

Investigating whether a crime reduction measure works

Paul Marchant

Introduction

Crime is a serious business. It causes great distress and fear. It costs a lot to deal with its consequences. In these regards crime shares much with the problem of ill-health and disease. The application of sound science and statistics has allowed great strides to be made in dealing with problems of ill health. Medical statistics is one of the recognised, established disciplines involved in researching healthcare.

The parallels between research in crime reduction and in healthcare do appear to differ in terms of quality. Although there is still room for considerable improvement in researching health-care, an investigation into the underpinning of statistical methods used indicates that the problems are substantially worse in the study of crime. The consideration given to statistics in crime studies seems rather flimsy, yet important claims are made which are statistical at source and may affect policy, and so can have considerable costs attached. Therefore, for example, it is important to know whether the underlying crime level has really changed, rather than just being the result of perhaps sampling variation or some artefact giving rise to statistical bias or systematic error. This is necessary when trying to determine whether a Crime Reduction Intervention (CRI) has actually worked.

I started examining the scientific basis of the claim for the effectiveness for one particular CRI, basically because I was concerned about negative side effects and I thought the claim implausible. I remain concerned and unconvinced. The statistical issues and concerns I raise apply also to investigating other CRIs and to existing published analyses.

This piece extends work presented in Marchant (2006); earlier work on the statistical issues involved can be found in Marchant (2005a, b; 2004).

Crime

Crime seems a complex field of study. The first question is 'What is crime?' The Home Office publishes data on 6 key offences reported to the Police. In this article wider issues of what should constitute a crime are not entered into, the counts are taken as given. (Note an alternative approach to thinking about crime, Hillyard et al, 2005.)

It is of course reasonable that some crimes should be weighted as being more serious than others, e.g. violence against the person versus property crimes.

Crime Reduction Interventions

The kind of CRIs focused on here are those applied to areas. Examples might be CCTV, extra police patrols or changed street-lighting.

There are important differences between the way that area-based interventions have been trialled and standard Randomised Controlled Trials (RCTs), on individuals, familiar in health care (Marchant 2005a, b). It is a truism that the 'system' from which the data is collected determines the appropriate analysis.

The Downside of Crime Prevention

Interventions seldom have no side effects. One of the reasons we need to know properly the effectiveness of interventions, is so that we can weigh any benefit against the 'costs'. The costs may be more than monetary, as there may be environmental or social costs. An example of a negative impact occurs with car alarms, which produce noise when triggered. These are designed to reduce the risk of car break-ins. As far as I am aware there are no adequate experimental studies of their effectiveness at reducing this risk. The risk reduction might not even cover the monetary cost of the device. For example, people nearby may just assume that the alarm is a false one or ask themselves 'Do they want to become involved?' There is a downside however in the fearful noise such devices create. In New York City there have been calls for banning the devices so that resident can sleep undisturbed. e.g. by an organisation called transport alternatives.¹ Those opposing car alarms ask for non intrusive methods, e.g. immobilisers, trackers, silent pagers, to be used instead.

Some while back, I remember an interviewee saying on the BBC Radio4 'Today' programme that suggestions had been made to industry that the effectiveness of alarms could be tested scientifically, but no take-up of the suggestion was done (perhaps unsurprisingly).

Another example of a negative effect is 'alley-gating'. This aim is to reduce crime and anti-social behaviour in small streets running behind houses (i.e. alleys) by gating them. Residents are given a key for access. However the downside is that it denies law abiding non-residents access and a through-route. (It also may give the impression of a 'fortress society', with consequent loss of 'public ease'.) This will mean that short-cuts away from the unpleasant environment of more major roads are denied to pedestrians. This has been called 'theft of the alleys' (Bennett, 2005). One may think of such alley-gating schemes as implemented by privileged car-drivers whereas the consequences are suffered by the less privileged; children, elderly people or carers with infants in push-chairs, and others who don't drive. It is not as though alternatives might not be available; might it not be possible, for example, to provide individual homes with more security or tackle those causing the problem.

¹<http://www.transalt.org/info/caralarms/08ineffective.html>. See also www.gothamgazette.com/article//20030707/202/445.

Exterior lighting

The particular issue which I have examined in some detail and describe here is the effectiveness of exterior lighting at reducing crime. An account of some the context was given in Marchant (2006) in an issue of Criminal Justice Matters and is expanded on here. (A number of other articles in the issue were critical of research in crime; the first (Hope, 2006) entitled 'Things can only get better', suggests what may happen when evidence is not in accord with policy).

There is a tendency for people to be worried by the dark, perhaps with good evolutionary reason and it may well be that the majority feel safer from crime with brighter exterior lighting at night. However, the question is whether people are in reality safer. Lighting may aid and encourage criminal activity more than it reduces it. Of course lighting at night is needed to see where we are going and avoid hazards. Note however that over-bright, glaring lights tend to cause the opposite effect.

As far as I am aware there have been no trials of reasonable standard to investigate whether domestic exterior lights, so-called 'Security Lights', are effective at reducing risk. (Perhaps a better name for these lights is 'Insecurity Lights' because there is no evidence of their effectiveness against crime but they certainly can point out who feels insecure.) Therefore in this article I shall concentrate on the crime reduction effectiveness of street lighting for which claims for effectiveness are made on the basis of relatively few studies.

Why examine the basis of the claim that lighting reduces crime.

Why examine the basis of the claim when lighting is seen to be so positive? Indeed light has a very good press!

'...God said, let there be light and there was light. And God saw the light, that it was good....' The Bible, Genesis, Chapter 1, Verses 3/4.

It seems 'wicked' to question the benefit of lighting. Indeed the language of light is very positive. In an evidence-based world, however, all claims should be checked.

However there is a 'dark side' to light; lighting's environmental impacts and possible health impacts, e.g. Clark (2006). It was initially the impact of increasing light pollution, Mizon (2002), in being responsible for the loss of the splendour of our view of the Universe that got me to examine why there is so much poorly directed lighting. (An earlier piece exhibiting my interest in this concern, amongst others, is Marchant, 1994).

This loss of amenity affects all sections of society, e.g. children, poets, artists, lovers..., and not just astronomers. Apart from this there are further negative consequences of lighting. The ecological impact is recognised, (see for example Rich and Longcore 2006). The extent of the

ecological impact will rise if more, brighter, poorly controlled lighting is introduced.

White light with its spectrum covering the whole of the visible spectral range and potentially beyond, rather than say orange sodium light, seems likely to have a greater effect on ecology. One can see that that the poor glow worm is threatened as its feeble glow is literally put in the shade by the increasing brighter whiter lighting. It seems there will be an impact on life which has grown up over millions of years on a planet, which has alternating periods of light and dark. The aspect of the night has changed markedly in a recent few decades in populated regions. Once, on a cloudy night it would be very dark, darker than a clear night, however this is now reversed with the cloud layer acting as a reflector for the light beaming up from below.

An article on possible health effects 'Bright Lights, Big Cancer: Melatonin-depleted blood spurs tumor growth' Science News Online 7 Jan. 2006 can be seen at <http://www.sciencenews.org/articles/20060107/bob9.asp>.

Of course light is needed to see by at night. What those concerned about the ill-effects of lighting require is that the pollution effects are minimised as for any other polluting technology. Minimising pollution entails not using more than is necessary in the first place and then only having it where and when needed and blocking the 'spillage' by shielding to avoid adverse consequences. It is not rocket science; in the case of lighting it is largely about 'lamp-shades'.

The lighting standards seem to be written largely by those with an interest in the industry. The British Standard has become the European Standard. (See appendix for membership). Note the standards documents are not accessible on the web but are expensive and copyrighted, which limits their scrutiny. This is a pity as such standards have contained unsubstantiated assertions such as lighting reducing crime in parks. There is no satisfactory research into this and as I have shown it is questionable whether lighting reduces crime on streets

Some History

A review of the crime reduction effectiveness of street lighting done in the USA (Tien et al, 1979) could find no benefit for lighting. The Home Office, Crime Prevention Unit Paper 28, about a study in Wandsworth in London (Atkins et al, 1991) similarly could not find any such benefit. It states in conclusions top of Page 20 'The principal conclusion is that no evidence could be found to support the hypothesis that improved street lighting reduces reported crime'. The Home Office review by Ramsay and Newton (1991) similarly found no evidence that lighting is effective against crime. It also investigated offenders' points of view. The report stated on page 11 'the case for lighting as a means of crime prevention needs to be proven,

rather than taken for granted.’ Fifteen years later my view is that the claim that brighter lighting reduces crime is not scientifically substantiated.

The Crime and Disorder Act 1998 put a responsibility on public bodies to work to reduce crime and disorder. In the year following this, the Institution of Lighting Engineers (ILE) (www.ile.co.uk) published two booklets, both refer to the Crime and Disorder Act. One, ‘A Guide for Crime and Disorder Reduction through a Public Lighting Strategy’ (Painter, 1999), refers to its author’s research, funded by Urbis Lighting Ltd. However, as far as I can see, this source of funding is not acknowledged in this report. The booklet’s conclusion is that there is evidence that lighting reduces crime and that lighting engineers are encouraged to lobby for lighting to be introduced as a crime reduction method, somewhat beyond the remit of the job, one would think. Kate Painter, did the research with David Farrington at the Institute of Criminology, in Cambridge.

The other booklet, ‘Lighting and Crime’ (Pease, 1999), results from a review funded by the Lighting Industry Federation (LIF), the industry’s trade body. It reanalyses earlier work; e.g. that of the Wandsworth study, to claim that lighting does in fact reduce crime, contrary to the finding of the authors, Atkins et al (1991).

The Pease booklet refers to the work of Painter, describing the latter as a ‘technical tour de force’ and asserts that this shows that lighting can be used to reduce crime. The Pease report begins in the introduction section with “After discussions with Home Office and representatives of the lighting industry, the writer was commissioned to prepare this report of the relationship between street-lighting and crime” (note the choice of wording). Nowhere can I see in the Pease document any mention of the LIF funding- source, (The funding source can be seen in its summary on the ILE website, http://ile.org.uk/uploads/File/05_lightingcrime.pdf). The next sentence is “For the last ten years, and in the face of a research base increasing in both volume and quality, the perception has persisted of a Home Office view that street lighting is not relevant to crime.” Perhaps scepticism is in fact the justified view.

One has to ask why was the report not put out under the name of the Lighting Industry Federation, which paid for it, rather than the more neutral and professional-sounding ILE. The document refers to those “yet to be persuaded” of the (beneficial) effect of lighting on crime as “disciples of darkness”. Note that the ILE receives funding directly from lighting companies through its gold member scheme, rather than just personal subscriptions from individuals. In my view the statistical aspects of the ILE reports share similar deficiencies, for example that of unrecognised overdispersion, outlined below.

Following this the United Kingdom Home Office commissioned two research studies. One was into lighting and crime, Home Office Research

Study 251 (HORS251) published as Farrington and Welsh (2002). (The other was into CCTV and crime, Home Office Research Study 252 (HORS252) published as Welsh and Farrington (2002)). HORS251 claimed that lighting was effective at reducing crime by around 20%.

These matters are not simply of academic interest, as under the Government considerable sums of money have been given for PFI schemes for street lighting.² My home city of Leeds has such a scheme. The case put forward for spending more than £100 per head of population stresses the supposed crime reduction aspect greatly.

My Experience

I am sceptical of the idea that lighting is needed to reduce crime. I suspect that a lit up, 24-hour world would tend to be more dysfunctional and crime ridden. I'm sceptical of technological fixes in general, especially for social problems and think that such fixes tend to be oversold and veer towards the sellers' interest rather than that of the buyers. I of course agree that people should be able to move freely around in safety, at any time of day or night and therefore lighting is necessary. Whether a 24-hour society should actually be encouraged is another matter, as although such a society may be commercially desirable, its social impact may be harmful.

Personally I don't find the night scary, in fact I enjoy the fading light as day changes into night; the soft transition of colour. I find it more alien and unnerving to have piercing bright lights, evoking a high security prison camp, switching on all over place.

I have long thought that the idea that lighting is necessary to 'keep evil at bay' was a rather medieval concept. I would be convinced however if there was good, i.e. scientific, evidence that lighting did reduce crime. The burden of proof, in science, is on the proponent to provide evidence that a hypothesis is true. The default position is that we do not have knowledge one way or the other. In the present case this means that without scientific evidence we are ignorant of whether lighting increases or reduces crime. However with better research it should be possible to determine which of the alternatives is the case.

It was with this in mind that I started to examine the claim that increased lighting was needed to reduce crime as this was often given as a reason for the ever increasing exterior lighting levels. Key research work in the ILE reports, of 1999 mentioned above, was by Painter at the Cambridge Institute of Criminology, who did 'before and after' household surveys comparing two areas, one receiving street lighting in the intervening

² See: www.dft.gov.uk/stellent/groups/dft_roads/documents/page/dft_roads_610683.hcsp
http://www.dft.gov.uk/stellent/groups/dft_roads/documents/page/dft_roads_507991.hcsp

period, the other not. The work was carried out in the two English towns of Stoke on Trent and Dudley. Quite how this work could be described as “impeccable” (ILE, 2005) when in both studies the individual household addresses could not be linked ‘before’ to ‘after’, is mystifying. In addition they are open to the two statistical concerns (Overdispersion and Regression towards the Mean) outlined below.

Then, in 2002, came HORS251, which included a meta-analysis of 13 studies. This claimed that lighting reduced crime by approximately 20% within a very narrow confidence interval. I managed to get some of the papers from which data had been taken for the analysis. There were problems with interpretation. For example, one of the component studies had a z-statistic for the effect = 6.6, yet its original author (Shaftoe, 1994) made no claim for lighting benefit (Marchant, 2004).

I examined this work and considered that it was not as rigorous as it needed to be to make such a strong claim. (Basically the analysis was done as though the data had come from RCTs with crime counts treated the same way as binary outcomes of individual patients. In design terms each of these two studies is a non-randomised cluster trial, with only 2 clusters per trial, in which the intervention goes to the worst case cluster in both.) The Home Office was informed of concerns in 2003 and I was initially given a welcome and later informed that a ‘health warning’ would be placed along with the HORS251report. However after a delay an addendum was added to the version on the Home Office website stating that having adjusted the variances the conclusion was substantially unaffected, mentioning my name as though I agreed with it.

Another event in 2003 was the House of Commons Science and Technology Committee investigation into Light Pollution and Astronomy. The report HC747-1 (ISBN 0 215 01307 7) published in October 2003, contains the phrases “..the evidence relating to the correlation between lighting and crime is not conclusive” ... “is an area that merits further research.” An outcome from the inquiry was the inclusion of lighting as a potential statutory nuisance in the Clean Neighbourhoods and Environment Act (2005).

I had a short article, Marchant (2004), published in the British Journal of Criminology which drew attention to some key problems of HORS251.³ Perhaps as a result of this I received in December, out of the blue, an invitation to speak at the Lighting and Landscapes conference which was to be held at Kew Gardens in the following March. However in February, I received another communication from the Landscape Institute’s Marco Forgioni saying that because of a change of arrangements that there was no longer an opportunity for me to speak. I responded that if I was not able to speak then it would only be fair that Kate Painter, a proponent of

³ See Guardian newspaper article “Bright lights ‘do not deter criminals’” 21 Nov 2003

<http://www.guardian.co.uk/crime/article/0,2763,1089943,00.html>

the claim that lighting reduces crime, should not speak also, in order for matters to be balanced. However she did speak and I did not.

My 7-page British Journal of Criminology article showed that the formula for the CIs used must be inappropriate. One can see from the time series plots of a couple of individual studies, for which there is available data, that the strong claims made in HORS251, are inconsistent with the data. My paper also mentioned other short-comings such as the threat to validity posed by Regression Toward the Mean (RTM). The authors of HORS251 had a 20-page response starting on the next page, justifying their claim that lighting reduces crime. However, I was and remain unconvinced by the claim. I sent a response to the Home Office which I told was forwarded to the authors, but no direct response has been received from them.

Around the time of publication of my article in the British Journal of Criminology, the following appeared in the Lighting Journal, the magazine of the Institution of Lighting Engineers "...Paul Marchant, a statistician at Leeds Metropolitan University who argues that statistics used in the Home Office Study 251 could equally be used to show that street lighting actually increases levels of crime. This is an argument which the APPLG⁴, alongside the ILE, would hope to show as utterly absurd. Of course it is worth noting that Paul Marchant is also an astronomer as well as being a statistician, and that this may lead to some bias in his interpretation of the statistics he refers to" (Markland, 2004).

Following a talk in 2004 at the International Conference Royal Statistical Society 'Connecting Practice with Research', I put simple accounts together on the statistical issues at the heart of concerns on HORS251, (Marchant 2005a, b). Two principal issues are; Unit of Analysis Error, leading to overdispersion and Regression Towards the Mean (RTM) leading to the fact that the crime rate in the high crime area getting the lighting and that in the lower crime rate comparison area will tend to move closer together anyway, even when the lighting has zero effect on crime. (Current work suggests that RTM could indeed give an artefactual effect of comparable size to the claimed lighting benefit)

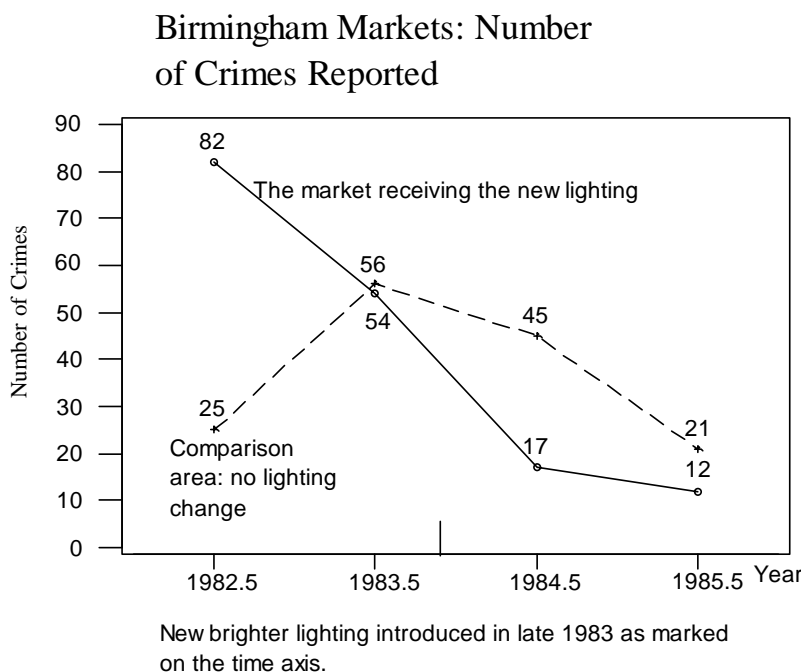
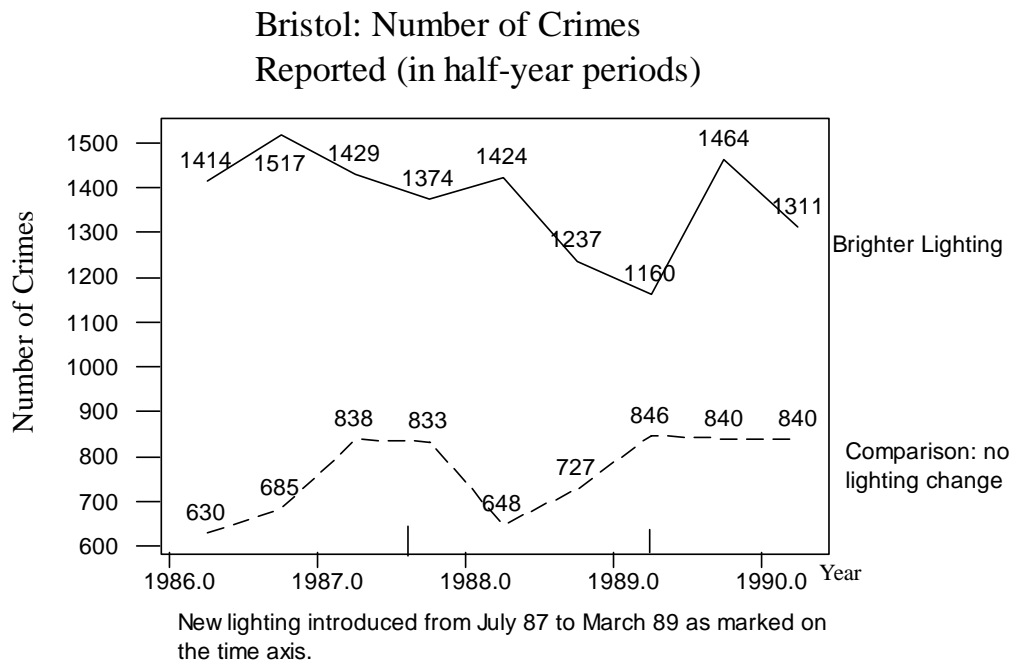
Farrington and Welsh (2006) give a revised analysis saying that a model with a fitted overdispersion of 4.4 gives the overall effect of lighting as still statistically significant. As a consequence of this, the point estimate of reduction is still around 20% but the lower confidence limit moves down to around 10%. Therefore, there is a firm prediction made for new increased lighting schemes. That is, they should give on average a

4 The APPLG is the All-Party Parliamentary Lighting Group, which receives funding from the LIF. See UK Parliament website:

<http://www.publications.parliament.uk/pa/cm/cmparty/050902/memi232.htm>

reduction in crime of at least 10% when such schemes have been introduced. This should be checked scientifically i.e. independently.

However, I have my doubts on the revised claim, even apart from RTM issues, because the only 2 studies whose results remain statistically significant by themselves, hardly show, on examination of their data, convincing evidence of lighting effect.



Also in their 2006 paper Farrington and Welsh claim that RTM is unimportantly small because police 'Basic Command Unit' data does not show much of an effect (only a few percent when comparing adjacent quintile bands) going from year to year. However, these BCU areas are very much larger than those in which the lighting experiments are carried out

and correlation tends to be weaker in smaller areas. Note the quote from Wrigley (1995) “This tendency for correlation coefficients to increase in magnitude as the size of the areal unit involved increases has been known since the work of Gehlke and Biehl (1934)”. It is, of course, when correlation is weak that RTM becomes more important.

The issue of the lighting research was raised on the BBC Radio4 statistics programme ‘More of Less’⁵ on 27 July 2006. It was gratifying that the presenter Andrew Dilnot said that my “doubts about the statistics are serious and reasonable” and it is interesting indeed that he also said “though we asked various people involved in the research to take part in the programme, none replied”.

High Scientific Standards Needed

It has become evident to me, through my investigations, that more exacting scientific and statistical standards are needed in the area of crime research. As well as the need for researchers to be aware of what is lost by not using randomisation of areas or adequate controls, processes such as having detailed protocols with open access to them and the data resulting, are necessary. By registering protocols, the problem of potential dissemination or publication bias (Copas, 2005) should be reduced by ensuring that negative findings should remain as visible as positive ones. Note the World Health Organisation (WHO) has recently moved to register protocols and trials. The title of the comment paper in the Lancet ‘Clinical trial registration transparency is the watchword’ (Sim et al, 2006) is apposite. It is problematic that an ‘outsider’ finds it difficult to get access to the ‘grey literature’, e.g. internal reports, used often quite rightly in research synthesis, as in HORS251. Grey literature needs to be made available.

The issue of transparency is germane to a Private Eye article, p28 No1142 30 Sept 2005, entitled ‘Conflicts of Interest: Let there be light’ which alleges very close involvement, including family ties, between the commissioning of research from the Home Office, academic researching and lighting industry involvement.

One of the consequences of research, good or bad, is that it may get picked up selectively by salespersons and others with interests in promoting a case. For example, the Institution of Lighting Engineers’ book the Outdoor Lighting Guide (ILE, 2005) repeats a lot of what is in the earlier ILE documents, asserting benefits of lighting in crime reduction. It fails to acknowledge any errors in research as outlined above and continues to label research as “impeccable” which in fact has serious flaws in it. The Guide is not complete in failing to make clear that research referred to was funded by the lighting industry. The Outdoor Lighting Guide promotes increased lighting drawing attention to responsibilities under the Crime and Disorder Act 1998, as in earlier ILE documents. It

⁵ http://news.bbc.co.uk/1/hi/programmes/more_or_less/

would be interesting indeed, if by increasing lighting, crime was caused to increase. Sections 2.1 - 2.2.4 of the Outdoor Lighting Guide focus on crime and give what are said to be “evidence-based policy recommendations”. Dubious assertions are repeated; for example; the effect of lighting “is greatest in the most crime-prone areas” and “tends to reduce daytime crime as well as night”. Both of these may be accounted for by nothing more than regression towards the mean. One might conjure with the concept of ‘policy-based evidence’.

The idea that lighting reduces crime during the day time ought to raise alarm bells or at least scientific curiosity. It surely suggests that something might be wrong. Indeed regression towards the mean might explain it; high criminality within an area drifting to towards more average values causing crime levels, both night and day, to drop. If there were indeed a genuine effect of daytime crime dropping, e.g. by the community pride mechanism put forward in HORS251, it would seem doubtful that a new street lighting scheme is the only or most cost effective way to achieve this. The issue of whether any treatment works more effectively in worse cases is an interesting one and perhaps unsurprisingly has been considered in medicine, where standards of research and data are much higher. It is a thorny problem; see Tu and Gilthorpe (2006). One might wonder if those claiming that lighting causes greatest crime reduction in the most crime prone areas have considered matters fully.

Another problem of a seemingly scientific conclusion is that of ‘cost benefit ratio’. Cost benefit analysis has been done based on very few studies of lighting effectiveness by the lighting and crime researchers, Painter and Farrington (2001) and gives a highly favourable result for lighting. However doing this calculation only increases the problem; an unknown, unproven benefit/harm is being compounded with uncertain costs. We need to get much better information to do such an exercise properly otherwise it tends to look ‘scientific’ to the eye of a novice, when in fact it isn’t, because of flimsy data and method. Their paper in *Lighting Research and Technology* is available from the Urbis lighting company website.⁶ One can see that the copyright is held by the Chartered Institution of Building Services Engineers www.cibse.org, an organisation with links to the Society of Light and Lighting.

Selling

The business of selling on the basis of asserted research findings is particularly acute in the case where there is worry within the public at large. Matters today, I suspect, are not so different from previous times when claims were made for therapies of all sorts. Most strange cures were prescribed and indeed sought (and to some extent still are in the wide alternative medicine business. Note the yogic flying method of crime reduction (Park 2000) must match any new age health quackery for absurdity). No doubt in days of yore there were lists of success stories for

⁶ <http://www.urbislighting.co.uk/lightingandcrime.php3>

sworn-by remedies that we now know to be positively harmful; e.g. bleeding sick people. Note it is not a question of sincerity of belief but rather of proper scientific inquiry, e.g. independent and sceptical.

One of the problems is a link between education and marketing. This is one of the practices used by drug companies which Dr Angell MD (former editor of the New England Journal of Medicine) draws to attention in her critique Angell (2004) of the pharmaceutical industry and its distortion of health care in principally the USA context⁷.

What we may be seeing is similar influence of the crime reduction industry.⁸ One can see that in this case that a UK lighting company offers Continuous Professional Development (CPD) in 'Lighting Against Crime'. The website speaks of being "well received by a variety of audiences, including Crime Prevention Officers and Crime Prevention Design Advisors at the Metropolitan Police Training Centre in Hendon. CPD (Continuing Professional Development) is a commitment to structured life long learning and skills enhancement and is a prerequisite of membership for all those who belong to professional institutions within the construction industry." This is somewhat worrying as there is no satisfactory scientific evidence presented to show that lighting reduces crime.

The crime reduction industry seems a lucrative field. There is no particular problem with that, providing the remedies do actually work and have no serious side effects. However, my examination of the area suggests more scepticism is warranted. Would that there were more in the industry who shared the scepticism of the late Archie Cochrane, after whom the worldwide Cochrane collaboration www.cochrane.org is named. "I had considerable freedom of clinical choice of therapy: my trouble was that I did not know which to use and when. I would gladly have sacrificed my freedom for a little knowledge. I had never heard then of 'randomised controlled trials', but I knew there was no real evidence that anything we had to offer had any effect on tuberculosis, and I was afraid that I shortened the lives of some of my friends by unnecessary intervention". Cochrane (1972). Readers may be interested in an article on scepticism in research, Gorard (2002).

I suppose it would be hard for someone in the industry to say (or even think) "crime, that is a tricky problem. It is difficult to know what to do about it" and then to go further "let's do proper scientific trials, done to the highest standard, as then the public can be best assured of getting

⁷ Note also however the report of the Health Committee of the UK Parliament 2005, An Inquiry into the influence of the pharmaceutical industry. www.publications.parliament.uk/pa/cm200405/cmselect/cmhealth/42/4202.htm

⁸ See for example <http://www.dwwindsor.co.uk/index.cfm> and search for 'crime'.

value for money rather than potentially counter-productive nostrums instead.”

There have been a number of criticisms of the drug industry when it has been less than open, for example in coming clean about serious side effects. This is an example of selective reporting and part of dissemination bias mentioned above. Selective reporting is a practice which is against scientific behaviour of transparency and independence. Richard Feynman the US Nobel Laureate physicist has, amongst many of his engaging works, written on what makes science different from non-science/ ‘spin’.⁹

One of the extraordinary aspects has been the point, forcefully made by the authors whose work I criticise, is that by subjecting their claim to close scientific examination there is a risk of making a Type II error; that is not seeing an effect which is in fact really there. Bearing in mind the scientific principle, that the burden of proof falls on those making a claim to have knowledge, this is bizarre. The obvious answer is to do better research, which could be done at moderate cost. It seems clear that much of the problem in this field is that little appears to be known about the occurrence of crime on the relatively small area scale at which the lighting trials operate. Indeed Farrington and Welsh (2004) state “Dr Marchant’s critique has drawn attention to our discipline’s lack of knowledge about key criminological issues” followed by examples where knowledge is lacking. Indeed my essential point is that, it is hard to see how any strong conclusion, about effectiveness or otherwise of an intervention, can be drawn when so little is known about the variation of crime levels when left to just ‘business as usual’ . I am trying to obtain relevant information to examine this issue. Indeed I am attempting to obtain the comparison area data from a national evaluation of CCTV (Farrington et al, 2005).

Good quality research could be done at a fraction of the large sum being spent on the basis of a doubtful justification. Indeed useful information also could and indeed should be obtained when new lighting is installed. This must be evaluated using the highest scientific standards.

Conclusion

I have given an account of some of the context surrounding and my experiences of examining the claim that exterior lighting reduces crime. It is my aim to set out more fully the statistical issues at a later date. I have no reason to think that problems of a similar nature do not exist in regard to other crime reduction interventions. More attention needs to be paid to statistical issues in crime research. What is needed is good quality research, adopting standards routinely used in medical research and from where methods may be transferred. This will include detailed protocols, which are registered and made publicly available at the outset. The precise outcomes measures to be used should be defined at this early stage. This

⁹ See Cargo Cult Science Feynman, (1985).

<http://www.cs.umbc.edu/www/graduate/feynman-cargo.shtml>

should avoid ‘moving the goal posts after the ball has crossed the line’ and data dredging. Procedures which incorporate randomisation and blinding of analysts, in a way which can not be subverted, will add confidence to any conclusions. As I have written above, the matters of crime and ill health share similarities, but the research standards in crime seem to be lower.

Of course lighting is needed to see by at night but the question is “does increased lighting really reduce crime?” Perhaps it does but then again perhaps it does not and in reality perhaps the claim that light reduces crime is being over-hyped. Of course lighting systems may need to be replaced when they are old. However the effects of change need to be checked scientifically. Evaluation of implemented projects needs to be done to high standard also. The costs of research and evaluation would be a small fraction of the cost of the implementation on a wide scale of schemes, which may be ineffective or even counter-productive.

It is important that statisticians look in on the field of crime research to ensure that any claims made are well founded.

References

Angell M (2004) *The Truth About Drug Companies*, Random House ISBN 0-375-50846-5

Atkins S, Husain S and Storey A (1991) *The Influence of Street Lighting on Crime and Fear of Crime*, Crime Prevention Unit Paper No. 28, Home Office.

Bennett A 2005 *The Theft of the Alleys, Walk, the magazine of the Ramblers Association* p82, No. 8 Autumn 2005

Bland JM and Altman DG (1994) Regression towards the Mean, *British Medical Journal* 308 1499;

<http://bmj.bmjournals.com/cgi/content/full/308/6942/1499> available along with much other useful statistical material at: <http://www-users.york.ac.uk/~mb55/>

Clark B (2006) *A Rationale for the Mandatory Limitation of Outdoor Lighting*, Conference Paper

<http://amper.ped.muni.cz/~jhollan/bajc/lp181a.pdf> Other material available at www.asv.org.au

Cochrane AL (1972) *Effectiveness and Efficiency. Random Reflections on Health Services*. London: Nuffield Provincial Hospitals Trust, 1972. (Reprinted in 1989 in association with the BMJ, [Reprinted in 1999 for Nuffield Trust by the Royal Society of Medicine Press, London \(ISBN 1-85315-394-X\)](#))

Copas J (2005) The downside of publication, *Significance* p154 Dec
<http://www.blackwell-synergy.com/toc/sign/2/4>

Farrington DP, Gill M, Waples SJ and Argomaniz J (2005) *The Effects of CCTV on Crime: Meta-Analysis of an English National Quasi-Experimental Multi-Site Evaluation*; Unpublished paper.

Farrington DP and Welsh BC (2002) *Home Office Research Study 251, Effects of Improved Street Lighting on Crime: a Systematic Review*
<http://www.homeoffice.gov.uk/rds/pdfs2/hors251.pdf>

Farrington DP and Welsh BC (2004) Measuring the Effects of Improved Street Lighting on Crime: A reply to Dr. Marchant *The British Journal of Criminology* 44 448-467
<http://bjc.oxfordjournals.org/cgi/content/abstract/44/3/448>

Farrington DP and Welsh BC (2006) How Important is Regression to the Mean in Area-Based Crime Prevention Research?, *Crime Prevention and Community Safety* 8.
<http://www.palgrave-journals.com/cpcs/journal/v8/n1/index.html>

Feynman RP (1985) 'Surely You're Joking, Mr. Feynman!' (Adventures of a Curious Character), Norton New York.

Gorard S (2002) Fostering Scepticism: The Importance of Warranting Claims, *Evaluation and Research in Education*, 16, p136 Available under resources at <http://www.trials-pp.co.uk/>

Hillyard Paddy, Pantazis Christina, Tombs Steve, Gordon Dave and Dorling Danny. *Criminal Obsessions: Why harm matters more than crime*, ISBN 0-9548903-1-0 Crime and Society Foundation, available as .pdf www.crimeandsociety.org.uk Oct. 2005, London

Hope T (2006) , 'Things can only get better' *Criminal Justice Matters* No62 p18, The Centre for Criminal Justice Studies, Kings College, London
In <http://www.crimeandsociety.org.uk/opus31/Hope.pdf>

ILE, Institution of Lighting Engineers (2005) *The Outdoor Lighting Guide*. UK: Taylor and Francis.

Leeds City Council (2004) *Outline Business Case for PFI Credits to the DfT: Street Lighting Scheme*, revised July 2004.

Marchant P (2006) Shining a light on evidence based policy: street lighting and crime, *Criminal Justice Matters* No. 62 p18, The Centre for Criminal Justice Studies, Kings College, London
In http://www.crimeandsociety.org.uk/opus33/Marchant_final.pdf
See also <http://www.crimeandsociety.org.uk/articles/userresearch.html>

- Marchant P (2005) What Works? A Critical Note on the Evaluation of Crime Reduction Initiatives, *Crime Prevention and Community Safety* 7 (2) 7-13.
<http://www.palgrave-journals.com/cpcs/journal/v7/n2/index.html>
- Marchant P (2004) A Demonstration that the Claim that Brighter Lighting Reduces Crime is Unfounded, *British Journal of Criminology*, 44, (3) May 2004, pp.441-447.
<http://bjc.oxfordjournals.org/cgi/content/abstract/44/3/441>
- Marchant P (1994) The Long View and the Big Picture in Williams C.C. and Haughton G eds. *Perspectives Towards Sustainable Development*, Avebury Studies in Green Research
- Markland F (2004) Last Word from Westminster *The Lighting Journal*, March/April. Rugby: Institution of Lighting Engineers.
- Mizon, Bob (2002) *Light Pollution: Responses and Remedies* Springer ISBN1-85233-497-5
- Painter K (1999) *A Guide for Crime and Disorder Reduction through a Public Lighting Strategy* Rugby, Institution of Lighting Engineers
- Painter K and Farrington DP (1997) The Financial Benefits Of Improved Street Lighting, Based On Crime Reduction, *Lighting Research and Technology* 33 pp 3-12 copyright The Chartered Institution of Building Services Engineers
- Painter K and Farrington DP (1997) Crime Reducing Effect Of Improved Street Lighting: The Dudley Project in *Situational Crime Prevention: successful case studies* ed. RV Clarke (2nd edition) NY: Harrow and Heston
- Park RL (2000) *Voodoo Science: the Road from Foolishness to Fraud*, Oxford OUP pp28-31
- Pease, K (1999) *Lighting and Crime*. Rugby: Institution of Lighting Engineers.
- Private Eye (2005) 'Conflicts of Interest: Let there be light' Issue No. 1142, p28, 30 Sept 2005
- Ramsay, M and Newton, R (1991) *The Effect of Better Street Lighting on Crime and Fear: A Review*. (Crime Prevention Unit Paper 29.) London: Home Office.
- Rich C and Longcore T (2006) *Ecological Consequences Of Artificial Night Lighting*, Island Press ISBN 1-55963-129-5

Sim I, Chan AW, Gulmezogulu AM, Evans T, Pang T, (2006) Clinical trial registration transparency is the watchword *Lancet* 367 p1631-3, 20 May

Tien, JM, O'Donnell, VF, Barnett, A and Mirchandani, PB (1979). *Street Lighting Projects: National Evaluation Program, Phase 1 Report*. Washington, D.C.: National Institute of Law Enforcement and Criminal Justice, U.S. Department of Justice.

Tu YK and Gilthorpe M S (2006) Revisiting the relationship between change and initial value: A review and evaluation, *Statistics in Medicine* in Press.

United Kingdom Parliament (2006) website. Register of All Party Groups, All Party Parliamentary Lighting Group, note on 'benefits received by group from sources outside Parliament'. London: UK Parliament <http://www.publications.parliament.uk/pa/cm/cmparty/050902/memi232.htm>

Welsh, BC and Farrington, DP (2002) *Home Office Research Study 252, Effects of CCTV on Crime: a Systematic Review*. <http://www.homeoffice.gov.uk/rds/pdfs2/hors252.pdf>

Wrigley N (1995), Revisiting the Modifiable Areal Unit Problem and Ecological Fallacy pp49-71 in Gould PR, Hoare AG and Cliff AD eds. *Diffusing Geography: Essays for Peter Haggett*

Appendix

British Standard 5489 2003,

Committee made up of:

Chartered Institution of Building Services

Campaign to Protect Rural England

County Surveyors' Society

Department of Transport, Local Government and the Regions -

Construction

Directorate

Department of Transport, Local Government and the Regions - Highways

Agency

General Aviation Awareness Council

Institution of Electrical Engineers

Institution of Lighting Engineers

Institution of Mechanical Engineers

Lighting Industry Federation Ltd

Scottish Office - Construction and Building

Co-opted members