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Understanding and Preventing Lead Theft from Churches: A Script Analysis

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Abstract

Many types of crime across several nations have recorded sustained reductions in the past decade – the so-called international crime drop. By contrast, over the same time period the theft of metals has grown internationally mainly attributed to increases in metal prices. This chapter is concerned with a specific type of metal theft that also constitutes a heritage crime: the theft of lead from churches. We begin by summarising what is known about lead theft from churches, asking why lead and churches are attractive targets and settings for crime, respectively. Next, to better understand the process of committing lead theft from churches, we use police recorded crime data (2009- 2013) from Durham, England, to develop a crime script, which we use to identify and appraise existing and prospective prevention measures. We finish by discussing how our findings relate to research on and the prevention of lead theft from churches.

Introduction

The story of mankind is a story of metals. Human use of metals can be traced back at least as far as 6000 BC. Throughout human history it has provided the material to make better tools, fashion stronger weaponry and armour, build taller buildings and adorn decorative items. It also has a long history as a desirable item to steal.

We all carry the vestiges of efforts to reduce a common form of metal theft in our pockets and purses. When made of precious metals, coins were often clipped because they kept their exchange value whilst some of the silver or gold from which they were made could be retained. The milled edges of many contemporary coins reflect the

measure adopted to thwart coin clippers in the sixteenth century. Sir Thomas Gresham, financial agent to Queen Elizabeth I, has an economic law named after him, 'Bad money drives out good,' because of the dire consequences of coin clipping. It meant that complete coins fell out of circulation as they were retained when their real value exceeded their exchange value.

With regard to lead specifically, as Bennett (2008, p.179) writes, 'Lead theft … has a history that predates the Industrial Revolution, stretching back to the first use of lead in plumbing systems in the Roman era, and thereafter the use of lead in roofing for churches and other civic buildings in the Middle Ages'. Bennett refers also to cases of lead theft from buildings going back to the earliest dates of the Proceedings of the Old Bailey (1674).

Although the problem of metal theft is clearly not a new one, the past decade has seen sharp increases in the levels of metal theft internationally. This is in contrast to the sustained reductions in acquisitive crimes (as well as several interpersonal crimes) across many Western countries since the early to mid-1990s – the so-called international crime drop (see Tseloni et al. 2010; van Dijk et al. 2012). Increases in metal theft have been mainly attributed to price rises as global consumption of metals outstrips available supply. This has led to an increase in the price available at scrap metal outlets and, from the perspective of the offender, growth in the potential profits from successfully stealing and selling metal-bearing items.

Despite being widely advocated, there are few empirical tests of the metal price-theft hypothesis. An exception is Sidebottom et al. (2011), who analysed the relationship between the price of copper and levels of police recorded copper cable theft from the British railway network for the period 2004-2007. They showed that changes in the price of copper were positively associated the changes in the levels of copper cable theft. The same was not found for two additional potential explanations for the theft patterns observed, namely that copper cable theft reflected changes in the levels of theft more generally or shifts in levels of unemployment over time. More recently, Sidebottom et al. (in press) provided further support for the metal price-theft hypothesis, this time by analyzing data that spanned a longer time period (2006-2012) and focusing specifically on the theft of 'live' copper cabling from the railways[i].

Presently, no published studies have analyzed the price-theft relationship for lead, despite general increases in the price of lead since the early 2000s.

The recent growth in metal theft has elevated its status as a problem deserving of greater police and policy attention. In Britain, metal theft is estimated to cost the economy around £770 million a year, which relates to the cost of replacing stolen metals as well as the delays, damage and disruption it causes. Various items have been stolen for their constituent metals, reflecting the widespread use of metals in modern society. These include copper railway cabling, iron manhole covers, brass fire hydrants and aluminium beer kegs. For the purposes of this chapter, we categorise metal theft in one of three ways: 1) the theft of metal from national infrastructure (such as railways or telecom and utility companies); 2) the theft of metal from retail and residential premises (such as copper boilers and piping being taken from homes and construction sites); and 3) the theft of metal from heritage assets.

In Britain it is this last form of metal theft that has provoked widespread outrage, following several well-publicised stories of the theft of bronze memorial plaques and urns from gravestones. Yet it is also one of the least studied, with little published research available on the theft of metal from heritage sites (an exception is Coombes et al. 2010). That written material which is available is largely limited to guidance documents produced by agencies affected by or interested in the problem of lead theft (such as insurance companies or heritage preservation groups, for example see Livesey, 2010; English Heritage, 2011). And it rarely reports the analysis of relevant data. Several reasons may account for this lack of research, a leading contender being that police forces in many countries (including the UK and USA) do not have a discrete crime category for metal thefts (or heritage crimes), which makes the extraction of relevant data challenging, especially since the theft of metal-containing items can be recorded by the police under several different crime categories (such as burglary, other theft, criminal damage, etc.) (see Home Office, 2013a). Moreover, questions concerning the experience of metal theft have not yet featured in household victimization surveys[ii].

This chapter is concerned with the particular problem of lead theft from churches and other places of worship (hereafter churches). It takes an environmental criminology

perspective (see Wortley and Mazzerolle, 2008) by focusing on *lead theft* as opposed to the background and characteristics of *lead thieves*. It is structured as follows. We begin by discussing the problem of lead theft from churches, the harms it generates and asking why lead is, and churches are, attractive targets and settings for theft, respectively. This is followed by a description of the data and methods used in this study. Next, we outline a crime script, which we then use to review current and prospective prevention strategies. The chapter concludes with a discussion of how our findings relate to research on and the prevention of lead theft from churches.

The Problem of Lead Theft from Churches

Lead is one of the most widely-used metals. Its applications range from bullets to batteries. It is a soft but hardy metal, of sufficient malleability to be rolled and crafted into various shapes and sizes. These attributes are of particular importance in the construction industry, where it is used extensively, most notably as a roofing material (including guttering and flashing) that is both durable and at times decorative. Many historic buildings used lead in their construction. According to Rumley (2009), most of the estimated 16,000 parish churches in England contain some form of leadwork, from lead water cisterns, lead in stained glass windows and, of most relevance here, as a roof covering and in downpipes and guttering.

Popularity as a building material is not a pre-requisite for being an attractive target for theft; spates of, say, plasterboard theft are generally unheard of. Yet the widespread use of lead as a construction material does afford plentiful opportunities to steal it. Moreover, in scrap metal markets and pawnshops there is a readily available outlet to dispose of metals for profit. This is important when understanding the process of metal theft. Unlike many commonly stolen items such as jewellery, cash and Smartphones, metals offer little inherent value to the prospective thief; profit is only realised upon sale.

Items clearly differ in the extent to which thieves favour them. Opportunities for theft and opportunities for disposal are two factors often shared by frequently stolen items. They form two elements of Clarke's (1999) CRAVED model, an acronym designed to highlight those attributes that make certain products more desirable targets for theft.

Clarke (1999) suggests that theft tends to concentrate on items that are *concealable*, *removable*, *available*, *valuable*, *enjoyable* and *disposable*.

Many 'hot products' can be explained in CRAVED terms. Johnson et al. (2009), for example, demonstrate how bicycles can be seen to fit each of the CRAVED components. Likewise, silver and gold as precious metals, especially in the form of money or jewelry, clearly fit the CRAVED description of attributes of hot products outlined above. One reason for casting gold bullion in large, heavy ingots is to make them more difficult to carry, when stolen. It is less clear how copper cabling and lead flashing from church roofs could be seen to fit each of the CRAVED components, beyond the *availability* and *disposability* mentioned above. Sidebottom et al. (2011) suggest that copper cabling possesses few CRAVED attributes, but that its desirability as a target for theft, and the recent theft increases, can be mainly attributed to its *disposability* and *value*. For metals these criminogenic elements are not fixed: the value of metal changes considerably in response to market prices. Nor are they independent: increases in the price of scrap metal may increase the opportunities for its disposal should fences or 'itinerant' scrap metal collectors appear and disappear in response to price fluctuations in the hope of profiting from elevated prices. As alluded to previously, the price-theft hypothesis is yet to be reliably tested for lead. While examples are available attesting to the tightly matching price and theft trends over time, no research has conducted an appropriate time series analysis and accounted for rival hypotheses, as has been the case for copper (see Sidebottom et al. 2011).

The foregoing discussion adopted a target-oriented perspective, asking what it is about lead that makes it an attractive target for theft. Yet risk is a multi-layered concept, influenced both by the theft target (here lead) and the environment in which it is routinely found (here churches) (Ekblom and Sidebottom, 2008). To this end, it is also useful to consider whether some churches are more conducive settings for lead theft than others, and why. English Heritage (2011) has already considered this question, and present a 'risk assessment' form designed to identify potentially criminogenic features of churches ranging from 'surveillance' to 'building access'. In a similar vein, Muncaster (2012) analysed insurance claim data provided by Ecclesiastical, the principal insurer for Anglican churches in Britain, between January 2007 and May 2012. Focusing only on churches in one county of England, she found

that lead thefts were unevenly distributed across churches to the extent that five per cent of churches accounted for 50 per cent of all recorded lead thefts in the target area. This skewed 'j-curve' pattern is a further example of what Wilcox and Eck (2011, p. 476) call the 'iron law of troublesome places', referring to the consistent finding that a small proportion of facilities account for a disproportionately large number of crimes experienced by such facilities in a given area (see also Eck et al. 2007). On visiting those churches with comparatively high levels of theft to determine possible indicators of vulnerability, she found that a common theme was the presence of a car park nearby and easy access to a main road.

The Harms of Lead Theft from Churches

The previous section discussed some of the factors associated the occurrence of lead theft, focussing both on the target of and the setting for crime. This section focuses on the *implications* of lead theft, in particular the harmful consequences it generates.

Replacement costs. We have already described how church leadwork can be both decorative and functional. The latter demands that any lead that is stolen must be replaced, either like with like (i.e. lead) or with some other alternative material (such as stainless steel or non-metal options like asphalt). The cost of such replacements can be substantial. Ecclesiastical report that between 2007 and 2012 there were around 12,000 insurance claims for the theft of metals estimated to cost around £30 million (Ecclesiastical, 2012). However, insurance data are likely to undercount the true extent of the problem since not every church will be insured. Moreover, Livesey (2010) writes that as of 2009 Ecclesiastical implemented a cap on the amount that they would pay to victims of metal theft: £5,000 for the replacement of stolen metals and £5,000 to cover associated damages. As Livesey (2010) goes on to point out, this policy change means that the costs of lead theft may not be fully recovered, especially where churches are repeatedly victimized.

Heritage costs. Beyond being functional, leadwork on churches can be richly decorative. The theft of and damage to decorative leadwork may be irreparable.

Theft-related damage. The process of stealing lead from church roofs can cause damage. Most obvious is the damage incurred by rainwater seeping through holes in the roof. These costs can be amplified if the affected areas contain an organ, historic paintings, tapestries and so on. Removing lead can also damage surrounding architecture, stonework and stained-glass windows. Finally, gravestones and monuments can be damaged in the process of moving stolen lead from the roof to the ground.

Community costs. Churches are often at the very heart of a community. Beyond being a place of worship, they provide a gathering place for members of the community, for religious and non-religious events. Lead theft jeopardizes these community functions, in several ways: 1) the theft of lead may render the church unusable whilst the damage incurred is being seen to. In certain extreme cases, this may remove an important occasion for generally homebound elderly individuals to leave the house; 2) a theft event may precipitate an unhealthy avoidance of the church due to a perception that it is an unsafe location.

Lead theft as crime multiplier. An incident of lead theft may increase the probability of further crimes occurring. Three mechanisms could account for this pattern: 1) the theft of lead from a church roof may provide access to the church interior, thereby providing opportunities for further theft and criminal damage offences, exploited by those responsible for initially stealing the lead or other offenders alerted by this new-found means of access; 2) if the damage incurred by lead theft goes unaddressed it may signal to prospective offenders that this is a place that lacks suitable place management and, consequently, is interpreted as a favourable setting for crime with a low risk of apprehension. This is consistent with "Broken Windows" theory (Wilson and Kelling, 1982), has been demonstrated empirically for minor forms of disorder (Keizer et al. 2008) and has also been discussed in relation to cemetery theft and vandalism (Stutzenberger and Eck, in press); 3) the theft of lead from one church may lead to theft of lead from another to replace it, something referred to as a van Dijk chain (see Felson and Boba, 2010).

Lead Theft from Churches in County Durham: A Case Study

Data

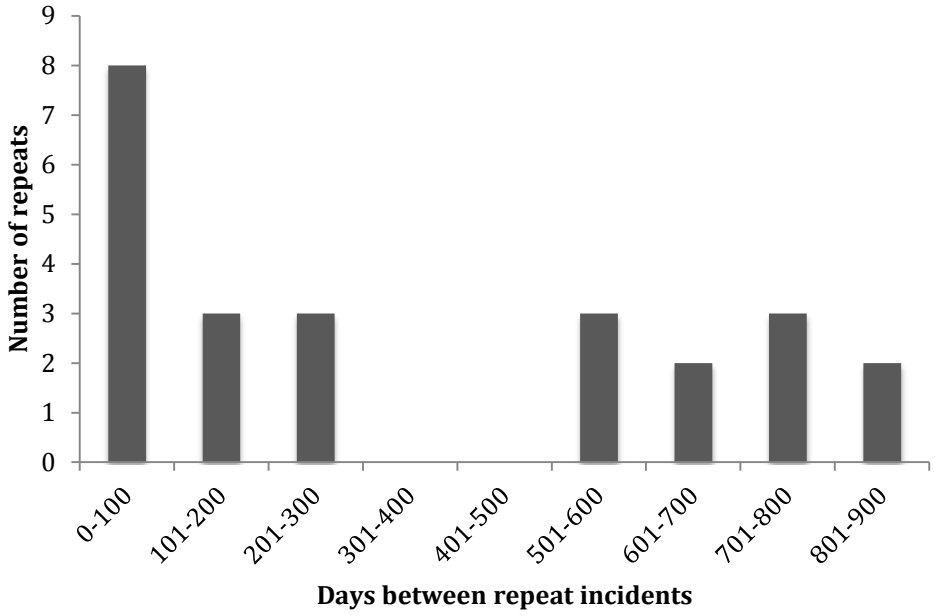
Recorded crime data were provided by Durham Constabulary for the period April 2009 to June 2013 (inclusive). Durham Constabulary force area consists of County Durham and the Borough of Darlington. County Durham covers 2,230 square kilometres and is a predominately rural area with a large ex-mining community. Durham City is its main urban area and has numerous heritage sites including the UNESCO World Heritage Site of Durham Castle and Cathedral. The Borough of Darlington covers over 200 square kilometres and incorporates Darlington Town and its surrounding rural areas.

In addition to police recorded crime data, we also sought to determine the number of churches in the Durham Constabulary force area to assess the extent and concentration of lead theft. A search of relevant ecclesiastical websites indicated that there are an estimated 503 churches in the area. It should be noted that this search is limited to Christian denomination churches and it is likely that there are other non-Christian places of worship area in the area. Moreover, we cannot independently verify the accuracy and timeliness of the information on these websites. Finally, we acknowledge that our assumption here is that all the churches in the Durham Constabulary force area have lead roofs and therefore constitute potential targets for lead thieves. If some of the 503 churches do not and therefore could not feature in our data then this would produce conservative estimates on rates of theft.

The police recorded crime data comprised all crimes where the property stolen was recorded as metal and the location included the word ‘church’. Of relevance here, each incident included a unique crime reference number, the location of the offence, the dates and times over which the offence was believed to have taken place, and a free text field that contained a description of the theft event. Prior to analysis, the data were checked to remove any incidents that did not occur at a church or where lead was not reported stolen. This led to the removal of 37 cases (28.5 per cent), most of which referred to the theft of copper lightning rods from churches (27 of the cases). In some cases multiple metals were reported stolen in a single theft event. If such events included the theft of lead from churches then they were retained for analysis.

The final sample contained 93 incidents of recorded lead thefts from churches for the period April 2009 to June 2013 (inclusive). This relates to an *incidence rate* over that time of 185 thefts per 1,000 identified churches. In all cases the lead was taken from the roofs. Of the 93 incidents 24 were repeats at the same church. Sixty-nine churches therefore experienced one or more incidents of lead theft over the time period, a *prevalence rate* of 137 per 1,000 identified churches. The *concentration* of lead theft (the average number of incidents per church suffering lead theft) was 1.35. Figure 1 shows the time course for repeat offences. It is difficult confidently to interpret this, but it seems to suggest that some repeats occur quite quickly, perhaps because offenders return knowing how to commit the crime and that there is more lead to be taken, with other offences following a longer gap, perhaps occurring once replacement lead has been installed.

Figure 1: Time course for repeat incidents of lead theft from churches in Durham, April 2009-June 2013



Before proceeding, we remind the reader that police recorded crime data such as those used here only refer to those crimes that are reported to the police. While for many crime types it is well known that a considerable proportion of offences never reach the police's attention (such as cycle theft or domestic violence), given the harms

associated with lead theft from churches and the requirement of a crime reference number for insurance purposes, we expect that the vast majority of lead thefts from churches are reported to the police.

The Use of Crime Scripts in Crime Analysis

There is a tendency to think of crimes as discrete events. When considering lead theft from churches, for example, most of us will envisage a thief ripping flashing from their local church. We are apt to forget those acts that likely precede or follow the theft itself. Clarke and Cornish (1985) argued, however, that crime is better thought of as a sequence of events involving various decision points on the part of the offender. They argue that each of these decisions is, crucially, influenced by situational factors and therefore might be manipulated for the purposes of crime prevention.

Cornish (1994) was the first to build on this suggestion by introducing the concept of a crime script, inspired by research on event schemas in cognitive psychology (Schank and Abelson, 1977). Cornish (1994) saw crime scripts as an offenders-eye-view of the sequence of actions required prior to, during and following the commission of a particular crime type. He suggested that setting out the steps necessary for successful crime commission might help identify promising avenues to disrupt or deny script completion, thereby reducing opportunities for crime. This is not to say that every offender committing a specific crime type will follow the same procedure. Clearly there is scope for much variation depending on the individual concerned and the situations they are in. Despite this diversity, underpinning the concept of a crime script is the assumption that specific categories of crime will exhibit sufficient commonalities for generalisations to be made that might usefully inform crime prevention.

Since Cornish's (1994) seminal paper, crime scripts have proved a popular method of deconstructing the modus operandi of specific crime types. Scripts have been generated for accessing child pornography online (Wortley and Smallbone, 2006), internal child sex trafficking (Brayley et al. 2011), organised crime (Hancock and Laycock, 2010), the illegal trade and disposal of waste (Tompson and Chainey, 2011), check card fraud (Lacoste and Tremblay, 2003) and the sale of stolen vehicles

(Tremblay et al. 2001). They have also proved popular with law enforcement practitioners, in part because they can be produced fairly easily often without the need for additional resources or data (Brayley et al. 2011).

A Script Analysis of Lead Theft from Churches in Durham

What, then, would a script for lead theft from church roofs look like? In this next section we use the abovementioned police recorded crime data to generate a lead theft script. It is our hope that in setting out the sequence of events characteristic of committing lead theft from church roofs it might identify promising opportunities for prevention.

At this point it is worth mentioning that despite their popularity, there is no agreed-upon method or data source for producing a crime script, nor standard format in which they are presented (Brayley et al. 2011). For example, some scripts have been derived from qualitative analysis of interviews (Hancock and Laycock, 2011) whilst others result from the analysis of quantitative data (Tompson and Chainey, 2011). This lack of consensus has led some commentators to question the quality of certain crime scripts (Borrion, 2013), concerned that different people may generate wildly different scripts using the same dataset. In awareness of this, for this chapter two of authors (Sidebottom and Tilley) independently produced an initial crime script based on analysing the free-text field of the recorded crime data, acknowledging that the free text field, as with other accounts of crimes, tends to focus on the immediate event rather than the earlier and later stages whose importance is stressed in the crime scripts literature. These other stages have to be inferred.

No limit on the number of components of the crime script was specified in advance, only that the script must include: 1) components before, during and after the theft event; 2) that such components refer to decision-points that are necessary to successful crime completion, and 3) it is pitched at a suitable level of abstraction that decision points can easily be mapped onto possible preventive interventions. On completion the two scripts were compared, discussed and synthesised to produce a master script (the two scripts are available on request). This was then scrutinised by the third author (Price) and checked against the police data.

The final script is presented in Table 1. The first column (Function) outlines the various scenes that comprise our lead theft script and the second column (Action) details the specific behaviours and decisions points at each scene. Table 1 is followed by a brief discussion where we expand on some of key components in the process of stealing lead from church roofs and make reference to the free text information present in the data analysed. We then consider the implications of our script for crime prevention.

Table 1 A Lead Theft from Churches Script using Durham Police Recorded Crime Data, April 2009 to June 2013 (n = 93)

Function	**Action**
Preparation	Select suitable church
Preparation	Acquire necessary tools
Preparation	Acquire means of transporting stolen lead
Pre-condition	Access church
Pre-condition	Scale roof
Theft	Remove lead from roof
Post-condition	Convey lead to ground level
Exit	Exit church with lead
Profiting	Locate a scrap metal dealer or local handler such as a criminal itinerant scrap metal collector, who is willing and able to buy stolen metal
Profiting	Deliver stolen lead to scrap metal dealer
Profiting	Receive payment for stolen lead
Exit	Exit scrap metal dealer

Churches suitable for lead theft

According to the data analyzed here, certain features appeared to be characteristic of churches that were favored by lead thieves. Beyond the obvious attribute of having a lead roof, four themes relating to church attractiveness emerged: 1) many churches

that experienced lead theft were described as ‘remote’, ‘secluded’ and ‘isolated’; 2) thefts were reported often to occur when the church was ‘unoccupied’ or ‘unattended’, typically at night; 3) several churches were reported to be undergoing renovation at the time of theft, thereby concealing the theft; and 4) the design of certain churches appeared to facilitate access to the roof (such as porches that could be climbed upon) or make it easier for the roof to be navigated (such as having a flat roof or sections thereof).

The apparent preference shown by lead thieves for isolated churches suggests that priority be given to them in allocating preventive efforts. Moreover the temporal patterns of repeat victimisation hinted at in Figure 1 would favour prompt efforts to reduce risks at those churches that have suffered incidents.

Obtaining the tools

Crime is dependent on more than opportunity alone: offenders must possess the adequate tools and resources. Several of the crime reports examined here described lead thieves ‘going equipped’ with instruments to remove lead (‘saw’, ‘clippers’, ‘bolt cutters’) as well as items to access the roof (‘ladder’). However, this was not true of all incidents. Several crime reports suggested that the stolen lead was ‘forcibly removed’.

Accessing the Roof

It is trite but nonetheless true that to steal lead from a church roof one first needs to access the roof. The data analysed here suggested three ways in which roofs were scaled: 1) through means brought to the offence such as a ladder, 2) exploiting *stable* situational variables relating to the church itself such as ‘climbing the drain pipe’, and 3) exploiting dynamic situational variables such as ‘using the recycling bin’ to access the roof or ‘climb[ing] nearby scaffolding’.

Removing the lead

Earlier we described how the properties of lead make it an ideal material for construction, focussing in particular on lead as a roofing material. These same properties also appear to facilitate lead theft. Firstly, lead is malleable. Several crime reports describe the lead being 'rolled' to aid its removal. Secondly, lead is strong and not liable to break or be damaged in a way that would detract its potential resale value. In theft terms, this means that little thought is required to how the lead is removed and conveyed from the roof. Many incidents described the lead as being 'thrown off the roof to the ground below'.

Capitalising on the removed lead

Police incident reports typically say little about the sequelae of lead theft incidents. Indeed the attending officer(s) would generally have little or nothing to go on in determining this. However, the need for transportation and disposal are obvious, and in investigating metal theft the police have taken an interest in scrap metal dealers as organisations through which those stealing metals are most likely to dispose of it. The lack of preparation required for sale, tradition of cash use and anonymity in transactions has facilitated low risk sales of scrap, including stolen metal. The law (in Britain) has now been changed to require full records of transactions and to abolish the use of cash in them (Home Office, 2013b).

Implications of the Crime Script for Crime Prevention

We focus now on situational measures that are or might be adopted to try to reduce lead theft at churches, informed by our lead theft script and other guidance on reducing metal theft (see Kooi, 2010). Situational crime prevention does not focus on the underlying dispositions to commit or 'root causes' of crime (Clarke, 1997; Tilley and Sidebottom, 2014). Rather it concentrates on the immediate conditions that create opportunities for crime. The objection raised against situational crime prevention is that it simply displaces crime: failure to modify criminal dispositions means that offenders thwarted at one location will merely go elsewhere. Against the expectations of many, however, the use of opportunity-reduction measures has been found rarely to produce substantial displacement (Guerette and Bowers, 2009). More often, they lead to 'diffusion of benefits' (Weisburd and Clarke, 1994). 'Displacement' and 'diffusion

of benefits' refer to side effects of situational measures, respectively the diversion of thwarted offenders to alternative crimes and the discouragement of would-be offenders to commit other crimes not covered by the measures in place. The net effect of measures comprises their direct preventive effects plus their diffusion of benefits effects minus their displacement effects. There is now considerable evidence finding that net effects are consistently positive (Guerette and Bowers, 2009).

If reducing opportunities for lead theft at certain churches simply led to theft from other church buildings, there would be little point in it from the point of view of either insurers or church authorities. If, however, the measures adopted protected other churches or reduced other crimes at churches where measures were introduced (for example theft of copper lightning rods or criminal damage) then these would be added benefits from the efforts made.

Table 2 shows the five types of situational technique for crime prevention: increase in effort, increase in risk, decrease in reward, reminder of rules and reduction in provocation, as they relate to the main stages in the crime script shown above, namely the preparation for the theft, the theft event itself, the escape from the crime scene and the disposal of and profiting from the lead that has been taken.

Opportunities to increase the effort associated with stealing lead from church roofs exist at every point of the crime script and relate to a wide range of interventions. Prospective offenders may be discouraged from targeting a church if they are aware of the security measures put in place. Installing signs advertising security measures is therefore important. In terms of the theft event, many simple 'target hardening' measures would serve to thwart common modus operandi as identified in the data, such as removing easy opportunities to access a church when it is unattended (by ensuring gates are locked) or ways of scaling the roof by restricting offenders from co-opting everyday items such as chaining recycling bins. Partnerships between churches, the police and the community could help ensure such measures are put in place by alerting participating members of, say, unlocked gates or bins. For offenders using vehicles to transport stolen lead, the implementation of barriers for when a church is unattended would increase the effort associated with parking close to the church of interest.

The mobilisation of scrap metal dealers appears in several sections of Table 2. It speaks to a key characteristic of metal theft more broadly, namely that being in possession of vast amounts of lead offers little tangible value to the thief: criminal gains are realised only upon sale. Sale outlets for metals are largely limited to scrap metal dealers, pawnshops and fences. Disrupting the markets through which stolen metals can be disposed has, understandably, been a key police priority (for a general discussion on disrupting stolen goods markets see Sutton, 2005). A common method has been to mobilise scrap metal dealers more diligently to request photographic identification or vehicle number plates from members of the public selling metals. This is intended to reduce the anonymity of those selling stolen metal and to increase the ability of police agencies to trace them.

In Durham, for example, scrap metal dealers suspected of trading in stolen metals have been the target of extensive educational and enforcement action on the part of the police, designed to ensure participation in the preventive processes through, say, requesting that people selling metals provide photographic identification. In addition, the Durham Constabulary Road Policing Unit has sought to disrupt itinerant scrap metal collectors believed to be trading in stolen metals, in a bid to reduce opportunities to sell stolen metals for those who could not attend scrap metal dealers due to transport difficulties. Both tactics are considered to have contributed to the general reductions in metal theft experienced in the Durham Constabulary area in recent years.

A further market-oriented technique concerns reward reductions. As alluded previously, England and Wales recently enacted a new scrap metal dealers act which rendered all transactions of scrap metal cashless thereby removing the quick and easy profits available from selling stolen metals (see Home Office, 2013b). This was a decision made mainly in response to the noted increases in metal thefts. Presently, myriad anecdotes attest to the success of efforts to disrupt scrap metal markets dealing in stolen metals. Regrettably, while focussing prevention efforts on scrap metal markets and manipulating the risk-effort-reward calculus make intuitive sense, there is yet to be any robust evaluation that can reliably attribute falls in metal theft to such measures. This is an area much in need of systematic research.

Several measures might increase the likelihood of lead thieves being detected. In advance of the theft event, church watch schemes involving churches, parishioners and the police might usefully act as a means to alert one another to suspicious activities. This may be particularly useful when a church is undergoing renovation and any associated scaffolding, as we have seen, may facilitate theft from the roof. Various alarm and surveillance measures may also increase the risks associated with lead theft. These can operate at churches and scrap metal dealers, and can relate to technological innovations such as Closed Circuit Television (CCTV), Automatic Number Plate Recognition (ANPR) software as well as less-expensive options such as hiring churchwardens to improve guardianship.

The common theme in relation to reward-reduction methods concerns the lead itself. First and where possible, substitution of alternatives to lead when replacing stolen lead would reduce the prospective benefits to thieves, although it would be important to publicise the replacement at the church itself so that intending offenders will be put off targeting it again. Second, lead might be 'marked' to reduce the likelihood of it being sold. Property marking is an enduring technique with evidence attesting to its potential (although far from universal) effectiveness in helping to prevent crime (Laycock, 1985). It has also been widely practiced in an attempt to reduce lead theft and many insurance agencies and heritage groups endorse the use of property marking technology.

As with metal theft prevention more generally, to our knowledge there are no reliable evaluations on the impact of lead marking on levels of lead theft from church roofs, despite its popularity. In view of this lack of evaluation studies and given the heavy investments in property marking, we consider it useful to chart the causal mechanisms through which property marking is hypothesized to reduce lead theft and the conditions necessary to activate such mechanisms. Simply put, property marking is expected to reduce lead theft because prospective offenders judge that disposing of 'marked' lead will be too difficult and will increase the chance of them being identified and linked to the theft event. Like any crime prevention measure, these causal mechanisms are dependent on several key conditions. Firstly, to deter prospective offenders they need to be unequivocally informed that the lead of interest

is marked. If offenders are unaware of property marking measures put in place or if they choose to disregard the message, the question of ease of sale depends on whether the outlet through which the offender tries to sell the metal are *incentivised* and *able* to scan for metal markings. For many of the forensic marking kits used on metals this would require access to ultraviolet (UV) lights. With this in mind, as part of their efforts to reduce metal theft, Durham Constabulary provided scrap metal dealers with UV lights so as to identify marked property, in combination with signage to advertise that they would not accept marked property. However, in our experience of visiting scrap metal dealers this is not universal across Britain, thereby threatening to jeopardize the effectiveness of property marking schemes. Moreover, it should be noted that in some of the incidents in our data lead was stolen from churches that had reportedly used property-marking kits. While it is unclear whether publicity was present advertising to prospective offenders that the lead was marked, this emphasizes that property marking needs to be twinned with a message informing offenders.

The final two columns of Table 2 refer to rule reminders and means of reducing provocations that facilitate lead theft. Fewer interventions fall under these categories. The rule reminders include not only offenders, but also members of the public and scrap metal dealers who might unintentionally contribute to the problem of church-related lead theft with its consequential damage to heritage assets. Many of the provocation methods mirror those in the effort-increase column, namely the importance of securing items such as bins and ladders that might otherwise tempt individuals to exploit easy opportunities to steal lead from churches.

Table 2 Situational Measures to Reduce Lead Theft from Church Roofs

	Effort ↑	**Risk** ↑	**Reward** ↓	**Rules** ↑	**Provocation** ↓
Preparation	Make security of churches clear	Advertise church watch Advertise churchwardens Report suspicious interest in roofs		Publicise that churches should not be accessed when gates are closed	Don't leave ladders around Don't leave gates open Secure access to scaffolding
The theft	Lock ladders Lock bins Lock church gates Anti-climb paint on drain pipes Ensure lead is securely fixed	Alarm roof Focus CCTV on roof Publicise lead marking Light sensors Church watch Employ churchwardens	Publicise use of lead substitute Publicise use of property marking	Publicise detections	
Escaping	Secure car park	ANPR photo at church car park entry and exit			
Profiting	Mobilise scrap dealers	Mobilise scrap dealers Record all lead sales with ID/photo/weight ANPR at scrap dealers Conspicuously check for marking	Mark property Mobilise scrap dealers to search for signs of property marking Introduce cashless transactions at scrap metal dealerships	Advertise: don't buy heritage vandalism!	

Conclusions

Little empirical research is available on the problem of lead theft from church roofs. This chapter sought partially to fill this gap and presented a lead theft script, based on an analysis of police recorded crime data. We hope the script will provide a useful template both to assist prevention efforts and to assess differences in the modus operandi of lead thieves. It pointed to several situational crime prevention measures that might disrupt the process of lead theft, some widely practiced and others less common. What is shared by all these measures is the lack of reliable evidence on their effectiveness in reducing lead theft from churches, and the conditions under which they are most effective. This is a concern since decisions on how best to reduce lead theft from churches, like any crime type, should be informed by available evidence. The evidence base for lead theft from churches and metal theft more generally is currently devoid of robust evaluations. Addressing this gap is a crucial area for further research.

Finally, we have been careful to stress the limitations of using the free text field of police recorded crime data when generating a crime script. Not all crime is reported to the police and for those incidents that are, there is often much variation in the content and details present in the free text field of a crime report, owing to a combination of the information available at the scene, the details provided by witnesses and victims and the diligence of the investigating officer. Better standardising the information provided in the free text field of police reports would be helpful in determining what are consistent crime patterns from what are the products of selective reporting and/or recording. Here, the crime script produced using the free text field of crime data may itself help with more complete reporting of free text data, serving as a sort of checklist for the type and quantity of information recorded for theft incidents. It is possible that each component of our script could be translated into an item for which information be sought - how did the offender enter the church, how did they get on the roof, etc – and in doing so, over time, a fuller range of measures to prevent lead theft from churches may emerge.

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ENDNOTES

[i] "Live" copper railway cabling refers to cabling that is in use on the railway network typically to control line-side signals or to distribute electricity to power trains. This is distinguished from "non-live" railway cabling which refers to cabling kept in storage prior to use or abandoned after use.

[ii] Questions were asked about metal theft in the 2012 British Commercial Victimization Survey (CVS), but reports for specific metals were not made. The CVS found that 16 per cent of victims believed that thefts had included metal taken for their scrap metal value and 17 per cent thought the same for burglaries they had suffered. However the report notes that, '(O)ther types of organisations may experience metal theft more widely. For example, thefts of lead from church roofs and thefts of telecommunications equipment are thought to account for a large volume of metal theft, but may not be covered by the survey.' (Home Office 2013b: 21). Unfortunately no victimisation survey has focused on crime experienced in third sector organisations.