Shining a light on evidence-based policy: street lighting and crime

Paul Marchant disputes the methods, and therefore the outcome, of an influential study that is the government's rationale for increased street lighting.

Many social, scientific and political debates are conducted using numerical information to support an argument. The question is: "does the evidence stand up?" Certainly the question "does a crime reduction method work?" is one which must ultimately be settled using numbers, because if the method does work, crimes will be fewer, on average. This brings in the discipline of statistics, simply because we need to be convinced that any reduction observed is more than might reasonably be expected to have occurred anyway; i.e. due to the many other factors which can affect the number of crimes committed and counted.

The poor use of statistical reasoning can have disastrous consequences, as in the Sally Clark conviction. The President of the Royal Statistical Society (RSS) writing to the Lord Chancellor concerning this sorry case made the following point: "Although many scientists have some familiarity with statistical methods, statistics remains a specialised area... ensure that statistical evidence is presented only by appropriately qualified statistical experts" (Green, 2002). It is important that this is taken heed of outside the courtroom too. Crime reduction is a case in point. Studies may seem to be scientifically valid because they have used statistical methods, but if these methods are used wrongly then the validity is illusory.

An example is a piece of work by two criminologists who claimed that increased street lighting reduces crime; see Farrington and Welsh (2002) Home Office Research Study 251. This study has been an important justification for government policy – yet my ongoing debate with the authors and the governmental body involved is that the use of statistical methods in this study lacks sufficient rigour and so the claim is not supported by the data.

The two principal statistical errors in the work are:

1) Unrecognised non-independence, through making 'the unit of observation error'.

Crimes are related, e.g. through repeat offending, yet were treated as statistically independent events. This greatly increases the variability in crime counts, because one criminal stopping or starting can make a big difference in the number of crimes counted in a small area. Large variation makes it uncertain what the true underlying level of crime is. The variation seems to be greater than the revised estimate given by the HORS251 authors. This causes any putative crime reduction 'signal' to be masked by large variability, 'noise'. In short we cannot tell whether lighting reduces or increases crime.

2) Regression towards the mean.

The areas being compared have different crime levels at the start. The one getting increased lighting has higher crime than its comparator which has no new brighter lighting installed. The well-known effect of 'regression towards the mean' is likely to see crime preferentially reduced in the higher crime area anyway, whether or not it got new lighting. It is a particularly severe problem when correlation from year to year is relatively weak as it is likely to be in small areas; see Bland and Altman (1994).

I gave a simple account of the issues and what needs to be done to get reliable information (Marchant 2005). An earlier short publication (Marchant 2004) which pointed out errors in HORS251 was followed on the next page by a long response from the HORS251 authors. (Additionally an addendum was added to HORS251 in response to the criticism -- it mentions my name as though I agree with it). A reply to the authors' response detailing points of contention was sent to the Home Office in December 2004 and was passed to the authors. Nothing has been heard directly from them on this, an example of how even strongly contested data may be adopted as evidence for government policy.

On the other hand, I have spoken to audiences well qualified in statistics and I would say that there has been surprise that a claim for lighting reducing crime could be made on the basis it has. It is a pity that the Home Office did not take independent advice from a statistics department with particular expertise in the issues involved to examine the research.

Of course absence of evidence that lighting reduces crime does not mean that lighting has no effect on crime. We just do not know what the effect of lighting is. As far as is known, lighting may either increase or decrease crime. The point of scientific method is to conduct well designed and executed studies so that good evidence is obtained sufficient to decide, thereby lifting the veil of ignorance. This is the only way to decide whether an intervention reduces or increases crime and it could be done well and relatively cheaply.

This is more than a matter of 'academic' interest, as policy decisions cost potentially billions of pounds. High benefit/cost ratios are claimed giving a spurious scientific legitimacy, when in fact the ratio is unknown and may be negative. For example, Leeds is one of a number of authorities planning to implement a relighting Private Finance Initiative (PFI). In Leeds, it will amount to spending more than £100 per head of population. The claim of lighting's crime-reducing effect is made extensively, on one-third of the pages of the document justifying the case (see Leeds City Council 2004). What happens if the grand claims are not forthcoming? (Note the Wandsworth study; Atkins *et al* 1991). What if matters get worse?

I initially examined the issue of lighting and crime because of concerns over the various negative environmental impacts of increasing exterior lighting. The idea that light is needed to keep 'evil at bay' also seemed frankly rather medieval. The statement "Since these studies did not find that night-time crime decreased more than daytime crime ...", (p. vi in Summary

of HORS251) does rather raise a suspicion that something might be wrong. Additionally there are major concerns about the diversion of substantial public funds. It is important that the case for spending stands up; funds should only be given to programmes for which there is sound evidence of benefit. Crime reduction is not the only reason for having night-time lighting, but it is made a very great deal of by the lighting industry.

The Outdoor Lighting Guide, recently published by Institution of Lighting Engineers (ILE, 2005), repeats much that is in the earlier ILE documents. It fails to acknowledge any errors in research as outlined above and continues to label research as "impeccable" which is in fact flawed. The *Guide* is incomplete; for example it fails to make clear that the review done in July-August 1998 was commissioned by the Lighting Industry Federation (LIF), the industry's trade body. (The review was published as a 45-page booklet by the ILE – see Pease, 1999). The *Guide* promotes increased lighting to local authorities by drawing attention to their responsibilities under the *Crime and Disorder Act 1998*. It would be interesting indeed if by increasing lighting, crime was caused to increase. This is more reason to collect information and evaluate outcomes in a properly scientific way.

The sections of the *Guide* which focus on crime (2.1 - 2.2.4) give what are said to be "evidence-based policy recommendations" which repeat dubious assertions; 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 describe the recommendations as the lighting industry's 'policy-based evidence'.

The lighting industry knows of the flaws in the claim for lighting benefit. My work has been noted in the *Lighting Journal*, the magazine of the Institution of Lighting Engineers (ILE), which claims that the All Party Parliamentary Lighting Group (APPLG) and the ILE would hope to show my analysis as "utterly absurd" (Markland, 2004). It is important to note the connections between the APPLG and the lighting industry. On the APPLG page of the UK Parliamentary website it states: "Lighting Industry Federation provides secretarial support, including the funding of two part-time research assistants who work for the group, and also provides occasional working luncheons to which members of the group are invited" (UK Parliament 2006).

Just in this one area it is easy to see the impact of dubious claims. It is clear that sound scientific research is needed – otherwise we run the risk of implementing ineffective or counter-productive measures. If it is obvious that lighting reduces crime, as some might claim, then lighting's beneficial effect can be easily found scientifically. High-quality research could be done at a fraction of the cost of implementing unproven, potentially counterproductive solutions on a wide scale. It is also necessary to get valid independent assessments of the impact on crime of schemes which have been implemented. ■

***Paul Marchant** is a Chartered Statistician working at Leeds Metropolitan University across a range of areas. He has concerns about the inappropriate use of statistical methods giving rise to negative consequences.*

Continued on page 45

'Street Lighting' continued from page 19

References

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.

Bland J.M. and Altman D.G. (1994) *Regression Towards the Mean*, British Medical Journal 308 1499; http://bmj.bmjjournals.com/cgi/content/full/308/6942/1499 available along with much other useful statistical material at: http://www-users.york/ac.uk/~mb55/

Farrington, D. and Welsh, B. (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

Green, P. (2002) *Letter from the President to the Lord Chancellor regarding the use of statistical evidence in court cases, 23 January 2002*, London: Royal Statistical Society. http://www.rss.org.uk

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. (2005) 'What Works? A Critical Note on the Evaluation of Crime Reduction Initiatives', *Crime Prevention and Community Safety* 7 (2) 7-13. www.extenza-eps.com/PERP/doi/abs/10.5555/crpr.2005.7.2.7 also see http://praxis.leedsmet.ac.uk/praxis/Publications/publicationsmarchant.htm for further papers and presentations.

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/reprint/44/3/441?ijkey=248zvehLpmor2&keytype=ref

Markland, F. 'Last Word from Westminster' *The Lighting Journal*, March/April 2004. Rugby: Institution of Lighting Engineers.

Park, R. L. (2000) *Voodoo Science: the Road from Foolishness to Fraud*, Oxford: OUP, pp 28-31.

Pease, K. (1999) *Lighting and Crime.* Rugby: Institution of Lighting Engineers.

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

'Researching Corporate Crime' continued from page 25

focuses overwhelmingly, as Hillyard points out, on what are in the scheme of things rather petty events. For what is any social science if it does not shine a light on power and its operation, to learn much more about how power operates and is maintained, how resistance to power is neutralized – and thus how that power and its socially corrosive effects might be more effectively challenged? ■

Steve Tombs *is Professor of Sociology at Liverpool John Moores University and* ***Dave Whyte*** *is a lecturer in the Department of Sociology, Social Policy and Criminology at the University of Stirling.*

References

Braithwaite, J. (1984) *Corporate Crimes in the Pharmaceutical Industry.* London: Routledge and Keagan Paul.

Geis, G. and Goff, C. (1983) Introduction, in Sutherland, E., *White Collar Crime: The Uncut Version.* London: Yale University.

Jupp, V. (1989) *Methods of Criminological Research.* London: Unwin Hyman.

Punch, M. (1996) *Dirty Business: Exploring Corporate Misconduct.* London: Sage.

Slapper, G. and Tombs, S. (1999) *Corporate Crime.* London: Longman.

Snider, L. (2003) 'No Funding, No Access, Then You Get Sued: Methodological Obstacles to Studying Corporate Crime', in Tombs, S. and Whyte, D. (eds.), *Unmasking the Crimes of the Powerful. Scrutinising states and corporations*, New York: Peter Lang.

Tweedale, G. (2003) 'Researching Corporate Crime: a Business Historian's Perspective', in Tombs, S. and Whyte, D. (eds.), *Unmasking the Crimes of the Powerful. Scrutinising states and corporations*, New York: Peter Lang.

Walklate, S. (2005) *Criminology: The Basics.* London, New York: Routledge.