

The Impact of Street Lighting on Crime, Fear, and Pedestrian Street Use

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This paper presents findings of a coordinated program set up to assess the impact of lighting improvements on crime and fear of crime. Lighting improvements were targeted on three streets and a pedestrian footpath in three separate areas of London, United Kingdom. Streets selected for the study were those judged by a multi-agency team to be crime-prone. The impact of the strategy was evaluated using attitudinal and behavioral measures, through "before" and "after" surveys of the public. The data from each of the projects provided evidence that properly designed and focused street lighting improvements can lead to reductions in crime, disorder, and fear of crime. They can also increase nighttime street activity.

Keywords: Street lighting; informal surveillance; street crime; disorder; pedestrian activity; displacement; evaluation; London; United Kingdom.

Introduction

The issue addressed by this study is whether street lighting improvements can reduce crime, disorder, and fear in urban streets. The program originated in response to two areas of public concern: First, widespread anxiety about the spiraling increase in recorded crime and the apparent failure of traditional strategies to cope with it. Despite considerable investment in the police throughout the 1980s, the clear-up rate (the amount of crime solved by the police) has fallen steadily. Second, successive crime surveys indicate that crime and the fear that it generates impairs the quality of life in many urban areas. In deprived inner city areas, two-thirds of women and significant numbers of men avoid going out at night for fear of being attacked. A recent crime audit, carried out for the Nottingham Safer Cities Unit, estimated that avoidance of the city center after dark as a precaution against crime cost around £24 million (approximately \$34 million) and 600 jobs each year (Nottingham Safer Cities Project, 1991).

One response to these concerns has been to explore possibilities for reducing crime through changes in environmental design, planning, and management. An underlying assumption of this approach is that cues, stimuli, and physical features of the environment can trigger the propensity to offend. Though the methods adopted to reduce criminal opportunities vary according to local crime problems and physical surroundings,

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they have been variously dubbed "defensive," "environmental," "physical," and "situational" methods of prevention. As a mechanical modification to one aspect of the built environment, street lighting is a strategy encompassed by an approach best known as Crime Prevention Through Environmental Design (CPTED).

Evidence that fear of crime is out of proportion to risk even in high crime areas has caused researchers to examine a range of physical and social cues within the environment that arouse fear irrespective of objective risks. Two significant factors that emerge are that high levels of anxiety are linked with a decaying physical environment and neighborhood disorder (Skogan, 1990a). Moreover, fears are heightened after dark. As a highly noticeable aesthetic improvement to the nighttime environment, lighting improvements have the capacity to signal that efforts are being made to manage the process of neighborhood decline, crime, and fear.

Within this context, the rationale for the concentrating on street lighting improvements as means of reducing crime and fear in urban areas is relatively straightforward. According to the 1988 British Crime Survey, over half the crime committed in the United Kingdom occurs outside at night. It is, therefore, plausible that some of these crimes could be prevented by street lighting improvements. Equally, improved lighting is an immediate means of enhancing visibility and surveillance. Good illumination can transform the physical features of the built environment and potentially reduce fear of crime after dark.

Previous Research

As will become apparent, the results of the relighting initiative reported here show that good street lighting can reduce crime disorder and fear. Other research, however, suggests that it does not. A major review of street lighting projects in the United States found the empirical evidence to be inconclusive. Of the 103 lighting projects evaluated, only 15 withstood serious investigation, and each of these was found to be seriously flawed.

In particular, every project had used police crime statistics as the sole measure of the impact of lighting on crime. Yet with few exceptions (e.g., theft of cars), recorded offenses are an inappropriate means of evaluating the effectiveness of crime prevention measures. Not only is a substantial amount of crime never reported to the police, there is also some evidence that crime prevention initiatives increase the public reporting of offenses. Both factors can distort the results

of projects that hinge upon official crime statistics to assess effectiveness.

Likewise, a recent study in the United Kingdom, which also relied heavily on police data to monitor the influence of street lighting on crime across a wide area of London, found no evidence that lighting improvements reduced crime. A household survey carried out in the same area indicated that street lighting improvements had only minimal impact on fear of crime (Atkins *et al.*, 1991). Similar conclusions were reached in a very small survey of 33 households undertaken in Scodand (Nair *et al.*, 1993).

These two UK projects differ in geographic scale and location, but they share many methodological flaws identified by Tien *et al.* over 15 years ago (Tien *et al.*, 1979). To summarize these deficiencies: Both studies are characterized by weak project designs. The failure to implement the household surveys competently resulted in low response rates and unrepresentative samples. Both failed to address competing explanations for the observed results or control for "other" social and environmental influences that could have confounded the program effects. One of the most striking limitations of the two UK studies is that lighting improvements were carried out in conjunction with other environmental improvements (Home Office, 1990: 20; Nair *et al.*, 1993), making it difficult to isolate the impact of lighting from other interventions in the program areas (for a fuller discussion see Painter, 1993).

The program outlined in this paper was designed to overcome some of the methodological shortcomings identified above. Before describing the research design and results of the program, however, it is necessary to consider the mechanisms by which lighting improvements could reduce crime.

Ways in Which Lighting Could Reduce Crime and Fear

Though it might seem obvious that good lighting has the potential to reduce crime and fear, there is a need to discuss how and in what circumstances this might occur. Street lighting is a tangible alteration of the built environment but it does not constitute a physical barrier to crime. As an environmental crime strategy, it can only be effective if it alters the behavior of the public, including potential offenders. The starting point for the program as a whole, therefore, was to identify the ways in which lighting might reduce crime. The literature within environmental criminology suggested several possibilities:

1. Lighting reduces crime by improving visibility. This deters potential offenders by increasing the risks that they will be recognized or interrupted in the course of their activities (Mayhew *et al*, 1979).
2. Improved illumination reduces fear of crime because it physically improves the environment and alters public perceptions of it. People sense that a well-lit environment is less dangerous than one that is dark (Warr, 1990).
3. Lighting improvements encourage increased street usage which intensifies natural surveillance. The change in routine activity patterns works to reduce crime because it increases the flow of potentially capable guardians. From the offender's perspective, the proximity of other pedestrians acts as a deterrent since the risks of being recognized or interrupted when attacking personal or property targets are increased (Cohen and Felson, 1979). From the potential victim's perspective, perceived risks and fears of crime are further reduced.
4. Enhanced visibility and increased street usage combine to heighten possibilities for informal surveillance. Pedestrian density and flow and surveillance have long been regarded as crucial for crime control since they can influence offenders' perceptions as to the likely risks of being caught (Jacobs, 1961; Newman, 1972; Bennett and Wright, 1984).
5. The renovation of a highly noticeable component of the physical environment combined with changed social dynamics acts as a psychological deterrent. Offenders judge that the image of the location is improving and that social control, order, and surveillance have increased (Taylor and Gottfredson, 1986). They may deduce that crime in the relit location is riskier than elsewhere and this can influence behavior in two ways: First, offenders living in the area will be deterred from committing offenses or escalating their activities. Second, potential offenders from outside the area will be dissuaded from entering it (Wilson and Kelling, 1982). Crime in the relit area is reduced though it may be displaced elsewhere.
6. The positive image of the nighttime environment in the relit area is shared by residents/pedestrians and this social process feeds on itself. As actual and perceived risks of victimization lessen, the area becomes used by a wider cross section of the community. The changed social mix and activity patterns within the locality reduces exposure to risks of crime and reduces fear.
7. Lighting improves community confidence. It provides a highly noticeable sign that local authorities are investing in the fabric of the area. This offsets

any previous feelings of neglect and stimulates a general "feel good" factor. Fear is reduced.

It is feasible that lighting improvements could, in certain circumstances, increase opportunities for crime by bringing greater numbers of potential targets and offenders into the same physical space. It is also likely that more than one of the preventive mechanisms operate simultaneously or overlap. Yet, just as the ways in which lighting might work to reduce crime need to be specified, so also do the conditions within which that potential is most likely to be released. The next section describes how suitable streets were chosen and the types of crime included in the studies. It also outlines the methods by which the results were achieved.

Research Design

The program consisted of three linked studies, each of which used a quasi-experimental design and multi-method approach. It was stripped to the bare essentials for evaluative purposes. Each of the three studies was strategy-specific, crime-specific, time-specific, and place-specific. The program was focused at street level to facilitate the introduction of lighting improvements in conditions that could be carefully controlled and monitored throughout the research period. The aim was to assess the impact of lighting improvements on crime, disorder, and fear.

Selection of Streets for Study

The capacity of street lighting improvements to prevent crime will depend on *the* characteristics of the environmental setting into which it is introduced. To state the obvious, not all badly lit streets are the same. For the purposes of the study, it was necessary to identify streets that were badly lit and potentially crime- and fear-inducing. Evidence suggests that street crime (personal and property) and fear is concentrated in high-activity, dilapidated urban areas. Such locations tend to produce a level of transience, mobility, and victim/criminal convergence, all of which facilitate opportunistic offending, social disorder and inflate public fears (Brantingham and Brantingham, 1984; Skogan, 1990a).

The police in the three chosen areas (Edmonton, Tower Hamlets, Hammersmith and Fulham) were asked to identify streets that were poorly lit and potentially hazardous. A multi-agency team made up of the crime prevention officer, local municipal officials,

lighting engineers, and academics subsequently visited various sites at each of the locations. The streets chosen had contextual similarities: They were badly lit; sited in mixed-use locations (connected commercial, transport, leisure, and shopping facilities); contained on-street parking; had some pedestrian usage and displayed, to varying degrees, observable signs of environmental and social incivilities.

In Edmonton, North London, two routes were monitored. The chosen street ran alongside three high-density, multistory, council-owned tower blocks. An adjoining pedestrian-only footpath leading from the street to the tower blocks was also included in the study. The street and footpath converged under a railway bridge. From that point, the street led to a railway station entrance, public telephone box, snooker club, public houses, shops, and launderette.

In Tower Hamlets, which is an extremely deprived, multi-racial area in the East End of London, a rail entrance/exit led onto the street selected. Property along the street was partly boarded up but also included high-density, dilapidated, council-owned accommodation. The street also connected the main arterial East End Road at one end with high-quality private housing at the other. Located nearby was a Salvation Army hostel for alcoholics and the homeless and several public houses. The street was also used by nurses and night staff as a route to a large hospital situated near the main arterial road.

In Hammersmith and Fulham, an area in West London, the selected street ran from private rented accommodation through a sheltered housing complex, inhabited by elderly people (65 years +) to a major arterial road. This contained bars, shops, launderette, and late-night retailing outlets.

Types of Crime Included in the Study

The study concentrated on the types of crimes committed in streets and public places. These include street robbery, theft from the person, physical and sexual assault, theft of and from cars, and vandalism. In addition, it was decided to incorporate all forms of threatening abusive and disorderly behavior. Such incivilities have emerged as a significant policy issue because they intensify fear of crime, impair the quality of urban life, and contribute to neighborhood decline (Skogan, 1990a).

Type and Level of Lighting Installed

The type, level, and uniformity of lighting and the way it is implemented will affect the potential to prevent

crime. If, for instance, the level or uniformity of the lighting is second rate or if the lighting is obscured by other environmental features such as shrubbery, then the potential mechanisms suggested earlier may not be induced. Each of the improved lighting schemes in the program was designed to meet British Standard BS5489, Part 3. This lists three categories of lighting levels to correspond with low-, medium-, and high-crime risk areas. The highest category 3/1 was achieved in all three streets and the pedestrian footpath. This gives an average illuminance of 10 lux and a minimum of 5 lux. The Code of Practice also states a preference for "white" light sources for category 3/1. High-pressure sodium lamps were used to replace the low-pressure sodium lamps (orange) that in the pretest conditions did not achieve the minimum standard of 3/3 laid down. In these circumstances, the lighting upgrade constituted a highly conspicuous alteration to the nighttime environment.

Survey Procedures

On-street pedestrian surveys were undertaken before and 6 weeks after lighting improvements in each of the three streets and the pedestrian footpath. They were completed after dark between 5.00 PM and 11.30 P.M. for 10 evenings in each pre- and posttest period. The focus of analysis was the amount of crime that occurred after dark in the street, 6 weeks before and 6 weeks after relighting. Pedestrians were asked about their experience of crime within a 5-minute walk of the interview point, over the previous 12 months. They were asked to be specific about crime that had occurred in the street after dark during the 6-week period prior to the interview. The lighting was installed within 1 week following the pretest interviews.

Six weeks after the lighting was installed, pedestrians using the same streets were interviewed in similar circumstances at comparable seasonal times (i.e., before the change to British summertime). In addition, incidents were mapped, the number of pedestrians using the streets was monitored, and observational material was logged. A multi-agency team monitored program and fieldwork implementation. In each project, lighting installation and fieldwork procedures were fully implemented.

The decision to use on-street pedestrian surveys requires some explanation. It is well established that, with few exceptions, surveys provide a more accurate barometer of crime and disorder than officially recorded statistics. But surveys have additional advantages. They provide attitudinal and behavioral measures of fear and they are able to tap into the

experiences of local communities. Furthermore, proponents of the "lifestyle-exposure-to-risk" theory indicate that those who go out two or more evenings, especially on weekends, and use public transport are three times more likely to be victimized than those who stay indoors (Gottfredson, 1984). Because risks of crime are associated with the routine activities of an urban lifestyle (Cohen and Felson, 1979), it seemed appropriate to focus on those most exposed to risk.

The short-term duration of the studies was to facilitate control and monitoring of "other" environmental influences that could have confounded the effects of the relighting schemes. In addition, evidence suggests that more accurate data are achieved by using recall periods of under 3 months (Skogan, 1990b).

Nonetheless, it was important to consider whether any positive effects of lighting improvements could be sustained over a longer period of time. For this reason, the Hammersmith and Fulham study used a 12-month period to monitor impact. In addition to the pedestrian surveys, 43 elderly residents living alongside the relit route were interviewed on three occasions. The household surveys were conducted on a panel basis before and 6 weeks and 12 months after lighting improvements. Burglary was added to the crime categories outlined above. The findings of this case study are described at the end of the next section.

Results

Crime

Incidents of crime and disorder were markedly reduced in two of the three streets, following lighting improvements (Table 1). After adjusting for the difference in sample size in Edmonton, 21 incidents were reduced to four and similar reductions were found

in Tower Hamlets (18 reduced to four). As there were only two reported incidents in the street in the Hammersmith pedestrian survey before relighting, it is not possible to state that lighting had any impact on crime against pedestrians. One finding not shown in Table 1 is that there was a significant drop in crime and disorder (17 incidents reduced to three) in two adjacent unlit roads that led into the relit street. This suggests that lighting improvements had an unintended, positive impact outside the study area. Indeed there is increasing evidence that crime prevention initiatives can have beneficial effects beyond their main objectives. This effect has been referred to as "diffusion of benefits" (Clarke, 1992; Clarke and Weisburd, 1994).

Most of the reductions reported relate more to threatening and disorderly incidents than to crime. Yet research indicates that social and physical disorder is closely correlated with high levels of crime, fear, and neighborhood decline. One explanation for the association between disorder, crime, and fear is that if left unchecked disorderly incidents escalate into more serious crime (Wilson and Kelling, 1982; Skogan, 1990a). Where street lighting improvements can lead to a reduction in such incidents, they have a significant contribution to make as a crime-control strategy.

Fear of Crime

Alongside the reduction in crime, there was a marked reduction in fear of physical attack (Table 2) and a corresponding increase in personal safety among men and women in all three streets. To simplify results, only the reductions in fear after dark are presented.

Over 90% of pedestrians interviewed in all locations thought fear of crime in the surrounding area

Table 1. Crime before and 6 Weeks after Lighting Improvements in Edmonton, Tower Hamlets, and Hammersmith and Fulham

Incident	Edmonton		Tower Hamlets		Hammersmith and Fulham	
	Before N = 207	After N = 153	Before N = 143	After JV = 143	Before N = 200	After N = 200
Street robbery/ physical attack	5	0	2	0	1	0
Theft of/from/ damage to vehicles	12	2	5	1	0	0
Threats	4	1	11	3	1	0
Total	21	3	18	4	2	0

Table compiled from Painter, 1988, 1989, 1991a. N = sample size.

Table 2. Fear of Attack, at Night, by Gender: "Do You Worry About the Possibility of the Following Things Happening, at Night, When Walking through Here?" Percent answering "yes"

Incident	Edmonton				Tower Hamlets				Hammersmith and Fulham*	
	Male		Female		Male		Female		All	
	Before	After	Before	After	Before	After	Before	After	Before	After
Physical attack	50%	28%	87%	57%	49%	16%	79%	58%	60%	34%
Threats/pestering	17%	10%	15%	4%	22%	8%	55%	55%	88%	32%
Women only: sexual assault	N/A	N/A	86%	64%	N/A	N/A	77%	60%	78%	25%

Table compiled from Painter 1988, 1989, 1991a. All percentages are "rounded" and sample sizes are the same as in Table 1.
 *Gender breakdown not available for this project.

had decreased. In Edmonton, 62% said they had felt safer using the street; in Tower Hamlets, 69% felt safer. Pedestrians were then asked, "Why do you feel safer in this road?" In Edmonton, 83% attributed this to the relighting. The figure for Tower Hamlets was significantly lower (30%). The majority of pedestrians at this site said that they felt safer, but did not know why. This suggests that in some environments lighting improvements might have a subliminal influence on personal safety even if the improvements have not been consciously noticed or have been taken for granted.

Impact of Lighting Improvements on Women

Coincident with the reduction in women's fear of physical and sexual assault, **women were far more likely than men to notice the lighting improvements in all three locations.** Toward the end of the interview, pedestrians were asked whether they had noticed any changes to the street lighting (Table 3).

The lighting projects provide empirical support for the proposition that women's fear of crime is not simply related to their physical vulnerability, but to cues and stimuli within the built environment to which they appear more sensitive than do their male counterparts. Following lighting improvements, interviewers noted that women had altered their demeanor and the pace at which they walked. They used the pavement rather than the road, walked normally rather than ran, and generally appeared more confident. As one woman commented:

People don't seem to walk in the middle of the road. People are more confident since the new lights. It looks less intimidating.

Table 3. Percentage Noticing Lighting Improvements, by Gender

	All	Male	Female
Edmonton	69%	63%	82%
Tower Hamlets	67%	59%	80%
Hammersmith and Fulham	79%	76%	84%

Table compiled from Painter 1988, 1989, 1991a.

Indirect Effects on Perceptions of Crime and the Environment

Perceptions of specific crime problems in all areas were positively affected following the lighting initiatives. In each street, respondents thought that assaults, threatening behavior, and vandalism had decreased, (Table 4).

Perceptions of crime problems in an area are an important aspect of crime prevention since attitudes can have a tangible impact on behavior. If people believe that crime is on the increase in an area, they will use it less often. In turn, this reduces the amount of informal surveillance and social control and opportunities for crime can be increased.

Impact on Nighttime Street Usage

In all three streets and the pedestrian footpath the number of pedestrians were monitored pre-post-test, and in all cases there was a substantial increase in the number of people using the streets (see Table 3).

The results indicate that lighting improvements can increase pedestrian street use throughout the evening. This effect has been noted in another lighting project implemented over a larger geographical area

Table 4. Percentage of Respondents Believing Problems Had Decreased in the Immediate Area, Following Lighting Improvements

	Edmonton	Tower Hamlets	Hammersmith and Fulham
Threatening behavior	64%	76%	82%
Physical assaults	55%	69%	70%
Sexual assaults	65%	53%	60%
Vandalism	39%	56%	48%
Gangs of youths loitering	9%	26%	23%
Fear of crime	85%	94%	90%

Table compiled from Painter, 1988, 1989, 1991a.

Table 5. No. of Men and Women Pedestrians Before and After Lighting Improvements

	Before	After	\bar{x} 7c Change
<u>Edmonton</u>			
Relit pedestrian footpath			
Male	1888	2832	+ 50%
Female	1374	2259	+ 64%
Relit road			
Male	2976	4271	+ 44%
Female	2477	3598	+ 45%
<u>Tower Hamlets</u>			
Male	898	1205	+ 34%
Female	524	775	+ 48%
<u>Hammersmith and Fulham</u>			
Relit road			
Male	547	1098	+ 101%
Female	495	846	+ 71%

Source: Painter 1988, 1989, 1991a.

and monitored over a 12-month period (Bainbridge and Painter, 1993).

The Impact on Crime and Fear of Crime Among Elderly Residents over 12 Months

The pedestrian surveys clearly achieved most of the stated aims. One limitation, however, was the short time period between the before and after surveys. Consequently, the third project in Hammersmith and Fulham included a 12-month follow-up household survey of elderly people living in the relit street in order to assess whether any positive effects of relighting on crime and fear could be sustained over a longer period.

The household survey of elderly people showed an

immediate and marked reduction in disorder and incivilities in the relit area. A total of 35 incidents were reduced to three in 6 weeks, a reduction that was sustained over a 12-month period.

Prior to lighting improvements, the majority of elderly residents were afraid to walk approximately 30 meters from their door to the on-site community center. Fearful of crime and disorder, they felt vulnerable and powerless. As one elderly woman put it:

I can no longer exercise any control over the little bit of garden outside my flat and that includes my front porch.

Lighting improvements greatly reduced elderly people's concerns and fears about crime. In the pre-test period, six of 10 worried "a lot/quite a lot" about crime. In the posttest period, only two of 10 worried "a lot/quite a lot." Fears of being burgled, robbed, or assaulted in the street showed significant reductions (-77% and -65%, respectively). One in three elderly people said that they were more willing to go out after dark and almost half (44%) thought it had increased their confidence to go out at night. Lighting also affected perceptions of crime problems over the 12-month period. Half of all respondents thought that crime had become less common in the previous 12 months, 61% thought fear of crime in the community had decreased, and 94% thought that the lighting had made it easier to recognize people and aesthetically improved the area.

Discussion

The results of this program are encouraging. They show that lighting can reduce crime, disorder, and fear of crime. Yet the positive effects to emerge from this program require some explanation, particularly as they are at odds with most other research findings. Certain factors that might have distorted or undermined the findings are considered next.

Telescoping

Reductions in crime pre—post-test might have been distorted as a result of "telescoping." Telescoping occurs when respondents pull forward incidents from an earlier period into the temporal window that they are asked to recall. If this occurred, then the incidence of crime in the 6-week pretest period will have been inflated and the reduction in crime exaggerated. Yet, the available evidence suggests that

surveys using briefer reference periods of recall actually produce more accurate data. One analysis of National Crime Survey data in the United States, for example, found that the personal crime victimization rate for a 4-week period of recall was 261 per 1,000, whereas the comparable rate for crimes occurring in the most distant 6 months of the recall period was 162, a fall-off of 61% (Skogan, 1990b). Whereas telescoping is an ever-present danger in survey-based research, the distortion of results is likely to be far greater in longer-term studies than in short-term ones such as this.

Short-term vs. Long-term Effects

Using short periods of time to evaluate impact does attract the criticism that the effects of relighting wear off over a longer period of time. The extent to which lighting effects taper off is an unknown quantity on present evidence, but the Hammersmith and Fulham study reported here and two subsequent studies undertaken in high crime areas indicate that reductions in crime, disorder, and fear are sustainable over a 12-month period (Painter, 1991b; Bainbridge and Painter, 1993). One possible explanation may lie in the fact that as a physical improvement lighting differs from other strategies (e.g., increased police patrols and Neighborhood Watch) that have been found to have short-term effects. Once lighting is installed, it requires minimal resources to maintain any immediate benefits over the longer term.

Displacement

Lighting may prevent crime or it might displace it. Displacement is a possible outcome of any crime prevention measure, but it is rarely total and can be benign if it leads to less serious crime or a more equitable distribution of crime (Barr and Pease, 1990). The Hammersmith and Fulham case study provides an example of "benign" displacement. Even if lighting displaced disorderly and obscene conduct elsewhere, a net gain was achieved in the deflection of offensive behavior from a vulnerable group of elderly people.

Conclusions

The research findings from the Edmonton, Tower Hamlets, and Hammersmith and Fulham projects

provide consistent evidence that lighting improvements have a powerful capacity to reduce crime, incivilities, and fear. In urban mixed-use locations, they also have the potential to increase pedestrian street use after dark. The study also illustrates the necessity of having a clear conceptual and methodological approach to evaluation. A badly lit environment does not, of itself, cause crime. It would be foolish for policy makers to believe that all that is required to reduce crime and fear is to find a badly lit site and relight it. If lighting is to be effective as a crime prevention strategy, it is important to be clear about the mechanisms that it is expected to induce in a specific environmental and social setting. It may be difficult to disentangle which mechanisms are induced with what effects. This is less important than thinking through in advance of installation how, why, and where it could work. The studies further illustrate that it is important to consider unintended benefits of lighting improvements to areas and times not encompassed by the scheme.

Nonetheless, one limitation of the three linked studies is that displacement of offenses by place and time was not dealt with. Two current research projects have been designed to specifically address this issue (Painter, forthcoming). Furthermore, it is difficult on the basis of the data presented here to estimate whether lighting improvements would be effective over wider geographical areas and longer time periods. Two recent UK studies, however, have produced encouraging results. The first undertaken on a high crime estate found that crime was reduced by 27% in the 12 months after public lighting was upgraded. The effects were supported by police statistics that revealed that crime committed on the estate after dark was reduced from 39% to 0% (Painter, 1991b). The second study, using household surveys to evaluate lighting improvements across a 2 square mile inner city area, found crime reduced by 53% in the 12 months following installation (Bainbridge and Painter, 1993). Although it is too early to draw definitive conclusions, it may be that the effects of relighting on crime and fear are generalizable to different environmental settings and larger geographical areas.

Finally, limits exist to what can be achieved by any single strategy. It cannot be expected that relighting will address crime and fear problems in all contexts. The principal conclusion to be drawn from the research is that improved street lighting will be most effective if the specific conditions of the environmental setting into which it is introduced are carefully analyzed and understood.

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