THE INFLUENCE OF STREET LIGHTING ON CRIME AND FEAR OF CRIME

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Crime Prevention Unit Papers

The Home Office Crime Prevention Unit was formed in 1983 to promote preventive action against crime. It has a particular responsibility to disseminate information on crime prevention topics. The object of the present series of occasional papers is to present analysis and research material in a way which should help and inform practitioners whose work can help reduce crime.

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Foreword

This report, on street lighting, crime and fear, breaks fresh ground. Earlier work has been limited to short-term investigations of small areas, or even individual blackspots. The research presented here, which was carried out in the London Borough of Wandsworth, deals with the criminological impact of some 3,500 brighter street lights. The timeframe for 'before' and 'after' comparison was a full twelve months in each case, while the total database comprised over 100,000 crimes reported to the police.

The team from the University of Southampton who carried out this research concluded that, as deployed on a broad scale, better street lighting has had little or no effect on crime. In their words, "the dominant overall conclusion ... was of no significant change" On the other hand, they did find that the improved street lighting was warmly welcomed by the public, and that it provided a measure of reassurance to some people - particularly women – who were fearful in their use of public space.

This report is perhaps slightly more technical than is usual in this series of Crime Prevention Unit Papers. To complement it, a readily accessible overview both of this and other relevant work has been prepared. That assessment, *The Effect of Better Street Lighting on Crime and Fear: a Review, is* being published at the same time as this report, as Crime Prevention Unit Paper 29.

I M BURNS
Deputy Under Secretary of State
Home Office, Police Department
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Summary

There is a widely held belief that the improvement of street lighting will reduce both crime and fear of crime. Improved visibility, it is thought, will increase the possibilities for identification and apprehension of criminals and hence deter the perpetration of criminal acts, while also providing reassurance to those people who are fearful for personal safety in public places. However, there is little firm evidence to support these beliefs. This research aims to fill that gap.

In 1985 the London Borough of Wandsworth commenced a programme to re-light the complete borough to a very high standard, partly with the aim of crime prevention. This research involved compilation of a database containing details of the dates, times and locations of over 100,000 crimes reported to the police in the Battersea and Tooting police divisional areas. This has been matched to the dates and areas where 3500 new street lights were installed, focussing mainly on data for one year before and one year after the introduction of new street lighting in 39 separate zones.

No evidence could be found to support the hypothesis that improved street lighting reduces reported crime. Although some areas and some crime types did show reductions in night-time crime relative to the daylight control, the dominant overall pattern, from which this study draws its authority, was of no significant change.

A secondary part of the study assessed the attitudes and behaviour of residents and their experience of crime not reported to the police. Social surveys were conducted with a panel of residents in a re-lit area and an adjacent control area before and after re-lighting. The perceived safety of women walking alone after dark in the re-lit area was improved, but few other effects were statistically significant. No change in un-reported crime, harassment or travel behaviour could be detected. Nevertheless the reaction of residents to the re-lighting scheme was overwhelmingly favourable; it is without doubt a popular measure.

It was concluded that although street lighting was welcomed by the public and provided reassurance to some people who were fearful in their use of public space, the area-wide introduction of new street lighting did not reduce reported crime.

Introduction

Reasons for the research

Does street lighting prevent crime? Making changes to environmental conditions and operational practices to discourage crime has become a well established part of conventional crime prevention wisdom. These ideas, usually termed 'Situational Crime Prevention' (SCP), underlie a considerable portion of current crime prevention efforts, including many elements of the Home Office's 'Crack Crime' campaign since 1988. Improved street lighting is entirely consistent with SCP concepts; increased visibility should both reduce opportunities for crime and increase the probability of an offender being caught. But, does it really work?

Fear of crime has become recognised as a problem in its own right (eg Home Office, 1989). Fear of crime affects travel and activity patterns, constrains participation in social activities, generates psychological stress, and is arguably a severe limitation on individual liberty. It is widely believed that effective street lighting can combat these individual concerns. Are those beliefs correct; does street lighting reduce fear of crime?

Improved street lighting is not only favoured by many crime prevention professionals, it is also one of the most common suggestions made by people fearful in their use of public open spaces as a means of both crime prevention and fear reduction.

Several local authorities have commenced re-lighting programmes and many others are considering whether to do so, with crime prevention and fear reduction being major influences on decision-making. However, there is remarkably little firm evidence on the effectiveness of street lighting as a crime prevention measure (see next section). Similarly, one of the conclusions of the 1989 Working Group on the Fear of Crime, under the auspices of the Home Office Standing Conference on Crime Prevention, was: 'Fear of crime is an under-researched issue…; it is essential that more evaluative research is carried out …' The research reported here aims to fill these gaps in an important area of public policy: what effect does street lighting have on crime and fear of crime?

Previous research

It is now well established that the level of specific crimes can be reduced by changing the physical situation in which they occur (Clarke and Mayhew, 1980 Heal and Laycock, 1986). Most obviously, this can be achieved by making the target of a crime more resistant to attack or by removing it completely. Less directly, modifying the environmental conditions in which crimes are committed can also be effective and contribute to a reduction in fear.

Improved street lighting has been suggested frequently as a measure that would both increase the risks of detection and reduce fear. On the assumption that crime is normally a covert activity and that offenders will assess the risk of being seen when making a decision about committing a crime, it is argued that improved lighting will encourage people to notice suspicious activity, increase opportunities for surveillance, and therefore will act as a deterrent. At the same time, given that fear is greatest after dark, it is assumed that, by reducing darkness, fear will also be reduced.

Whilst intuitively attractive evidence to confirm the beneficial effects of improved street lighting is limited. Fleming and Burrows (1986) report that the picture produced by the large number of studies in the United States 'is far from conclusive' and highlight the contrasting findings of three particular studies. An analysis of four high-crime areas in the District of Columbia found a marked reduction in crime following re-lighting (Hartley, 1974). In Kansas City, a major re-lighting programme led to lower levels of robbery and assault, some of which appeared to be displaced, but left property crime unaffected (Wright *et al*, 1974). However, Jones's (1975) assessment of lighting improvements in two police areas of New Orleans showed negligible change in the level of night-time crime. Nevertheless, assessments of sociological impact have been more encouraging and consistent, and suggest that increased - or more uniform - lighting does reduce fear.

At the time of writing, in 1986, Fleming and Burrows indicated that 'little research of any consequence has been carried out… in the U.K. '. Since then several studies have been published, most of them covering areas in London and undertaken by Painter with funding from various lighting manufacturers (Painter, 1988, 1989a, 1989b). These investigations have a common formula: each has covered a small badly-lit area and involved surveys carried out shortly before and shortly after re-lighting. Sample sizes were very small (24 incidents were recorded in Edmonton and 22 in Tower Hamlets), but Painter was in no doubt that re-lighting had led to a reduction in both the occurrence and fear of crime. Specific improvements were recorded in the incidence of threats, vandalism, autocrime and physical attacks, although there was considerable variation between areas.

Three further studies deserve mention. A study of lighting on three estates in the London Borough of Brent showed that residents believed lighting improvements were an important part of the solution to the crime problem (Safe Neighbourhoods Unit, 1989). However, a survey of community safety in Brighton revealed that there was little overlap between areas avoided because of fear of crime and areas that were poorly lit (Demuth, 1989). A study of the concurrent introduction of closed circuit television (CCTV) and re-lighting in a subway complex in Southampton showed significant improvements in perceived safety, despite low levels of awareness of the environmental changes. There were several indications that street lighting may have been more influential than CCTV (Atkins, Atkins and Lee, 1990).

The seemingly contradictory results of evaluative studies are not surprising. Many factors influence the level of actual crime and perceived risk, of which lighting may be one. The relative importance of these factors is likely to vary between areas so that, although lighting may be a major influence in certain locations, its significance elsewhere may be minimal compared to other factors (Ramsay, 1989). Indeed, it has been suggested that in certain circumstances better lighting may actually lead to an increase in the level of specific offences (Fleming and Burrows, 1986).

The impact of re-lighting may also be affected by the scale of lighting improvement and other technical considerations. Introducing lighting in an area previously without any illumination would seem more likely to have an effect than an incremental improvement. Moreover, there is no single specification for 'good quality'. Decisions are made locally that affect the level of illumination, uniformity of light, glare, colour and the aesthetics of any new installations (Coatham, 1990). Consequently, the 'treatment' varies between areas.

Contrasting conclusions may also be explained by variation in the time scale and spatial coverage of individual studies. Painter has shown how improved illumination can bring localised benefits over a short period. However, 'many forms of social intervention only have short-term effects, which subsequently taper off' (Ramsay, 1989). Moreover, each of Painter's small study areas included a narrow walkway or railway tunnel, locations that are widely recognised as potential troublespots and where re-lighting would be most likely to be beneficial. The results could well be different when re-lighting is less well-targeted or applied across larger areas.

One final influence on the outcome of such studies is their research methodology. Various authors have drawn attention to the practical difficulties which arise with such research (Tien *et al*, 1979; Fleming and Burrows, 1986). Large-scale long-term investigations often have to be based on imperfect data or imperfect control of extraneous variables. Small-scale short-term studies may suffer from statistically inadequate samples. Studies based on strict legal definitions of crime or recorded/reported offences may generate different findings to those based on victim surveys that include unreported incidents as well as nuisances or incivilities that may not constitute actual offences. Each conclusion therefore needs to be critically assessed within the context of its specific research framework.

These issues serve to highlight the complexity of lighting-related research. Although it is possible to speculate on the reasons for contrasting findings in individual studies, we are a long way from understanding how, where and when investment in improved lighting is likely to be worthwhile. This is particularly true in Britain where very few studies have been completed. Painter's work is providing useful and consistent information about short-term impacts on particular types of small areas. However, very little is known about longer-term effects or the benefits of re-lighting programmes that are less well-targeted or which are implemented across much wider areas.

The present study

Against this background, this report presents the results of a project that was initiated to add to our limited understanding of the crime-related effects of un-targeted major re-lighting programmes. Its aim was to assess the impact on crime, fear of crime and individual behaviour, with particular emphasis on street-crime levels over an extended period of time.

The area chosen for this study was the London Borough of Wandsworth, where in the mid-1980s work began to renew all the existing street lights. This massive undertaking was precipitated by the accelerating failure of old lighting columns, Rather than just replace existing installations with new technology, the opportunity was used to carry out a comprehensive review of lighting policy. The outcome was a decision to adopt anew strategy which placed strong emphasis on the use of street lighting to create safer and more secure communities (Dickinson and Palmer, 1987).

As a consequence, a decision was taken to implement an eight-year phased programme that will eventually cost over £10 million and involve the installation of over 20,000 new lights. The location, spacing and technical specifications of these lights have been strongly influenced not just by existing locations or traffic requirements but, unusually, also by considerations of public safety and security, In general, it has led to installation of very high performance lighting, a situation that has led the Borough to adopt the slogan 'Wandsworth the Brighter Borough'. Re-lighting in residential areas has typically produced a four-fold increase in illumination. The first lights were commissioned in November 1985, since when many of the areas in the eastern part of the Borough – covering the Battersea and Tooting Police Divisions - have been re-lit. It was on these areas that the research focussed.

There were two parts to the study. In the first, the temporal and spatial pattern of the re-lighting programme of the London Borough of Wandsworth was related to the crime reports held at Battersea and Tooting Police Stations. The aim here was to determine whether the progressive introduction of much improved quality of street lighting had a discernible influence on reported crime statistics. If a relationship was found, then further analysis of possible crime displacement effects would be carried out.

A second subsidiary component of the study was aimed at assessing various other effects stemming from the introduction of new lighting, The main targets were firstly changes in public perceptions, together with any subsequent modifications to travel patterns, and secondly changes in the occurrence of non-reported crimes and incivilities. Interviews were conducted with residents in an area before re-lighting and repeated with the same people several weeks after the streets had been re-lit. Interviews were also conducted concurrently in an adjacent control area which was not re-lit.

This report aims to describe the study in an accessible style. However, the analysis of the social surveys relies on some sophisticated analysis using multiple regression which can safely be omitted by the non-technical reader.

Analysis of reported crime

Research design

The research aim was to test whether street lighting reduced crime. However, it was not anticipated that street lighting would deter all types of crime. Hence although all crime types were studied, attention was focussed principally on a group of crimes considered likely to be affected by environmental influences. These are henceforth referred to as *'likely'* crimes and defined in detail later. Similarly street lighting can only plausibly affect crimes perpetrated when switched on, that is *after dark.* Finally, improved street lighting could only affect crime where it was installed, in the areas which had been re-lit or the *'treated' areas.* Hence the basic hypothesis to be tested was whether considerably improved street lighting had reduced *'likely'* types of crime *after dark* in the *treated* areas.

The time periods studied were one year before and one year after re-lighting, excluding the month in which the zone was re-lit. The one year period effectively controls for any seasonal crime patterns, in particular any changes associated with the different durations of daylight and darkness in summer and winter.

To assess whether night-time crime of 'likely' types had declined in the treated areas it is also necessary to control for other, non-periodic trends in crime occurrence. In principle the night-time crime rate in other areas which were not re-lit could serve as a control. However, the use of daytime crime in the same zone provides an effective control both for temporal trends and for changes in physical characteristics, such as changes in land use. For example, buildings may be constructed or demolished; use of property may switch between residential and commercial uses; or different types of household may move into an area (eg gentrification of Battersea). But although the spatial structure, land use mix or social characteristics of the zone may have changed during the study period, these would affect crime occurrence both by day and by dark. Any relative changes (eg a change of land use to a type more susceptible to night-time crime) would only produce very small effects. Even changes in policing strategies would, in principle, be controlled for in this way, provided that the *relative* enforcement effort between daylight and darkness was unaffected.

Using daylight crime as a control the hypothesis to be tested therefore became that the *proportion* of 'likely' crimes occurring during darkness had declined in the treated zones.

Finally if re-lighting were found to lead to a relative decline, it would be necessary to consider whether there has been any displacement. This could occur in three separate ways:

(i.) to daylight hours in the same zone
(ii.) to other crime types in the same zone
(iii.) to other areas

The principal hypothesis therefore incorporates both possible reductions in crime of 'likely' types after dark in treated areas (from effects i to iii above) *and* possible increase in day-time crimes (effect i above). Should this hypothesis have been proven, then further analysis would have been necessary to study in detail the relative magnitudes of the displacement effects.

Data acquisition

The re-lighting programme of the London Borough of Wandsworth began in November 1985. Acquisition of data from police stations was planned to take place in Summer 1989. These dates meant that data were obtained for the period between November 1984 and August 1989, to provide an analysis base for the zones re-lit between November 1985 and August 1988.

The zones were mainly coherent groups of streets that were subdivisions of local authority voting wards. In some cases, however, individual streets, often the major traffic routes, were re-lit separately. For convenience both these types of area are subsequently called *re-lighting zones.* A map showing the location of the zones, incorporating a list of these individually re-lit streets, is given in Appendix A.

During the period being studied both police stations switched from manual to computerised recording of crime reports. Data acquisition therefore involved two processes, manual transcription of data from documentary records in the pre-computerised period and electronic transfer of crime record data for the later period. While in principle these processes seemed simple, in practice there was considerable complexity. A more extensive account of the acquisition of reported crime data is given in Appendix B. Eventually a total database of 100,816 reported crimes was obtained, covering the periods shown in Table 1.

Table 1: Reported crime database

Police division	Period covered	Analysis to cover zones re-lit between:
Battersea	Jan 85-Sept 88	Jan 86-Sept 87 (17 zones)
Tooting	Nov 84-Aug 89	Nov 85-Aug 88 (22 zones)

Crime reports

Throughout this study, allegations of criminal offences were used as the basic unit for analysis: that is, crimes reported to the police rather than crimes eventually formally recorded by them. This strategy was adopted purely for practical reasons; since the police computerised database used reported crime, there was effectively no choice in this matter. However there are also reasonable theoretical grounds to support the use of reported crimes for this study. Reported crimes exceed recorded crimes by about 10 per cent, including matters reported to the police but subsequently withdrawn and those allegations 'no crimed' by police officers for reasons of lack of corroboration, inadequate seriousness, etc. Reported crimes are therefore perhaps a slightly stronger if not better indicator of public concern about crime than the formally recorded crime statistics.

Crime types

Crimes reported to the police are categorised by crime type using an extensive and detailed classification. Up to 129 crime types were in use at one police station, for example. For the purposes of this research these categories were aggregated into a set of 30 crime types contained within the four main police crime record books: major, beat, motor vehicle and burglary. Subsequently these 30 crime types were allocated to three categories indicating their likely susceptibility to changes in street lighting. The categories were:

(i.) crimes thought likely to be influenced by changes in street lighting
(ii.) crimes possibly affected by street lighting
(iii.) crimes thought unlikely to be affected by street lighting

Allocation was made on the basis of three factors. First, was there a reasonable proportion of crime occurring during darkness? If most crime of a particular type occurred during daylight then re-lighting could contribute little to crime prevention. Examples of crime predominantly occurring in daylight are shop-lifting and entering by deception (burglary-artifice). Second, was the crime likely to occur outdoors? Crime occurring mainly within buildings (eg theft by employee, other sexual offences) is unlikely to be affected by street lighting, although access to and from the premises may be relevant. Third, was motivation for crime likely to be affected by street lighting? Major crimes such as robbery and, to a lesser extent, violence against the person are strongly motivated and are unlikely to be affected by environmental conditions. Street lighting would be expected to have a stronger influence on opportunistic crime. The allocation of crimes to categories is shown in Appendix C.

Dividing crimes into these categories indicated that some 70 per cent of reported crime might be influenced by street lighting (principally due to the numerically large motor vehicle categories), 25 percent were possibly influenced and 5 per cent were unlikely to be affected.

Daylight and darkness

For the purposes of the research it was necessary to classify crimes according to whether they occurred when street lighting was switched on. The street lighting engineers of the London Borough of Wandsworth advised that published lighting-up times were an appropriate indicator of street lighting illumination times.

But while the precise time of certain offences is known, many crimes occur in the victim's absence and the period within which the event took place can span several days or even weeks. Police records provide the date and time for the earliest and latest time at which the alleged offence could have occurred. From this time 'window' for the offence and tables of lighting up times, a *lighting index* was calculated for each offence ranging from 0 (definitely in darkness) to 1 (definitely in daylight). The lighting index represents the proportion of the 'window' that was daylight. For example if a crime window spanned 4 hours before and 1 hour after lighting-up time (eg finding car damaged when returning just after dark) then the lighting index would be 4/5 of 0.8. This value also represents a probability that the offence occurred in daylight.

Using only crimes that could be allocated to daylight or darkness with absolute certainty (ie lighting index values of 1 and 0 only) would have meant disregarding a large part of the available data. For crimes susceptible to the influence of street lighting this was sometimes more than half the data. For crimes such as car thefts and criminal damage the time of the offence is less likely to be known precisely; indeed, frequently the crime window spanned lighting-up time. It was decided therefore to include offences where there was a high probability y of occurrence in either daylight or darkness (ie lighting index values close to zero or close to 1).

The results presented subsequently use lighting index values of 0.00-0.25 as 'dark' and 0.75-1.00 as 'day'. The selection of 0.25 and 0.75 was influenced by the distribution of lighting index values which showed discontinuities at about these points. Using this definition, data loss was reduced to about 30 per cent and the overall average probability of mis-classification was only about 2.5 per cent. (See Appendix D for further details.) Given the other possible data errors, arising either from original police entries or from transcription, this was considered an acceptable margin. Sensitivity tests using the strict definitions gave broadly similar results but had lower statistical significance since sample sizes were smaller.

Results and discussion

Table 2 presents the numbers of reported crimes in all re-lit zones in each of the categories of susceptibility to street lighting by 'day' and 'dark' for one year before and one year after re-lighting. Also given are the numbers of crimes that could not be allocated to either day or dark, and the percentages of the total sample in each category.

Since there can be no presumption that day-time crime is static, all four basic numbers (day and dark crimes, before and after re-lighting) must be considered as variables and hence the appropriate statistical testis the Chi-squared contingency test, incorporating the continuity correction (see Appendix E for full details). In this and subsequent tables, significance above the 90 per cent level is noted. Although 95 per cent level is more commonly adopted as a statistical criterion, it was thought appropriate to consider a wider range to identify any possible influences on the data at this stage. The Chi-squared test identifies whether significant change has occurred, but not the direction of that change. To assist interpretation, therefore, also tabulated is the percentage change in night-time crime relative today-time (subsequently referred to as RPC). This is calculated by finding the percentage change between before and after day-time crime levels and applying this to the 'dark-before' figure. This provides an 'expected' 'dark-after' figure. The RPC is the percentage difference between this expected value and that actually observed. (See Appendix E for full details and an example.) A negative value indicates that crime in darkness has declined faster than that during daytime and vice-versa.

Table 2: Reported crimes in all re-lit zones one year before and one year after re-lighting by crime type groupings

Susceptibility to street lighing	Before			After				
	Day	Dark	Don't know	Day	Dark	Don't know	RPC'	SIG[2]
Likely	1419 (27%)	2097 (40%)	1722 (33%)	1166 (27%)	1676 (39%)	1446 (34%)	-2.7%	No
Possible	800 (43%)	522 (28%)	542 (29%)	788 (45%)	518 (30%)	447 (25%)	+0.7%	No
Unlikely	192 (51%)	113 (30%)	73 (19%)	192 (54%)	86 (24%)	80 (22%)	-23.9%	No
All crimes	2411 (32%)	2732 (37%)	2337 (31%)	2146 (34%)	2280 (36%)	1973 (31%)	-6.3%	No

Notes.
1. Relative percentage change in dark c.f. day (see Appendix E).
2. Statistical significance by Chi-squared test (values above 90% significance are reported).

It can be seen from Table 2 that although crime after dark has generally declined faster than crime during the day (eg -2.7 per cent for 'likely' crimes and -6.3 per cent for all crime types), these changes were not statistically significant, even at the somewhat generous 90 per cent level. The greatest relative reduction in night-time crime occurred in the category thought least likely to be affected by street lighting (-23.9 per cent) but the numbers here are very small and again this change was not statistically significant. The principal hypothesis, that street lighting quality reduces reported crime, is thus rejected.

Table 3 shows the breakdown of results for 'likely' crimes by re-lighting zone in chronological sequence of re-lighting. Of the 39 areas, five show statistically significant changes in crime patterns; three of these show a relative decline in night-time crime after re-lighting (V1, L2 and X1), but two show an opposite effect (Z1 and Q1). In a statistical sense such results are consistent with an hypothesis of random occurrence in the variable being tested (ie from a sample size of 39 one would expect about five zones to take values outside the 90 per cent limits if events were random). The distribution of crime types in the zones showing greatest changes was studied, but no discernible pattern emerged.

Although these results generally discouraged any support for the main hypothesis, some further investigation of the context within which the study was located was carried out. Three matters were considered: proximity to parks, policing initiatives and neighbourhood watch schemes.

a) Policing the parks

It was noted that some of the zones showing the greatest relative reductions in night-time crime were in close proximity to parks or open spaces.

A Local Authority uniformed security force was established in 1981 for Greater London Council (GLC) Parks. In February 1985 these officers were commissioned as Constables and subsequently came under the control of the Borough of Wandsworth Parks Police with an Headquarters in Battersea Park. These officers are Local Authority staff, but have the same powers as the Metropolitan Police within the confines of Local Authority parks and commons. Their operational appearance is similar to 'regular' police except for a green stripe along caps and vehicles. Discussions with Senior Officers of the Wandsworth Parks Police suggested that no significant changes in operational practice with respect to day and night patrols had taken place during the relevant period, although in autumn 1990 a three month experiment of a limited 24 hour presence rather than the previous 16 hour day was being tested. Furthermore it was noted that several other areas adjacent or close to parkland did not exhibit similar trends.

Table 3: Reported crimes by each re-lit zone one year before and one year after re-lighting for crime types 'likely' to be affected

Zonal code[1]	Date re-lit	Before			After			RPC[2]	SIG[3]
		Day	Dark	Don't know	Day	Dark	Don't know		
O4	Nov. 85	27	42	47	21	59	74	+80.6%	
O1	Dec. 85	19	32	49	26	66	63	+50.7%	
Z1	Jan. 86	69	43	46	53	54	62	+63.5%	*
A8	Jan. 86	7	7	7	5	10	5	+100.0%	
B8	Jan. 86	2	6	2	2	6	9	0	
P2	Jan. 86	21	47	36	13	38	37	+30.6%	
R1	Feb. 86	34	62	63	25	57	29	+25.0%	
J6	Mar. 86	22	43	34	19	45	32	+21.2%	
J5	Apr. 86	69	87	61	63	98	81	+23.4%	
S1	May. 86	43	131	104	53	109	98	-32.5%	
U2	Jun. 86	213	269	188	154	183	122	-5.9%	
V1	Aug. 86	66	102	116	65	64	77	-36.3%	*
L2	Sep. 86	45	55	42	34	18	34	-56.7%	**
L1	Oct. 86	30	39	23	21	39	33	+42.9%	
V4	Oct. 86	28	63	64	32	57	46	-20.8%	
S2	Dec. 86	41	103	78	48	79	65	-34.5%	
S4	Jan. 87	74	95	93	44	40	43	-29.2%	
J3	Jan. 87	46	98	68	20	49	28	+15.0%	
O3	Feb. 87	20	45	44	15	33	23	-2.2%	
R2	Apr. 87	54	85	81	58	93	77	+1.9%	
Y1	May. 87	5	12	12	4	6	6	-37.5%	
X1	Jun. 87	54	96	52	50	50	45	-43.8%	**
B1	Jun. 87	29	36	19	19	19	10	-19.4%	
Y2	Jun. 87	16	20	9	17	15	11	-29.4%	
M4	Jun. 87	60	46	19	40	41	32	+33.7%	
A3	Jul. 87	2	6	3	2	2	3	-66.7%	
U3	Aug. 87	35	39	37	32	37	35	+3.8%	
U4	Sep. 87	16	19	17	13	16	15	+3.6%	
T3	Sep. 87	89	67	41	62	52	27	+11.4%	
B3	Oct. 87	1	1	1	0	2	1	0	
B2	Dec. 87	22	32	15	20	20	8	-31.3%	
K2	Dec. 87	13	35	33	7	13	25	-31.0%	
A2	Feb. 88	14	11	8	7	10	2	+81.8%	
Z2	Feb. 88	46	98	55	46	69	44	-29.6%	
I2	Feb. 88	14	19	40	17	22	30	-4.6%	
I3/I1	May 88	35	65	65	35	63	56	-3.1%	
C3	May 88	9	10	8	8	7	5	-21.3%	
G2	Aug. 88	1	2	1	1	1	2	-50.0%	
Q1	Aug. 88	28	29	41	15	34	51	+118.9%	*
All zones		1419	2097	1722	1166	1676	1446	-6.3%	

Notes.
1. Zonal codes are illustrated/listed in Appendix A.
2. Relative percentage change dark c.f day.
3. Statistical significance by chi-squared text
   * probability of chance occurrence P<0.10
   ** probability of chance occurrence P<0.05.

b) Policing initiatives

In Battersea Police Division an experimental street crime initiative had commenced in Spring 1986 and, according to police sources, produced some dramatic effects on street crime statistics commencing from about Autumn 1986. In Table 3, several of the strongest zonal effects were found in Battersea zones re-lit from Spring 1986 onwards. As noted earlier, a change in policing policy would introduce bias into our study only to the extent that the *balance* between day and night enforcement effort might be different. A change in the absolute level of policing was automatically reflected in the control. The street crime initiative was not targetted temporally but there remained the possibility, strongly expressed by certain local officers, that street lighting *in association with* high levels of policing might have affected crime in a way that lighting alone might not.

c) Neighbourhood watch

Neighbourhood Watch schemes had proliferated in Wadsworth throughout the period of study. Again there is no *a priori* reason to suggest that neighbourhood watch would affect night-time crime disproportionately, but could improved street lighting facilitate night-time surveillance by the community under the stimulation of neighbourhood watch and hence affect recorded crime?

Regression tests

It was decided to test these possible interactions by running a regression analysis on monthly crime levels in Battersea zones with proxy variables being used for lighting quality, policing activity levels and the presence of neighbourhood watch schemes. Further details are given in Appendix F. However, no statistically significant relationships were found and all R-squared values were extremely small, indicating that even the combined influence of lighting, policing and neighbourhood watch did not affect reported night-time crime.

Social survey

Methodology

The second fieldwork component was a questionnaire survey of local residents in one re-lighting area. Its purpose was to complement the analysis of reported crime by providing information about the attitudes and behaviour of local residents and their unreported experiences of crime and incivilities. An initial series of interviews

was carried out before re-lighting and repeated after it had been completed. At both these times, a comparable control area which was not re-lit was also surveyed. For practical reasons, this part of the project was limited to an assessment of change over a comparatively short period of time.

Several prerequisites determined the survey location: spatial separation from other re-lit areas; availability of a comparable control area; and absence of other crime prevention initiatives during the planned survey period. This led to the eventual selection of a re-lighting area in Earlsfield between Magdalen Road and Burntwood Lane. Detailed descriptions of this 'treated' area and the adjacent control area are provided in Appendix G.

Attempting to quantify fear of crime is a complex and difficult task. Several authors (eg Ferraro and LaGrange, 1987) point out that fear can be expressed for oneself or for one's household or neighbours; that fear as an emotion is different both from perceived risk and from a more general social concern about crime. Fear, concern or risk can all be different for different types of crime. This survey was not particularly sophisticated, generally following previous UK practice, partly to facilitate comparison with other surveys. Since the same questions were asked in both survey waves the presumption is made that the respondents' understanding or interpretation of the question remains unaltered. Thus a reasonably firm comparative base is obtained, even if absolute values are less certain.

The questionnaires were designed in consultation with the Home Office and piloted outside the survey area. With two exceptions, the questions asked before and after re-lighting were identical. An additional question about street lighting changes was added to interviews in the treated area and a question which had not provided useful data was omitted (see Appendix H for questionnaires).

From the Electoral Register 1028 addresses were randomly selected for interviews during the first sweep; 628 in the treated area and 400 in the control area. At each address an adult was chosen for interview using a random selection procedure. The sample for the post-relighting sweep comprised all those that had completed questionnaires in the first sweep. Before both sweeps an introductory letter was delivered to each address in the samples. This merely requested co-operation but did not mention either crime or lighting.

To carry out the interviews a small team was recruited locally; applicants were interviewed and screened for suitability before being given detailed briefing and training. They were then provided with suitable identification and a list of addresses to visit. The first few questionnaires completed by each interviewer in both sweeps of the survey were carefully checked in the field so that any errors could be rectified at an early stage.

The first sweep was completed between 19-28 February 1990. Re-lighting was completed on 13 April, approximately seven weeks after the initial interviews, and

the follow up interviews took place after a similar interval during 11-15 June. In total, 379 pre-lighting interviews were completed; 248 in the treated area (39 per cent response) and 131 in the control area (33 percent response). This lower than expected response rate was a consequence of the number of refusals and the difficulty of making contact with the adult selected for interview. However, 295 of the 379 (78 per cent) completed second interviews - 191 in the treated area and 104 in the control area - a rate higher than anticipated. Overall the sample was smaller than planned and the final response rate of 29 per cent should be borne in mind when reviewing the results. Comparison of characteristics of respondents with 1981 Census data suggested that both elderly people and women had been over-sampled. This was almost certainly a result of most calls being made in the afternoon and early evening. Appendix I provides a comparison between the survey and 1981 Census characteristics. It is recognised that the social composition of the area may well have changed over nine years, but this remains the best source of local area social data.

Results and discussion

a) Attitudinal questions

Measurement of attitudinal change is rarely straightforward. A panel survey is a superior technique, but analysis and statistical interpretation can become complex. Only a very brief non-technical summary of the main findings is presented here; further details can be found in Appendix J.

Essentially, in the relit or 'treated' area, there was no general increase in feelings of safety about being out in the area after dark. There was however an observable improvement in *women's* perceptions of security, following re-lighting; this was statistically significant.

Similarly, changes in perceptions of particular types of crime, in terms of perceived risks and personal concern, varied as between men and women, and for different age groups. Thus, elderly women in the treated/re-lit a rea became less worried about rape, and also about theft from cars. On the other hand, they became *more* concerned about damage to cars by vandals. Among women in general, following re-lighting, there was an increase in concern about theft from vehicles, and also in the perceived risk of vandalism to vehicles. Although significant, all of these changes were relatively modest, and so caution needs to be exercised when interpreting these results. That said, some respondents would seem to believe that better lighting may in certain circumstances cause crime to go up rather than down (see Fleming and Burrows, 1986).

b) Experience of crime

It is recognised that only a small proportion of crimes is reported to the police. Unreported crimes might well be affected by street lighting and this could, in turn,

influence residents' perceptions of safety and security. The survey aimed to identify whether crimes of all kinds had been reduced, relative to the control, by street lighting.

Table 4: Crimes reported in social survey area

Crime type	Treated area		Control area	
	Before	After	Before	After
a theft of vehicle				
b theft from vehicle	8	6		2
c attack/assault	2	1	1	
d theft bicycle	2	1		
e burglary			1	1
f attempt break-in	5		1	1
g milk stolen	3	5	3	
h theft outside	3		3	
i damage property	3			
j theft person			1	
k attempt theft	1	1		
l vandalism	11	8	2	
m other	1	1	1	
Total	39	25	13	4
(reported to police)	(5)	(5)	(3)	(1)
Day	7	10	4	0
Dark	23	9	4	2
D/K	9	6	5	2
'Likely' crimes				
Day	6	9	4	0
Dark	17	8	3	1
D/K	8	6	3	1
Total	31	23	10	2
'Possibly'	8	2	3	2

Note.
Crime types a to m are shown in full on the questionnaire given in Appendix H.

In both surveys, respondents were asked whether they or a member of their household had been a victim of a certain set of crimes in the study area since the beginning of the year. It was felt that using a single obvious 'anchor point' for both periods of recollection would be superior to any other, more vague specification of an 'after' period, or any reference to re-lighting which could introduce substantial bias. In the event this arrangement worked reasonably well with most of the more

serious crimes occurring in the before period also being reported in the after survey. Some 'minor' crimes occurring at the beginning of the year and reported in the first survey were *not* recalled in the second survey in June; however, there were very few extra crimes reported in June as having occurred in the earlier period. The reported crimes for each of the seven week 'before' and 'after' periods are shown in Table 4. Regrettably for the research (but not for the residents!) there was insufficient data, especially for the control area, to come to any statistically justifiable conclusions. It is clear that a very much larger and more intricate survey would be necessary to detect changes in unreported crimes.

c) Experience of harassment

Residents were similarly asked in both surveys about their experience of harassment within the area since the start of the year, It was thought to be impractical to request firm dates for harassment incidents and it had been hoped that a simple subtraction of the number of incidents reported in each survey would give some indication of the relative frequency of harassment before and after re-lighting. However, as the experience with the crime data reports showed, 'minor' incidents were not well reported over a long period for recall, The results are shown in Table 5. In some cases less harassment was reported in June as having occurred since the beginning of the year, than was reported in February. Hence it is not possible to draw any firm conclusions on experience of harassment.

Table 5: Harassment occurring since 1-1-90, as reported in February and June surveys

	Treated area				Control area			
	February		June		February		June	
Harassment	Female	Male	Female	Male	Female	Male	Female	Male
Shouted at	8	4	17	14	1	4	3	6
Followed	4	0	3	1	1	0	1	0
Pestered	7	5	8	9	5	3	2	2
Jostled	1	2	1	1	1	1	0	0
Indecent suggestions	2	0	2	0	2	0	0	0
Sexual pestering	1	0	1	0	0	0	0	0
Total	23	11	32	25	10	8	6	8
Persons harassed	21	10	26	20	7	7	6	6

Notes.
1. Harassment refers to number of persons reporting such incidents. The frequency of occurrence of incidents is not included.
2. An individual may have experienced more than one type of harassment.

Table 6: Effects on travel habits

(a) Travel after dark		Mean number of occasions	
Question		Treated area	Control area
Evenings out after dark in previous week?	Before	3.07	2.26
	After	1.98	1.33
Any part of journey involve walking in this area?	Before	2.31	1.60
	After	1.06	0.46
Were you alone when walking on journeys?	Before	1.76	1.32
	After	0.72	0.39

(b) Avoidance behaviour		Treated area		Control area	
Question		Yes	No	Yes	No
When out on your own in this area are there any places you avoid using?	Before	22%	77%	24%	76%
	After	22%	78%	21%	79%

(c) Reasons for avoiding area

(numbers of respondents mentioning)	Treated area	
	Before	After
Poorly lit	15	5
Quiet and lonely	12	9
Teenagers hanging around	9	9
Aware of crimes	4	3
Risk of crimes	3	6
Fields/common	3	3
Risk of harassment	2	5
Knows no-one there	2	0
Dogs around	2	1
Feels insecure	1	1
Rough area	1	1
Other	7	8
Total	61	51

Note.
For full details of questions see Appendix H.

d) Travel behaviour

Street lighting is commonly advocated as a means to reduce apprehension about travel after dark. In each survey, respondents were asked how many evenings in the previous week they had been out after dark, whether they had walked in the local area and whether they were accompanied on those journeys. Since hours of darkness had reduced substantially from February to June *fewer* journeys were made in the dark in the 'after' survey in both areas. Table 6 shows the results from this part of the surveys which indicate that there had been no dramatic effects on travel habits in the treated area relative to the control. Avoidance behaviour seemed similarly un-altered although in the list of reasons given for avoiding certain streets and places poor lighting fell from the most frequently mentioned reason to a minor ranking.

e) Reactions to re-lighting

Finally, respondents in the treated area only were asked some direct questions about the street lighting in their area. 96 percent had noticed changes to the street lighting and when questioned further about the nature of the changes the following responses were made:

Table 7: What changes have you noticed? (to street lighting)

Response	Number	Percentage of responses
Lights brighter	140	52
New lamps	86	32
More lamps	13	5
Lamps moved	7	3
Wider glow	7	3
Lamps taller	6	2
Light softer	5	2
Unsure	5	2
Lamps pink	1	–
Total	270	100

Note.
More than one response per person was permitted.

When asked whether re-lighting had affected their feelings of personal safety, 56 per cent said that it had, with 41 per cent feeling 'more safe' and 15 percent 'much more safe'. When asked *why* they felt safer the majority mentioned improved visibility. Other reasons given by a few respondents were: fewer dark spots, easier identification and feeling less vulnerable. Offered a final opportunity to provide any comments on the new lighting the overwhelming balance of opinion was

favourable, with comments such as: improvement, better visibility, very good, very satisfactory. Only 11 per cent of comments were adverse; 7 per cent did not like the new lights, 2 per cent felt re-lighting was unnecessary and 2 per cent had been inconvenienced during installation.

Table 8: Comments on re-lighting

Comment	Number	Percentage of responses
Improvement	37	22
Very satisfactory	25	15
Better visibility	19	11
Very good	19	11
Improved security	16	10
Do not like them	11	7
Lights nice	10	6
Installed efficiently	6	4
Re-light other areas	5	3
Driving easier	4	2
Unnecessary	4	2
Inconvenient	3	2
Other	8	5
Total	167	100

Note.
More than one response per person was permitted.

Conclusions

The main aim of this study was to test whether the area-wide improvement of street lighting reduces reported crimes after dark. The very wide extent of the study, covering some 3500 new street lights introduced over a period of nearly three years, was unprecedented in the UK. The change in street lighting standard was considerable; typically a four-fold increase in the intensity of lighting was achieved, with more lighting columns and white light sources being introduced throughout. The main database for the study consisted of over 100,000 reported crimes, although analysis was principally focused on some 9500 allegations in the most relevant locations and time periods. The area studied, an inner London Borough, has a high crime rate in a national context and thus represented a fair test for environmental crime prevention measures. In short, if street lighting does affect crime, this study should have detected it.

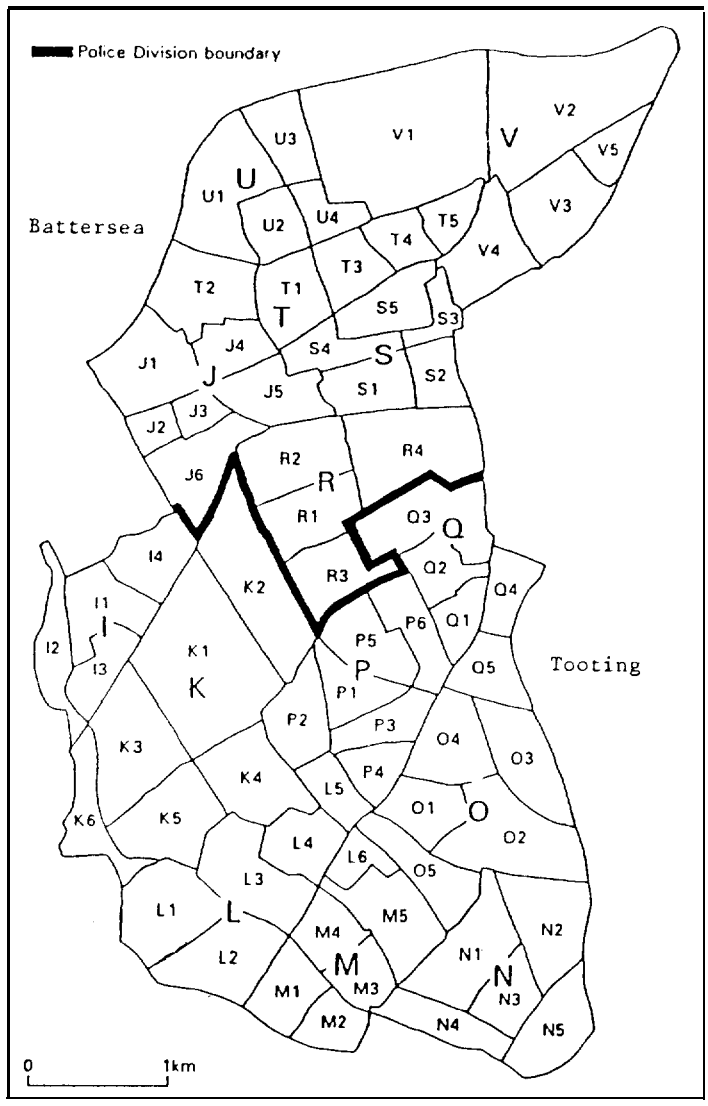
The principal conclusion is that no evidence could be found to support the hypothesis that improved street lighting reduces reported crime. Although some areas and some crime types did show reductions in night-time crime relative to the day-light control, the dominant overall pattern, from which this study draws its authority, was of no significant change. Some further work, investigating possible contemporary influences of policing initiatives and neighbourhood watch schemes together with street lighting, provided no additional explanation of the crime pattern.

The secondary aim of the study was to assess the response to improved street lighting in terms of the attitudes, opinions and behaviour of residents in a re-lit area. Here there was clear evidence that perceived safety of women when walking alone after dark had been improved in the treated area. Perceptions of safety in the home, or in the street during daylight hours, were not affected. There were no strong influences either on worry about certain types of crime or their perceived likelihood.

There was no evidence to suggest any significant changes in un-reported crime; in travel, particularly trips out after dark; on harassments or incivilities, when comparing the treated area with an adjacent control area. However, the reaction of residents to the re-lighting scheme was overwhelmingly favourable; it is without doubt a popular measure.

As stated in the introduction, the results of any research on this subject must be assessed within the context of the methodology used. The main finding on reported crime does not contradict other research which has sometimes found that street lighting has, in the short run and in small areas, apparently reduced crimes and incivilities. It does, however, suggest very firmly that as an area-wide long-term treatment, street lighting is unlikely to reduce crime to any great extent. The findings on fear of crime are generally supportive of existing knowledge. It is clear that a very much larger social survey would be necessary to trace with any statistical confidence more subtle changes in social and attitudinal effects arising from re-lighting.

Appendix A. London Borough of Wandsworth. Re-lighting zones in the police divisions of Battersea and Tooting.



Key to zonal codes not on map

X1: Queenstown Rd
B1: Battersea Bridge Rd
Y2: Latchmere Rd
Z1: Balham Town Centre
A8: Fernlea Rd
B8: Hillbury Rd
Y1: Ritherdon Rd
A3: St. Ann's Hill (part of)
B3: Willow Tree Close
B2: Hazelhurst Rd
A2: St. James Drive
Z2: Garratt Lane (part of)
C3: Henry Prince Estate

Appendix B. Acquisition of the recorded crime database

The objective was to compile a consistent database of reported crime occurring in a number of zones within the Battersea and Tooting police divisions one year before and one year after re-lighting took place.

Initially it had been intended to limit the extent of data acquisition by using the police beat codes on the crime records as a selection filter. In practice, following discussions with the police computer system managers, it was found that police beat allocations were unreliable and hence it became necessary to obtain a complete and comprehensive crime database rather than a selective one.

Preliminary work

A street index was compiled of all roads within the Battersea and Tooting police divisions and their corresponding London Borough of Wandsworth re-lighting zone codes. In a number of cases some parts of a zone (eg 1 or 2 streets) had not been re-lit, for a variety of reasons, at the same time as the rest of the zone. It was therefore necessary in some cases to distinguish between lit and non-relit streets within a zone.

The police crime classifications were reduced from well over 100 to 30 crime types (see main text and Appendix C) and a crime type code correspondence list was produced.

Documentary crime records

Temporary staff were recruited and, following security clearance, commenced data transcription from documentary crime records. Details recorded were the crime record identity number, the crime type code, the London Borough of Wandsworth zonal re-lighting code and the date and time (either precisely or covering a time 'window') at which the alleged crime took place. Details were entered onto portable Z88 computers in files of 100 records. At the end of each working day these files were downloaded onto a BBC Master PC and stored on floppy disk.

Subsequently it emerged that although computerisation of crime records had commenced in January 1987 at Battersea and in May 1987 at Tooting there were considerable gaps in the computerised data at both police stations. Sometimes these related to certain types of crime, which were not considered by the Police as worthwhile to enter, but were relevant to this research. Other gaps appeared to be due simply to lack of resources or inadequate priority being given to the task. With one very small exception these omissions in the database were filled by transcription from the documentary records that remained available.

Computerised (TOPSY) records

Software was acquired, tested and modified to enable the UNIX-based police records to be read by the DOS-based computers at University of Southampton. Further processing to eliminate non-data, control characters and superfluous data and to re-structure the data into the same format as the documentary records was also necessary.

Once the computerised data had been obtained, it was discovered that records from Battersea between October 1988 and February 1989 were missing. Although it would have been possible to obtain the missing data via the documentary records that still existed it was decided to use Battersea data only from January 1985 to September 1988 which was complete. This allowed analysis of 17 re-lighting zones that fell within the Battersea police division.

Table 9: Final periods for investigation

	Extent of reported crimes database	Analysis to cover zones re-lit between:
Battersea	Jan 85-Sept 88	Jan 86-Sept 87 (17 zones)
Tooting	Nov 84-Aug 89	Nov 85-Aug 88 (22 zones)

Additional work

The street directory was computerised and a program written to allocate zonal codes to crime locations. In both documentary and computerised data sets a number of manipulations were necessary for certain cases. For example, it was necessary to consider as special cases pubs, clubs or other venues not precisely locatable by street name. A further group of crime venues involve street addresses that spanned more than one lighting zone. These cases were treated individually as far as was possible, with allocation to zones being undertaken on a proportional basis dependent on the road length in each zone when locations were not explicit. After all crime records from the police computer database had been allocated zonal codes, data from both documentary and computerised sources were merged. A computer program was written to assign a lighting index value to each crime, based upon the relative durations of daylight and darkness within the time window. Finally the data was 'cleaned' by running various validity checks and was then available for analysis. In total, the number of records obtained was 100,816.

Appendix C. Crime types and susceptibility groups

Table 10: Crime types and susceptibility groups

CRIME TYPE (by police crime book)	Street lighting as an influence		
	Likely	Possibly	Unlikely
Major			
Indecent assault/exposure	*		
Street robbery	*		
Theft person : major	*		
Criminal damage/arson	*		
Violence against the person		*	
Going equipped		*	
Make off w/out payment		*	
Other sexual offences			*
Robbery			*
Dishonest handling			*
Drug offences			*
Riot/unlawful assembly			*
Other major (fraud, deception, etc)			*
Beat			
Theft : pedal cycle	*		
Theft : elsewhere (outside)	*		
Criminal damage	*		
Violence against the person		*	
Theft : dwelling/non-residential		*	
Other beat		*	
Shoplifting			*
Theft : employee/mail			*
Motor Vehicle			
Theft/taking and driving away/arson/ interference/going equipped	*		
Criminal damage	*		
Dishonest handling			*
Other motor vehicle (licensing, etc.)			*
Burglary			
Non-residential	*		
Dwelling		*	
Criminal damage (in burglary book)		*	
Artifice			*

Appendix D. Distribution of lighting index values

Table 11: Distribution of lighting index values

All crimes, all re-lit zones, one year before and one year after re-lighting. Frequency distribution by lighting index value:

	A Lighting index	B Number of crimes	c Probability of misclassification (mid-point of range)	D Probable number misclassifications (B x C)
Dark	0.00	3601		
	0.001 – 0.05	182	0.025	4.5
	0.05 – 0.10	280	0.075	21.0
	0.10 – 0.15	301	0.125	37.0
	0.15 – 0.20	341	0.175	59.7
	0.20 – 0.25	309	0.225	69.5
	0.25 – 0.30	350		
	0.30 – 0.35	474		
	0.35 – 0.40	567		
	0.40 – 0.45	508		
	0.45 – 0.50	469		
	0.50 – 0.55	486		
	0.55 – 0.60	402		
	0.60 – 0.65	378		
	0.65 – 0.70	396		
	0.70 – 0.75	317		
	0.75 – 0.80	117	0.225	26.3
	0.80 – 0.85	82	0.175	14.3
	0.85 – 0.90	88	0.125	11.0
	0.90 – 0.95	70	0.075	5.2
	0.95 – 0.999	50	0.025	1.2
Day	1.00	4115		
	Total	13883		250.5

Unusable (0.25-0.75) 4337 (31.3 per cent)
Usable (0-0.25; 0.75-1.0) 9536 (68.7 per cent)

Probable misclassifications of usable crimes = $\frac{250.5}{9536}$

= 2.6 per cent

Appendix E. Calculation of Chi-squared and RPC values

	BEFORE	AFTER	TOTALS
DAY	A	C	(A+C)
DARK	B	D	(B+D)
TOTALS	(A+B)	(C+D)	(A+B+C+D)

(a) *Chi-squared, including continuity correction:*

$$\text{Chi-squared} = \frac{(\text{Abs}\ ((AxD) - (BxC)) - ((A + B + C + D)/2))^2}{((A + B) \times (C + D) \times (A + C) \times (B + D))/(A + B + C + D)}$$

(b) *Relative percentage change, (RPC)*

RPC is the percentage change in crime after dark relative to the percentage change in daytime.

$$\text{'Expected' dark after} = E = B\left(1 + \frac{(C-A)}{A}\right)$$

RPC = 100* (D-E)/E

Example

	Before	After
Day	100	90
Dark	110	80

Daytime crime has declined by (100 - 90)/100 = 10 per cent,
Expected 'dark-after' = 110 crimes less 10 per cent = 99.
Actual 'dark-after' = 80.
Relative Percentage Change = (80 - 99)/99 = -19 per cent

ie crime after dark has reduced by 19 per cent more than it would have done had it followed the same trend as daytime crimes.

Appendix F. Investigation of the joint effects of lighting, policing and neighbourhood watch schemes

I. Variables

a. Policing

Battersea Police provided a map showing policing activity on a grid square reference basis. This was derived from records of the computer aided dispatch (CAD) system, indicating where policing presence was required. Policing requirements do not relate solely to crime reports, but include all requests by telephone or other means for investigation or assistance for whatever cause. The CAD map is used as the basis for allocating police patrol priorities and hence was thought to represent, as far as is possible, the relative spatial disposition of policing activity within Battersea division. The CAD levels in each grid square were used to estimate a policing activity index for each re-lighting zone and these were then used within the regression analysis.

b. Neighbourhood watch

The location and date of establishment of 94 neighbourhood watch schemes in the Battersea Police divisional area within the relevant time period was obtained. From this information the number of neighbourhood watch schemes in each re-lighting zone for each month was tabulated and used as input to the regression. No account was taken of the size of each neighbourhood watch scheme or its level of activity.

c. Lighting

A proxy lighting variable was created taking on values of 1 for each residential zone before re-lighting and 4 after re-lighting, since lighting intensities were increased by about a factor of 4 (source: London Borough of Wandsworth Street Lighting Engineers). Non-relit zones maintained a value of 1 throughout. Main roads which were treated separately were assigned values of 2 (before) and 4 (after) re-lighting.

d. Crimes

Two different independent variables were tested, first the proportions of likely crimes occurring during darkness and secondly the proportion of total crimes during darkness. A total of 1138 valid cases were obtained, representing 35 zones over 33 months, but omitting those cases where the denominator of the crime ratio would have been 0.

II. Regression

Initially simple linear regressions were run on the proportions of 'likely' crimes and total crimes during darkness against policing, lighting and neighbourhood watch variables. R-squared values were extremely low, reaching only 0.025, suggesting that there was no relationship between the proportion of night-time crime and any of the variables, either singularly or in additive combination.

Subsequently a second series of regressions was run on the proportions of night-time crime against each of the three cross-products of the independent variables. Again no statistically significant relationships were found and all R-squared values were very low, not exceeding 0.018. Finally a regression was run of the proportion of night-time crime against the triple product of lighting, policing and neighbourhood watch, but again no valid relationships ensued.

Thus there are no statistically proven grounds for believing that street lighting in combination with policing and / or neighbourhood watch reduces night-time crime.

Appendix G. Descriptions of social survey treated and control areas

I. Treated area

The treated area had, roughly at its centre, the intersection of Waynflete Street and Swaby Road. It was bounded, to the west, by part of Garratt Lane; to the south by part of Burntwood Lane; to the east by Openview; and to the north by part of Magdalen Road.

The outer side of Openview is the boundary of a large recreational area containing the Openview Social and Sports Club and the Wandilea Bowls and Social Club.

The houses in Openview, Lidiard Road, Leckford Road, Aldrich Terrace, and the north side of Swaby Road are mainly local authority. They are arranged in terraces of between four and six houses. A proportion have been purchased by tenants. The majority of houses whether council or privately owned are of good quality and there is clear evidence of community pride in well-maintained gardens and other external features. The streets have undergone some narrowing (involving pavement widening) and parking bays have been created in a number of places.

The houses in Dawnay Road and Dawnay Gardens are marginally less well maintained with shabbier frontages and gardens. A smaller proportion appear to be owner-occupied.

The small rectangular area of green in front of Aldrich Terrace is fenced and appears to provide a safe play area for children. One half is tarmaced with swings, a slide and a roundabout and the other is grassed with a number of wooden benches. There was no graffiti apparent.

The south side of Swaby Road largely consists of terraced maisonettes (on the ground and first floor of each house). All appear to be owner occupied and are generally in good order. About half the houses in Tranmere Road are also split into maisonettes, the remainder being individual terraced dwellings. The remaining streets in the area contain a similar mix of maisonettes and terraced houses of various sizes and designs, probably built early this century. The smallest are to be found in Bridgford Road, Freshford Street and the southern end of Waldron Road. St. Andrew's Court (off Waynflete Street) is a small cul-de-sac containing seven three-storey blocks of flats, probably built in the 1960s.

Apart from the social amenities already mentioned, the area contains two primary schools, Meadway School in Waldron Street and the Earlsfield Junior Mixed and Infants School at the western end of Tranmere Road. There is also a church (St. Andrew's) which has its own Parish Hall in Waynflete Street.

II. Control area

The control area had, roughly at its centre, the intersection of Ellerton Road and Frewin Road. It was bounded, to the west, by Fieldview; to the south by part of Burntwood Lane; to the east by Lyford Road; and to the north by part of Magdalen Road.

The control area formed two separate parts, with no direct access between Tilehurst Road and Ellerton Road.

In the western section the properties are very similar to those in the eastern part of K3. Fieldview, Brightman Road, Godley Road, Gunners Road and the western side of Tilehurst Road comprise short terraces, mainly in Local Authority ownership although with some properties now privately owned. The eastern side of Tilehurst Road is mainly semi-detached, privateIy owned properties and is generally better maintained. Between Godley and Tilehurst Roads there is a small area of open space with paths, seats and shrubbery.

The eastern section of K1 consists of rather better accommodation mostly in private ownership. There are a mixture of detached and semi-detached properties in Ellerton, Loxley and Frewin Roads. Titchwell and Multon Roads contain mature 3-storey terraced townhouses. Collamore Avenue, Lyminge and Marham Gardens are mainly smaller semi-detached houses. The eastern part of Burntwood Grange Road contains more modern 3-storey town houses. Burcote Road, Herondale Avenue and the western section of Burntwood Grange Road comprise substantial detached and semi-detached properties of a higher standard and no interviews were undertaken in these streets.

Appendix H. 'Before' survey selection sheets

EARLSFIELD CRIME SURVEY

RESPONDENT SELECTION SHEET AND SCREENING QUESTIONNAIRE

ADDRESS CODE NUMBER: [ ][ ][ ][ ] ← SELECTION DIGIT

Good afternoon/evening. I'm one of a team of interviewers from Southampton University and we're conducting a survey into the problems of crime and nuisance in this street and the surrounding area. This address has been selected at random from the electoral register. Can you help me check which person I should interview.

		CODE	SKIP TO
1. a)	Firstly, is there one household at this address, or more than one? By household, I mean people who use the same living room or share at least one meal a day.		
	one	1	c)
	More than one	2	b)
	IF "MORE THAN ONE HOUSEHOLD" AT ADDRESS - CODE 2 AT a).		
b)	ESTABLISH WHEREVER POSSIBLE THE TOTAL NO. OF HOUSEHOLDS AT ADDRESS — RECORD OR CODE — NO. OF HHLDS	[ ]	c)
	Could not estab.	98	c)
c)	CHECK: Select from WHOLE ADDRESS OR DWELLING UNIT — CODE WHICH		
	Whole address	3	Q.2
	Dwelling unit	4	d)
	IF 'DWELLING UNIT' (CODE 4 AT c.)		
d)	RECORD TOTAL NUMBER OF DWELLING UNITS AT ADDRESS NUMBER		
e)	LIST EACH IN LOCATION ORDER IN THE TABLE OVERLEAF. USE GRID ON PAGE 3 TO SELECT. GO DOWN EACH COLUMN REPRESENTING TOTAL NUMBER OF DWELLING UNITS (AT d.) UNTIL YOU COME TO THE ROW FOR THE SELECTION DIGIT. THE NUMBER GIVEN WHERE COLUMN AND ROW MEET IS THE 'DU' CODE OF THE SELECTED HOUSEHOLD. RING 'DU' CODE OVERLEAF TO INDICATE SELECTED UNIT.		

		CODE	SKIP TO

LOCATION OF DWELLING UNIT	'DU' CODE
	1
	2
	3
	4
	5
	6
	7
	8
	9

RING 'DU' CODE TO INDICATE SELECTED UNIT. GO TO f.)

VISIT SELECTED UNIT AND ASK OF RESPONSIBLE ADULT:

f) Including yourself, how many people aged 16 or over live in this part of this address?

	1 person only	1	INTER-VIEW
CODE OR ENTER	Number of persons aged 16+		
	REFUSED	97	END

IF 'ONE HOUSEHOLD' (CODE 1 AT Q1.a.) or 'WHOLE ADDRESS' (CODE 3 AT Q1.c.)

Including yourself, how many people aged 16 or over live at this postal address?

	1 person only	1	INTER-VIEW Q.3
	Number of persons aged 16+		
	REFUSED	97	END

		CODE	SKIP TO
	IF TWO OR MORE PERSONS AGED 16 OR OVER		
3.	LIST BELOW ALL PERSONS AGED 16 OR OVER IN ALPHABETICAL ORDER OF THEIR FIRST NAMES:		

FIRST NAMES	PERSON CODE
	1
	2
	3
	4
	5
	6
	7
	8
	9

REMEMBER TO RING PERSON CODE OF SELECTED PERSON

b) USE GRID TO SELECT. GO DOWN COLUMN REPRESENTING TOTAL PERSONS AGED 16+ UNTIL YOU COME TO THE ROW FOR THE SELECTION DIGIT. THE NUMBER GIVEN WHERE COLUMN AND ROW MEET IS THE PERSON CODE OF PERSON TO INTERVIEW. RING PERSON CODE ABOVE TO INDICATE SELECTED PERSON.

c) ENTER FULL NAME OF SELECTED PERSON ON FRONT SHEET. INTERVIEW THAT PERSON ONLY.

SELECTION GRID

SELECTION DIGIT (LAST DIGIT OF SERIAL NO.)	TOTAL PERSONS 16+ IN HOUSEHOLD (ADDRESS) CODED 1-5 AT Q.3a) (total number of dwelling units)							
	2	3	4	5	6	7	8	9
0	1	3	3	2	1	5	4	7
1	2	1	1	4	3	6	5	9
2	1	2	2	5	4	3	1	4
3	2	1	4	3	5	7	6	8
4	1	3	2	1	6	2	1	6
5	2	1	3	5	1	7	4	2
6	1	2	4	3	2	5	3	1
7	2	1	3	2	4	1	7	5
8	1	3	2	1	3	4	2	6
9	2	2	1	4	5	6	8	3

'After' Survey Preliminaries

ADDRESS SERIAL NO. | | | | |

TO THE PERSON WHO COMES TO THE DOOR, SAY...

Good afternoon/evening. I'm from Southampton University and we're conducting a follow-up crime survey in this area (REFER TO LETTER IF NECESSARY). I would like to speak to the person who we interviewed in February. Can I talk to:

NAME ON FRONT SHEET (ADF) _____ please?

IF YOU ARE ALREADY TALKING TO THE 'NAMED' PERSON, CONTINUE...

In order to complete our study we are now carrying out the final part of the research and if you wouldn't mind I'd like to ask you a few more questions.

It won't take much time and we really would appreciate your help.

It is important for our research that we interview you again.

Can someone call back at a more convenient time?

(IF YES, RECORD DAY AND TIME ON ADDRESS DETAIL FORM)

IF YOU ARE NOT ALREADY TALKING TO THE 'NAMED' PERSON ASK FOR HIM/HER AND IF AVAILABLE, BEGIN BY SAYING...

Good afternoon/evening. I'm from Southampton University and I believe you took part in our survey when we visited this area at the end of February (SEEK CONFIRMATION)... ... AND CONTINUE

IF 'NAMED' PERSON UNAVAILABLE TRY TO ASCERTAIN WHEN HE/SHE WILL BE EITHER CALL BACK LATER OR MAKE AN APPOINTMENT (RECORD DETAILS ON ADDRESS DETAIL FORM).

Both Surveys - Questionnaire

		CODE	SKIP TO
1.	SHOW MAP AND SHOW CARD A Thinking about this area, how satisfied or dissatisfied are you with living here?		
	very satisfied	1	
	satisfied	2	
	dissatisfied	3	
	very dissatisfied	4	
	Don't know	5	

2. SHOW CARD B

I'm going to read out a list of statements about the area in which you live. Could you tell me how far you agree or disagree with them?

	STRONGLY AGREE	AGREE	NEITHER	DISAG-REE	STRONG DISAG.	NO OPPIN.
This area has good bus services	1	2	3	4	5	6
Car parking is difficult around here	1	2	3	4	5	6
This area has poor street lighting	1	2	3	4	5	6
This area is convenient for shopping	1	2	3	4	5	6
This is a rough area to live in	1	2	3	4	5	6
There are plenty of leisure facilities near here	1	2	3	4	5	6
This area has good schools	1	2	3	4	5	6

3. SHOW CARD C

Here is a scale from 1 to 9. If "9" refers to someone feeling very safe and "1" refers to someone who feels very unsafe, where on the scale would you put yourself

a) FIRSTLY

When you are walking alone in this area in daylight?

INTERVIEWER CIRCLE NUMBER AND ENTER IN BOX OR CODE NOT APPLICABLE

VERY SAFE 9 8 7 6 5 4 3 2 1 VERY UNSAFE ☐

NOT APPLICABLE 99

		CODE	SKIP TO
b)	When you are walking alone in this area after dark? VERY SAFE 9 8 7 6 5 4 3 2 1 VERY UNSAFE	☐	
	NOT APPLICABLE	99	
	IF RESPONDENT DOES NOT GO OUT ALONE IN THE DARK ASK: How safe do you think you would feel? VERY SAFE 9 8 7 6 5 4 3 2 1 VERY UNSAFE	☐	
c)	What about in your home alone during the daytime? VERY SAFE 9 8 7 6 5 4 3 2 1 VERY UNSAFE	☐	
d)	And alone in your home after dark? VERY SAFE 9 8 7 6 5 4 3 2 1 VERY UNSAFE	☐	

4 SHOW CARD D

Many of us at some time or another worry about being a victim of a crime and I would like you to tell me how worried you are about being the victim of the following types of crime?

	VERY WORRIED	FAIRLY WORRIED	NOT VERY WORRIED	NOT AT ALL	DON'T THINK ABOUT IT	N/A
Having your home broken into	1	2	3	4	5	6
Being attacked or mugged on the street	1	2	3	4	5	6
ASK WOMEN ONLY Being raped or sexually assaulted	1	2	3	4	5	6
Having your home damaged or vandalised	1	2	3	4	5	6
Having your car stolen	1	2	3	4	5	6
Having things stolen from your car	1	2	3	4	5	6
Having your car damaged by vandals	1	2	3	4	5	6

5. SHOW CARD E

How likely do you think it is that any of these crimes will happen to you in the next year?

	CERTAIN TO	VERY LIKELY	FAIRLY LIKELY	FAIRLY UNLIK-ELY	VERY UNLIK-ELY	CERT. NOT	D/K	N/A
Having your home broken into	1	2	3	4	5	6	7	8
Being attacked or mugged on the street	1	2	3	4	5	6	7	8
ASK WOMEN ONLY Being raped or sexually assaulted	1	2	3	4	5	6	7	8
Having your home damaged or vandalised	1	2	3	4	5	6	7	8
Having your car stolen	1	2	3	4	5	6	7	8
Having things stolen from your car	1	2	3	4	5	6	7	8
Having your car damaged by vandals	1	2	3	4	5	6	7	8

6. SHOW CARD F

I am now going to read out a list of things that might happen in your area. 1 would like you to tell me how common you think they are:

	VERY COMMON	FAIRLY COMMON	NOT VERY COMMON	NOT AT ALL COMMON	DON'T KNOW
Noisy neighbours or loud parties	1	2	3	4	5
Graffiti on walls or buildings	1	2	3	4	5
Teenagers hanging around the streets	1	2	3	4	5
Drunks and tramps on the streets	1	2	3	4	5

CONTINUED . . .

	VERY COMMON	FAIRLY COMMON	NOT VERY COMMON	NOT AT ALL COMMON	DON'T KNOW
Rubbish and Litter in the streets	1	2	3	4	5
Homes and gardens in bad condition	1	2	3	4	5
Vandalism/deliberate damage to property	1	2	3	4	5

a) Now, could you think for a moment about each evening last week (Monday to Sunday) and tell me whether you were out after dark. For example, perhaps you were returning from work or you went out to some social or leisure activity, to the pub, to the shops, to visit a friend etc?

INTERVIEWER READ OUT EACH DAY AND PROBE FULLY
RECORD RESPONSE IN GRID BELOW

b) Did any part of the journey or journeys involve walking after dark IN THIS AREA?

c) Were you unaccompanied when walking on this/these journey(s)?

INTERVIEWER INSTRUCTION:
IF UNACCOMPANIED WHEN WALKING ON ANY OF THESE JOURNEYS RECORD AS 'YES' UNACCOMPANIED IN GRID BELOW

	a) WENT OUT		b) WALKED		c) UNACCOMPANIED	
	Y	N	Y	N	Y	N
Monday	1	2	1	2	1	2
Tuesday	1	2	1	2	1	2
Wednesday	1	2	1	2	1	2
Thursday	1	2	1	2	1	2
Friday	1	2	1	2	1	2
Saturday	1	2	1	2	1	2
Sunday	1	2	1	2	1	2

		CODE	SKIP TO
*8. a)	SHOW CARD G Here is a list of possible factors which might influence your decision to stay in or go out of an evening. Could you tell me any that apply to you.		

	YES	NO	MOST IMPT
Being able to find a babysitter	1	2	1
Something on TV you want to watch	1	2	2
Nothing to do	1	2	3
Feel vulnerable and scared when out	1	2	4
Don't have own transport	1	2	5
Can't afford to	1	2	6
Ill-health	1	2	7
INTERVIEWER READ OUT: Any other(s)? (WRITE IN)	1	2	8
			9
			10

IF 3 OR MORE FACTORS INDICATED, ASK

b) Which are the TWO most important factors?

INTERVIEWER INSTRUCTION
CODE ON GRID ABOVE BY CIRCLING APPLICABLE NUMBERS

9. a)	When you go out on your own in this area are there any particular streets or places which you avoid using?		
	Yes	1	
	No	2	10.a)
	IF YES (CODE 1 at a.), SHOW MAP AND ASK		
b)	Where are they? RECORD DETAILS		

*n.b. Question 8 was not asked in 'After' Survey

		CODE	SKIP TO
c)	Do you avoid them during the day, in the dark, or both?		
	Day	1	
	Dark	2	
	Both day and dark	3	
d)	Why do you avoid them? (RECORD VERBATIM)		
	_____		
	_____		
	_____		
	_____		
10. a)	SHOW CARD H How important is it for your feelings of personal safety that you have somebody to accompany you when you go out after dark on foot?		
	very important	1	b)
	quite important	2	b)
	not very important	3	Q.11
	not important at all	4	
	never goes out on foot after dark (can't say)	5	
b)	IF VERY IMPORTANT OR QUITE IMPORTANT Would you still go out if you couldn't find someone to go with you?		
	INTERVIEWER TO CODE: yes	1	Q.11
	no	2	
	depends on importance of trip (can't say)	3	

The following questions concern things that may have happened to you over the period since the 1st of January 1990, in which you may have been the victim of a crime or offence. I am only concerned with incidents which have happened to you personally OR to a member of your household.

11. Firstly, I shall read out a list of crimes and I would like you to tell me if you or another member of your household has been a victim since the beginning of this year.

Have you or another member of the household . ..?

READ OUT FROM GRID BELOW AND CIRCLE 'YES' OR OR 'NO' IN THE APPROPRIATE COLUMN.

IF YES TO ANY CRIMES a) TO m) COMPLETE CRIME REPORT FORM FOR EACH

		YES	NO
a)	Had their car stolen or driven away without permission	1	2
b)	Had anything stolen off their vehicle or out of it	1	2
c)	Been deliberately attacked or assaulted	1	2
d)	Had a bicycle stolen	1	2
e)	Had this house or flat burgled	1	2
f)	Had someone attempt to break-in to this house or flat to steal or cause damage	1	2
g)	Had milk stolen from outside this house or flat	1	2
h)	Had anything else stolen from outside this household, say doorstep, garden, garage, shed etc.	1	2
i)	Had someone deliberately deface or damage the outside of this house or flat	1	2
j)	Had anything stolen from their person (out of their hands, pocket, bag or case)	1	2
k)	Had someone attempt to steal from their person	1	2
1)	Had something of theirs damaged by vandals	1	2
m)	Been the victim of any other crime (WRITE IN)	1	2

CRIME REPORT FORM

CRIME (Insert letter a) to m) in box ☐

IF a, b, c, d, j, k, l, m
CODE VICTIM:

Respondent	☐	Mother	☐	Brother	☐
Husband	☐	Father	☐	Sister	☐
Wife	☐	Other Male _____			☐
Son	☐				
Daughter	☐	Other Female _____			☐

Date: _____

DARK ☐ DAYLIGHT ☐ DON'T KNOW ☐

LOCATION: (INTERVIEWER ASCERTAIN WHETHER IN OR OUT OF AREA)
(SHOW MAP) _____

_____

ARE THE POLICE AWARE OF THE INCIDENT?: YES ☐
NO ☐

CRIME REPORT FORM

CRIME (Insert letter a) to m) in box ☐

IF a, b, c, d, j, k, l, m
CODE VICTIM:

Respondent	☐	Mother	☐	Brother	☐
Husband	☐	Father	☐	Sister	☐
Wife	☐	Other Male _____			☐
Son	☐				
Daughter	☐	Other Female _____			☐

Date: _____

DARK ☐ DAYLIGHT ☐ DON'T KNOW ☐

LOCATION: (INTERVIEWER ASCERTAIN WHETHER IN OR OUT OF AREA)
(SHOW MAP) _____

_____

ARE THE POLICE AWARE OF THE INCIDENT?: YES ☐
NO ☐

INTERVIEWER - FILL IN ADDITIONAL FORMS AS NECESSARY

1. Now, I would like to find out about the things that may have happened to you personally NOT other people in your household – JUST IN THIS AREA (SHOW MAP). I shall read out a list of things and I would like you to tell me whether you have been a victim of any of these since the beginning of this year.

a) Have you ...?

INTERVIEWER READ OUT FROM GRID BELOW AND CODE APPROPRIATE NUMBER IN COLUMN a)

IF YES (CODE 1 at a.). ASK

b) How many times has this happened to you?

ENTER NUMBER IN COLUMN b) OF GRID BELOW

c) On the LAST occasion, was it daylight or dark?

CODE APPROPRIATE NUMBER IN COLUMN c) OF GRID BELOW

	a)		b)	c)		CODE	SKIP TO
	YES	NO	HOW MANY TIMES?	DAY	DARK		
Been shouted at or taunted in the street	1	2		1	2		
Been followed by someone	1	2		1	2		
Had someone pester you for money	1	2		1	2		
Been jostled or obstructed	1	2		1	2		
ASK WOMEN ONLY:							
Had indecent suggestions made to you	1	2		1	2		
Been sexually pestered in any other way	1	2		1	2		

****

IF ADDRESS IS IN AREA COVERED BY 'MAP A' ASK QUESTION 13

IF ADDRESS IS IN AREA COVERED BY 'MAP B' SKIP TO QUESTION 14

****

		CODE	SKIP TO
*13a)	TO 'MAP A' RESPONDENTS ONLY: I would now like to ask you a few questions about the street lighting in this area. Firstly, have you noticed any changes to the street lighting in the last eight weeks?		
	Yes	1	b)
	No	2	Q.14
	IF YES CODE 1 At a).		
b)	What changes have you noticed? (RECORD VERBATIM)		
c)	Have the changes to the lighting affected your feelings of personal safety when you are out in this area after dark?		
	Yes	1	d)
	No	2	f)
	Can't say	3	f)
	IF YES (CODE 1 AT c). SHOW CARD X		
d)	Compared with how you felt before the changes to the lighting, how do you feel now?		
	much less safe	1	
	less safe	2	
	more safe	3	
	much more safe	4	
e)	Why is that? (RECORD VERBATIM)		
f)	Is there anything else you would like to say about the changes to the street lighting? (RECORD VERBATIM)		

*n.b. Question 13 was only asked in treated area in 'After' survey

	RESPONDENT'S CHARACTERISTICS	CODE	SKIP TO
14.	I should finally like to ask a few questions about yourself and your household.		
	SHOW CARD I		
	Which of the statements on this card applies to you?		
	Full-time employment	01	
	Part-time employment	02	
	Self-employment	03	
	Not working, currently looking for a job	04	
	Prevented from looking for work through temporary sickness	05	
	On a government scheme	06	
	Waiting to take up a job	07	
	Looking after the home	08	
	Retired	09	
	In full-time education	10	
	Permanently sick or disabled and not in employment	11	
	Don't know	12	
15.	How many cars or vans does this household normally have available for personal use? none	1	
	one	2	
	two	3	
	more than two	4	
	SHOW CARD J		
16.	Can you tell me from this card which age group you belong to?		
	18 and under	1	
	19-24	2	
	25-34	3	
	35-44	4	
	45-54	5	
	55-64	6	
	65 and over	7	
	INTERVIEWER TO CODE:		
	RACE: White	1	
	Asian	2	
	Afro-Caribbean	3	
	Middle Eastern	4	
	Other	5	
	SEX: Male	1	
	Female	2	

Thank you very much indeed for your time. Your help in this final part of our research is greatly appreciated,

Appendix I. Characteristics of survey respondents compared with small area statistics from 1981 Census data

Table 12: Sex of survey respondents compared with Census data

	Treated area (K3)		Control area (K1)	
	Sample	Census	Sample	Census
Male	38.2%	47.5%	37.5%	46.2%
Female	61.8%	52.5%	62.5%	53.8%

Females were over-sampled and males under-sampled, probably as a result of the times at which interviews were sought and despite the random person selection within households contacted.

Table 13: Age of survey respondents compared with Census data

	Treated area (K3)		Control area (K1)	
	Sample	Census	Sample	Census
16-24	9.4%	16.8%	6.7%	17.8%
25-34	23.6%	18.1%	14.4%	13.1%
35-44	18.3%	12.2%	19.2%	13.8%
45-54	12.0%	12.9%	9.6%	16.1%
55-64	8.9%	15.3%	18.3%	15.7%
Over 65	27.7%	24.7%	31.7%	23.5%

The youngest age group has been under-sampled and the eldest over-sampled. Some change in age profile since 1981 might be expected; for example, K3 appears to have experienced some gentrification.

Table 14: Car ownership of survey respondents compared with Census data

	Treated area (K3)		Control area (K1)	
	Sample	Census	Sample	Census
None	33.5%	48.4%	30.8%	34.4%
One	50.8%	42.1%	38.5%	44.3%
Two	14.1%	7.1%	26.9%	18.0%
>Two	1.6%	1.4%	3.8%	3.3%

These figures are indicative of the generally higher status of K1. Increase in car ownership since 1981 is likely. Survey question asked about vehicle availability, not car ownership as in census.

Table 15: Employment of survey respondents compared with Census data

	Treated area (K3)		Control area (K1)	
	Sample	Census	Sample	Census
Full-time employed	39.8%	43.2%	18.3%	39.9%
Part-time employed	12.0%	10.1%	15.4%	9.6%
Self-employed	6.8%	4.5%	8.7%	6.6%
Seeking work, temporarily or permanently sick	4.6%	6.6%	6.8%	5.6%
Student	3.1%	3.5%	2.9%	6.3%
Retired	26.7%	15.9%	35.6%	15.8%
Other (Government scheme, looking after home, etc.)	6.8%	16.3%	12.6%	16.3%

The major discrepancy appears to be an over-sampling of retired persons, although this may arise from different classification of elderly women between 'retired' and 'looking after home'. Full-time employed in K1 are under-sampled although among totals of employed persons the discrepancy is less. There have been changes in employment patterns since 1981.

Table 16: Social class of survey respondents compared with Census data

	Treated area (K3)		Control area (K1)	
	Sample	Census	Sample	Census
A	3.0%	9.4%	10.4%	16.7%
B	27.3%	25.0%	41.8%	39.4%
C1	37.1%	19.8%	23.9%	13.6%
C2	20.5%	30.2%	16.4%	13.6%
D	8.3%	12.5%	3.0%	12.1%
E	3.8%	3.1%	4.5%	4.5%

Social class categorisation in the sample was estimated from very limited questioning. The table indicates the higher status of area K1. Given data limitations the sampling proportions appear reasonable.

Appendix J. Attitudinal questions – discussion and regression equations

I. Discussion

Analysis of the survey results has followed the non-equivalent control group design (Judd and Kenny, 1981). The response in the 'after' survey is regressed against the same respondent's 'before' response together with classificatory variables such as age, sex and class, and, crucially, whether the respondent was resident in the treated area (the 'treated' variable). If there had been no change in attitudes, then the 'after' responses should be perfectly correlated with the 'before' responses. If there was a change in attitude only in the treated area, then the 'treated' variable would enter the regression equation. Similarly if attitude changes were stronger among women, the elderly or those of a certain social class, then these variables would become significant in the regression. Since the questions were asked in February and June one might expect certain changes in attitude to take place due to seasonal effects, particularly daylight hours. These changes in attitude might indeed be stronger among (say) women rather than men. Also tested were some possible combinations of classifications (eg sex x age, sex x treated) to test whether elderly women or women in the treated area had differential responses.

There might also be some overall general trend in changing attitudes. This is catered for by allowing the previous response to be an independent variable, rather than letting the difference in responses between the before and after surveys be the dependent variable (a 'change score' type analysis). The central issue in the analysis was whether response change was different in the *treated* area: did any 'treated' variables enter the equations? Since the analysis was seeking explanation rather than prediction, unweighed responses were used for this part of the study.

In the introductory section of the survey, respondents were asked a series of questions including whether they agreed with the statement that 'this area has poor street lighting'. As was expected, residents in the treated area did change their attitude to this question relative to those in the control area. Table 17 shows both the simple comparison of mean scores and the results of the regression analysis performed as outlined above.

Table 17: Responses to statement 'this area has poor street lighting'

(a) Comparison of mean scores

	Before	After	Change	Number of Respondents
Treated Area	2.9	4.2	+1.3	189
Control Area	3.3	2.9	-0.4	102
				291

(5 point scale: 1 = strongly agree; 5 = strongly disagree)

table continued overleaf

Table 17 (continued)

(b) Regression equation

RA = 2.20 + 0.14 (RB) + 1.23 (TREATED) + 0.08 (AGE) R^2 = 0.30 N = 291
(9.6) (2.7) (11.0) (2.6)

RA = Response After
RB = Response Before
t values for coefficients are given in brackets
TREATED: 1 = Treated Area, 0 = Control Area
AGE: 6 categories from 1 (youngest) to 6 (eldest)

It can be inferred that treatment has affected the response to this question with those in the treated area moving over one response category closer to disagreement. Age also provided a significant contribution to explanation of the 'after' response levels with elderly people disagreeing more than younger persons.

Perceived safety was assessed on a nine point scale between very safe and very unsafe, by day and dark both within the home and in the street outside. The hypothesis was that street lighting might affect perceptions of safety outside after dark; in other contexts changes in attitude should be small although some positive spillover affect on attitudes might be possible (eg re-lighting shows care and concern about community welfare which might influence attitudes more generally). The regression results for these questions are shown in Table 18. It can be seen that treatment only enters in the expression for safety in the area after dark, and here only in combination with sex. These equations suggest that although women generally perceived themselves to be less safe after dark at the time of the after survey, women in the treated area perceived themselves to be more safe. These factors were only significant in combination. If the variable sex was omitted, then the cross product of treatment and sex variables was not significant either. The 'treated' variable did not enter any of the other equations.

Thus it can be stated that women's perceptions of safety in the treated area after dark were improved, counter to the general trend among women in both areas.

Attitudinal questions were also asked about certain specific crimes, distinguishing between worry about those crimes and perceived likelihood of their occurrence. The crimes suggested included several that street lighting plausibly might discourage (eg car theft, mugging on the street, vandalism to home). The aim was to see whether worry or risk perception had been affected by the introduction of improved street lighting. The results where the 'treated' variable entered the equations are shown in Table 19, with the full results in the latter part of this appendix.

Table 18: Regression equations for perceived safety

Safety in area by daylight

RA = 5.40 + 0.42 (RB) - 0.52 (SEX) - 0.10 (AGE) R^2 = 0.29 N = 284
(10.3) (8.2) (3.4) (2.2)

Safety in area after dark

RA = 2.42 + 0.68 (RB) - 1.23 (SEX) + 0.92 (TREATED x SEX)
(7.1) (14.0) (3.9) (3.0) R^2 = 0.59 N = 215

Safety at home by daylight

RA = 4.15 + 0.51 (RB) R^2 = 0.25 N = 258
(9.2) (9.2)

Safety at home after dark

RA = 3.49 + 0.58 (RB) - 0.45 (SEX) R^2 = 0.40 N = 260
(8.6) (11.9) (2.3)

Notes.

RA = Response After RB = Response Before
Responses on 9 point scale: 1 = very unsafe; 9 = very safe
SEX: 1 = Female, 0 = Male
AGE: Categories 1 (youngest) to 6 (eldest)
TREATED: 1 = Treated Area, 0 = Control Area
N = Number of cases
t values of coefficients are given in brackets

For the questions about how worried people felt about certain crimes, the 'treated' variable entered three equations, but only in cross-product terms with either age or sex. Worry about being raped was reduced among elderly women in the treated area to a greater extent than for younger women. In the equations for worry about articles being stolen from a car or the car being damaged by vandals, the 'treated' cross-product term entered, but in the opposite sense to that which might have been expected. Women in the treated area were now more worried about theft from vehicles, although this effect was countered by a general tendency for elderly women to be less worried about such thefts. Worry about a car being damaged by vandals was now greater among elderly people in the treated area. When asked about how likely the respondents perceived certain crimes to be, 'treated' was relevant only in the vandalism to vehicles question where women in the treated area thought such crime to be more common now than previously.

Table 19: Attitudinal questions : regression equations in which 'treated' variable is statistically significant

(a) WORRY ABOUT...

Being raped?

RA = 1.50 + 0.50 (RB) + 0.06 (TREATED x AGE) - 0.10 (CLASS)
(7.6) (8.0) (2.5) (2.4)
R^2 = 0.30 N = 173

Things being stolen from car?

RA = 1.18 + 0.59 (RB) + 0.09 (SEX x AGE) - 0.46 (TREATED x SEX)
(7.5) (8.7) (3.3) (3.7)
R^2 = 0.36 N = 168

Car being damaged by vandals?

RA = 1.47 + 0.45 (RB) - 0.05 (TREATED x AGE) R^2 = 0.27 N = 168
(8.4) (7.2) (2.0)

(4 point scale 1: very worried 4: not at all worried)

(b) HOW LIKELY IS IT THAT . . .

Car will be damaged by vandals?

RA = 2.09 + 0.43 (RB) - 0.31 (TREATED x SEX) R^2 = 0.25 N = 168
(8.9) (6.6) (2.4)

(6 point scale 1: certain to 6: certain not to)

(c) HOW COMMON IS...

Graffiti on walls on buildings?

RA = 1.83 + 0.49 (RB) - 0.77 (TREATED) + 0.10 (TREATED x AGE)
(10.1) (9.6) (4.9) (3.8) R^2 = 0.36 N = 295

Teenagers hanging around the streets?

RA = 1.58 + 0.50 (RB) - 0.95 (TREATED) + 0.12 (TREATED x AGE)
(10.5) (11.2) (5.4) (4.0) R^2 = 0.45 N = 295

(4 point scale 1: very common 4: not at all common)

Notes.

RA = Response After RB = Response Before
t values of coefficients in brackets
TREATED: 0 = Control Area 1 = Treated Area
SEX: 0 = Male 1 = Female
AGE: 6 categories from 1 (youngest) to 6 (oldest)
CLASS: Social class estimates A, B, C1, C2, D, E coded 1-6 respectively.

For all these equations, the overall relationships are rather weak, with only about one third of the variation being explained overall. The contribution of the classificatory variables or their cross-products to this explanation, although statistically significant, was generally very small. It has been suggested that lighting may indeed encourage certain crimes as improved visibility makes identification of targets easier (Fleming and Burrows, 1986). It seems that some respondents may also subscribe to that view.

There is a view that perceived safety is linked to the occurrence of 'incivilities' such as graffiti and vandalism or the presence of teenage gangs, drunks or tramps. Partly as a control on the measure of perceived safety and partly to assess the rather more unlikely effect that street lighting might deter incivilities, respondents were asked to assess how common they thought such happenings were in their local area. The results are given in full in the latter part of this appendix with those of greatest relevance presented in Table 19. The 'treated' variable entered the equations for both graffiti and teenagers hanging around. In both cases these were now more common in the treated area. However, against that was the concurrent effect that elderly people in the treated area thought these occurrences were now less common. It is not implausible that graffiti and teenager gatherings were indeed more frequent in the treated area in June. This appears not to have influenced adversely the perceived safety of residents in the street after dark.

II. Full Results of Regression Equations for Attitudinal Questions

WORRY ABOUT ...

Home being burgled?

RA = 1.61 + 0.44 (RB) - 0.06 (CLASS) R^2 = 0.20 N = 291
(10.2) (8.4) (2.1)

Being attacked in the street?

RA = 1.60 + 0.45 (RB) - 0.04 (SEX x AGE) R^2 = 0.29 N = 287
(11.3) (9.1) (2.1)

Being raped?

RA = 1.50 + 0.50 (RB) + 0.06 (TREATED x AGE) - 0.10 (CLASS)
(7.6) (8.0) (2.5) (2.4)
R^2 = 0.30 N = 173

Home being damaged?

RA = 1.37 + 0.48 (RB) R^2 = 0.27 N = 290
(11.9) (10.3)

Car being stolen?

RA = 1.03 + 0.59 (RB) R^2 = 0.34 N = 168
(6.8) (9.4)

Things being stolen from car?

RA = 1.18 + 0.59 (RB) + 0.09 (SEX x AGE) - 0.46 (TREATED x SEX)
(7.5) (8.7) (3.3) (3.7) R^2 = 0.36 N = 168

Car being damaged by vandals?

RA = 1.47 + 0.45 (RB) - 0.05 (TREATED x AGE) R^2 = 0.27 N = 168
(8.4) (7.2) (2.0)

Notes,

RA = Response After; RB = Response Before
Responses on a 4 point scale 1: Very worried 4: Not at all worried
t values of coefficients are given in brackets
SEX: 0 = Male, 1 = Female
TREATED: 0 = Control Area, 1 = Treated Area
AGE: Categories from 1 (youngest) to 6 (eldest)
CLASS: Social Classes A, B, C1, C2, D and E coded 1 to 6 respectively

HOW LIKELY DO YOU THINK IT IS THAT ...

Home will be burgled?

RA = 2.10 + 0.45 (RB) R^2 = 0.22 N = 280
(10.2) (8.8)

Will be attacked in street?

RA = 2.52 + 0.39 (RB) R^2 = 0.19 N = 274
(12.7) (7.9)

Will be raped?

RA = 2.26 + 0.47 (RB) R^2 = 0.24 N = 168
(7.8) (7.9)

Home will be damaged?

RA = 1.96 + 0.50 (RB) R^2 = 0.29 N = 280
(10.2) (10.6)

Car will be stolen?

RA = 2.56 + 0.36 (RB) - 0.07 (SEX x AGE) R^2 = 0.18 N = 168
(9.6) (6.3) (2.5)

Things will be stolen from car?

RA = 2.29 + 0.39 (RB) - 0.06 (SEX x AGE) R^2 = 0.22 N = 168
(9.6) (6.3) (2.1)

Car will be damaged by vandals?

RA = 2.09 + 0.43 (RB) - 0.31 (TREATED x SEX) R^2 = 0.25 N = 168
(8.9) (6.6) (2.4)

Notes.

RA = Response After RB = Response Before
Responses on a 6 point scale between 1 (certain to) and 6 (certain not to)
t values of coefficients are given in brackets
SEX: 0 = Male 1 = Female
TREATED: 0 = Control Area 1 = Treated Area
AGE: 6 categories from 1 (youngest) to 6 (oldest)

INCIVILITIES

HOW COMMON ARE ...

Noisy neighbours or loud parties?

RA = 1.31 + 0.56 (RB) R^2 = 0.33 N = 295
(8.8) (11.8)

Graffiti on walls or buildings?

RA = 1.83 + 0.49 (RB) - 0.77 (TREATED) + 0.10 (TREATED x AGE)
(10.1) (9.6) (4.9) (3.8) R^2 = 0.36 N = 295

Teenagers hanging around the streets?

RA = 1.58 + 0.50 (RB) - 0.95 (TREATED) + 0.12 (TREATED x AGE)
(10.5) (11.2) (5,4) (4.0) R' = 0.45 N = 295

Drunks and tramps on the street?

RA = 2.15 + 0.32 (RB) + 0.18 (SEX) R^2 = 0.12 N = 295
(10.7) (5.8) (2.6)

Rubbish and litter in the streets?

RA = 1.28 + 0.55 (RB) R^2 = 0.42 N = 295
(4.6) (12.7)

Homes and gardens in bad condition?

RA = 2.05 + 0.30 (RB) R^2 = 0.12 N = 295
(14.4) (6.4)

Vandalism or deliberate damage to property?

RA = 1.89 + 0.37 (RB) R^2 = 0.17 N = 295
(12.3) (7.7)

Notes.

RA = Response After RB = Response Before
Responses on 4 point scale (1: Very common; 4: Not at all common)
TREATED: 0 = Control Area 1 = Treated Area
SEX: 0 = Male 1 = Female
AGE: 6 categories from 1 (youngest) to 6 (oldest)
Bracketed values are t values for coefficients

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