office 'surge' funding, will be randomly assigned to patrol different hotspots on different days. Officers will be tasked to spend a minimum of 15 and a maximum of 25 minutes in each hotspot. Officers will be tracked via a small GPS device provided by CCEBP.

Figure 1: Handheld GPS device

The objective of this design is to evaluate the effect of the patrols on crime harm from serious violent crimes involving young people. The design will allow the assessment of any residual effect of patrols from a one-day gap to a seven-day gap. The trial will run from August 2020 to March 2021.

Trial Design

Hypotheses

The primary hypothesis BSVHE will test is that 15-25 minutes of tracked, visible, foot-based patrol in hotspots of concentrated serious youth violence will reduce the level of crime and crime harm from serious youth violent crime when maintained at intervals of four days or fewer.

Secondary hypotheses assess the impact of the same patrols on other forms of street-based violence in the same hotspots.

Unit of Analysis

Time and place will be the unit of analysis. Each hotspot will be randomly assigned to patrol or no patrol for each separate day of funded 'Sparkler' patrols. The analysis will then track mean outcome measures overall aggregated units throughout the experiment.

Allocation ratio

Treatment units will be assigned on a 1:2 basis with control. For each 'Sparkler' day, seven of the 21 identified hotspots will be randomly assigned for patrol and 14 assigned for control.

Eligibility criteria

Each hotspot selected for the BSVHE has been identified using conditional probability analysis. Treatment and control units will only be selected from these hotspots. GPS tracking devices will monitor compliance with these assignments so the analytical framework will comprise both 'intention to treat' and 'as delivered' perspectives.

Settings and Locations

The 21 hotspots identified for the BSVHE are outlined in appendix A to this report. Each hotspot is formed of a Lower Super Output Area (LSOA) boundary. Additional analysis has been undertaken to identify key routes in each area to facilitate targeted patrolling.

Treatment and Control Elements

Treatment

Element A: 'Sparkler' officers will be tasked at the beginning of each shift to conduct foot patrols in single or double crewed formation in each of that days' seven identified hotspots. They will be instructed that each hotspot requires a minimum of 15 minutes and a maximum of 25 minutes **foot** patrol in which the officers should maximise their visibility and proactively engage with members of the public. The timing of the patrol is not prescribed.

Element B: Each 'Sparkler' officer will be given a handheld GPS tracker on a keychain at the beginning of their shift. The tracker output will be analysed by the principal investigator to assess officer attendance to the prescribed treatment areas. At the end of the shift, officers return the devices to the general pool where they will be cleaned and charged, ready for the next deployment.

Control

'Sparkler' officers will be specifically advised which hotspots they are NOT to visit to conduct those patrols (though they may drive through them or attend other call outs). Attendance will be monitored by GPS devices. Where officers perform 15 minutes or more of non-stationary or transport related time in control hotspots the results will be recorded and fed back to the Project Manager who will liaise with the 'Sparkler' lead. Feedback will then be given to officers on an individual basis.

Measurement

Outcome Measures

For the treatment and control units, the following measures will be assessed based on crimes recorded by Bedfordshire police.

1. Crime harm measured using the Cambridge Crime Harm Index (2020 version), which will be matched to Athena crime classification codes.
2. Crime counts
3. Crime prevalence

Each measure will be calculated for serious youth violence, as defined by Bedfordshire Police's internal process for identifying such crimes for national recording. All non-domestic violent crimes which do not fall into these categories will be subdivided between (a) non-youth serious violence and (b) youth non-serious violence and (c) non-youth, non-serious violence.

Measurement

Crime data will be collated by Bedfordshire analysts comprising daily counts for each hotspot in four categories as outlined above. The data will be stored in anonymised aggregate count format by the Principal Investigator.

Sample size

At the time of writing we do not have confirmation of how many planned 'Sparkler' shifts there will be. On this basis, the following table shows the various potential sample sizes for different frequencies of patrol.

Table 1: Potential Sample Sizes

Mean number of Sparkler deployments per week for Aug – Mar	Number of Shifts	Number of Treatment Units	Number of Control Units

0.5	17	119	238
1	34	238	476
1.5	51	357	714
2	68	476	952
2.5	85	595	1190
3	102	714	1428
3.5	119	833	1666

Randomisation procedure

Hotspots will be randomised using Microsoft Excel, prior to the commencement of the experiment. The randomisation sequence will be held by the Project Manager to be communicated to the operational teams prior to their deployment. The randomisation sequence will not be provided more than one shift ahead.

Analysis and reporting

Analytic framework

The trial will operate to the following analytical framework:

a. Crime harm will be considered as the primary metric for comparison between treatment and control.

b. The minimum sample size is 68 allocated 'Sparkler' deployments.

c. The principal analytic framework will be intention-to-treat.

d. With near-live tracking information available to the principal investigator, the minimum treatment-as-delivered threshold is set at 75%.

e. Data analysis will be conducted by the principal investigator.

f. Cohen's D will be used to calculate effect size.

g. An independent samples t-test will be used to compare the sample means of treatment and control.

h. The mean effect size of hotspot trials identified by Braga et al (2019) is $d = .132$. To identify this effect size at 80% statistical power, a sample size of 1,600 units (split on a 2:1 ratio) is

required. Given the potential variability of sample sizes, post-hoc power calculations will be undertaken.

Dissemination Plan

The BSVHE will report initial results in December 2020, covering the period August to November. This report will be internal only to CCEBP and Bedfordshire Police. The final report will be delivered in April 2021.

Preliminary and final results will be published in a 250 word abstract on CCR-RCT.

13 - APPENDIX 2

Abstract from Bland, M, Sherman, L.W, Leggetter, M, Cestaro, D, Sebire, J (2021) In Search of Residual Deterrence, A crossover randomised controlled trial in policing Serious Violence Hotspots. Not yet published.

Research Question

Does a 'sweet spot' of residual deterrence mean that police can employ a minimalist patrol strategy to reduce violent crime, without displacing it to nearby areas?

Data

We analysed GPS data from handheld devices given to officers in Bedfordshire Police, a police force in the East of England. Officers were assigned to conduct 15 minutes of foot patrol in pre-identified hotspots for violent crime. We assessed the impact on different types of crime and antisocial behaviour through analysis of recorded crime data and event data extracted from Bedfordshire's core systems, using the Cambridge Crime Harm Index as a weighting for harm.

Methods

We identified 21 hotspots based on Lower Super Output Areas and randomly assigned seven to a treatment condition of patrol and 14 to a control condition of no patrol, each day, for 90 days. This repeated crossover randomised controlled design replicates Barnes et al.'s (2019) study of patrols in Western Australia. In total 1,890 location-days were recorded during the experiment. We used an intention-to-treat framework to analyse the impact of patrols on the outcome measures overall, on consecutive days of assignment to the same condition and in 100 metre 'buffer' zones around each hotspot.

Findings

Hotspot patrols were conducted at substantially higher levels on treatment location-days, and we found statistically significant differences in the prevalence, count and harm of a) non-domestic violent crime and robbery and b) other non-domestic, victim-based crimes. We found no effect on crimes proactively identified by the police other than in their level of harm – on patrol days, more serious crimes were identified than on non-patrol days.

We found no evidence of a residual deterrence effect. Instead, the data showed that the largest reductions in crime harm came after three days of consecutive patrol. Nor did we find statistically significant differences on patrol and no-patrol days in crime prevalence, count or harm in the areas around the hotspots but a moderate trend in the data indicates that displacement may emerge the higher the number of consecutive patrols.

Conclusions

That foot patrol of hotspots can reduce crime is not a new finding, but our evidence potentially supports notions of a 'tipping effect' in deterrence which has been long discussed by scholars. Our findings suggest that, to reduce both violent and other forms of crime, uniformed officers need to patrol hotspots for short amounts of times on consecutive days. The use of GPS tracking technology will be key to integrating patrol strategies into 'business as usual' but the police service needs to also consider how it can systemically and culturally absorb the principles of these findings to realise optimal results.

Keywords

Hotspots, knife crime, serious youth violence, violent crime, foot patrol, deterrence, residual deterrence, GPS tracking, crime harm index