

Chapter 7

PREVENTING CRIME AT PLACES

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WHY PLACES ARE IMPORTANT

Most places have no crimes and most crime is highly concentrated in and around a relatively small number of places. If we can prevent crime at these high crime places, then we might be able to reduce total crime. Do we have evidence that this is feasible?

Places have received relatively little attention in crime policy so it is important to define "place." A place is a very small area reserved for a narrow range of functions, often controlled by a single owner, and separated from the surrounding area. By small we mean that a location is smaller than a neighborhood or community. Examples of places include stores, homes, apartment buildings, street corners, subway stations, and airports. We will also include mobile places, such as buses, in our discussions.

Concentration of crime at places is predicted by routine activity theory (Cohen and Felson 1979; Felson 1994) and offender search theory (Brantingham and Brantingham 1981). Some of the original evidence for clustering of crime at places was found in Boston (Pierce, Spaar and Briggs 1986) and Minneapolis (Sherman, Gartin and Buerger 1989). Additional evidence for crime concentration at places has been found for specific types of crime. Crow and Bull (1975) noted over 20 years ago that most convenience stores have no or few robberies, but a few have many robberies. In England and Canada a growing body of research has revealed that in high burglary neighborhoods most residences have no burglaries, but a few residences suffer repeated burglaries (Forrester et. al. 1988; Forrester et. al. 1990; Polvi et. al. 1990; Farrell 1995). Among drinking establishments, a few bars have most tavern-related violence (Sherman, Schmidt, and Velke 1992). Ten percent of the fast food restaurants in San Antonio, Texas account for one third of the property crimes at such restaurants (Spelman 1995b). In Kansas City and Indianapolis, gun crimes were found to be highly concentrated at a few places (Sherman and Rogan 1995b). Drug dealing is highly concentrated in a few locations, even in areas with a high volume of drug dealing (Weisburd, Green and Ross 1994; Eck 1994; Sherman and Rogan 1995a). This clustering is most apparent when compared to repeat offending and repeat victimizations. Combining the results from several studies, Spelman estimated that 10 percent of the victims in the United States are involved in about 40 percent of the victimizations, that 10 percent of the offenders are involved in over 50 percent of the crimes, and that 10 percent of the places are sites for about 60 percent of the crimes (Spelman and Eck 1989). Further, the concentration of crimes at a few places is relatively stable over time (Spelman 1995a, 1995b). These findings suggest that something about a few places facilitates crimes and something about most places prevents crimes.

Blocking Criminal Opportunities

The oldest forms of crime prevention were undertaken with the knowledge that making changes to places might prevent criminal events. These changes involve making crime more difficult, risky, less rewarding, or less excusable. This approach is known as opportunity blocking (Clarke 1992; 1995; Clarke and Homel, forthcoming). Opportunity blocking does not have to be done at places. It can also be built into targets (for example, designing anti-theft devices into automobiles [Clarke 1995] or printing holograms and photos on credit cards to curtail forgery and fraud).

Designing methods for blocking crime opportunities is the domain of Situational Crime Prevention (Clarke 1992; 1995). In this chapter we examine opportunity blocking at places, a subset of Situational Crime Prevention. It not only has a much longer history than offender-based prevention measures, it is used much more widely and in more settings than any other form of crime prevention. The vast majority of efforts to block crime opportunities at places are carried out and paid for by businesses, individuals, and local governments. Because places themselves have only recently become a subject for study by criminologists (Eck and Weisburd 1995), the Office of Justice Programs has funded very few explicit place-focused programs or tests of place-focused prevention. We will see that this lack of attention has limited our knowledge about this approach to prevention.

Opportunity blocking at places may have a greater direct effect on offenders than other crime prevention strategies. This is because place-focused tactics might influence offenders when they are deciding to commit a specific crime. Most offender based strategies try to sway offenders weeks, months, or years before they confront a tempting criminal opportunity. If offenders pay closer attention to the situation immediately before them than to the uncertain long term risks of their behavior, then it is quite possible that prevention at places may have a greater impact on offending than increases in penalties or less tangible increases in risks (e.g., decreases in police response time, increased police presence, or greater numbers of arrests and convictions). Because hotspots of crime are themselves clustered, if crime at these few places can be substantially reduced, communities can be made safer.

Although opportunity blocking takes a different approach than programs designed to change the life-course of potential and existing offenders, these two approaches can work together. Keeping cookies out of sight of toddlers is not only different from instructing them not to take the cookies -- and sanctioning them when they yield to temptation -- it reinforces instructions and sanctions by eliminating the temptation. For people with low self-control and low ability to see long term consequences of behavior (Gottfredson and Hirschi 1990) addressing the immediate circumstances surrounding crime opportunities may amplify the effectiveness of other strategies designed to address the prevalence of such offenders.

The evaluations selected for review in this chapter were required to meet three criteria. First, they must describe crime opportunity blocking at places. Second, they had to examine the manipulation of places, usually intentional changes in which the changes clearly precede any change in crime. Third, each evaluation must report outcome data, typically a measure of crime. We did not examine studies of implementation and management that did not measure an impact on crime. In short, we looked at evaluations of the impact on crime of intentional changes at places.

Over the last decade, police have paid attention to places, or "hotspots," of crime (Eck and Spelman 1989; Sherman and Weisburd 1995). This chapter does not review police efforts at places that relied solely on patrolling, investigations, or other enforcement. These are reviewed in Chapter 8 of this report. We did review evaluations of interventions involving police agencies when the intervention was a tactic that could also have been implemented by other agencies or institutions. Nuisance abatement, for example, has been implemented by police agencies, but it has also been implemented by prosecutors' offices, city attorneys, and citizen groups. In short, who implemented the tactic was of less importance than the fact that the tactic was applied at places.

Table 7-1 summarizes the evaluations examined. When a report described several separate quasi-experiments we treated them as distinct interventions. Two-thirds of the evaluations were conducted outside the United States, particularly in the United Kingdom and Australia. Only six studies were funded by an OJP-related agency. Although the OJP funded evaluations comprise only 15 percent of U.S. interventions, recent efforts by the National Institute of Justice (NIJ) are improving our understanding of places. NIJ's Drug Market Analysis Project helped introduce computer mapping of crime and drug places to police agencies and funded one of the randomized experiments described in this chapter (as well as several evaluations described in Chapter 8, on police prevention). The recent establishment of the Crime Mapping Research Center at NIJ has the potential to increase our knowledge of what works at places.

Violent crimes -- homicide, robbery and assault (no rape prevention evaluations were found) -- were the focus of 31 percent of the evaluations. Three of the six drug dealing prevention evaluations were OJP funded. Over half the evaluations examined serious crime (either a mixture of violent and non-violent crimes, or just non-violent crimes). Thus, 90 percent of the evaluations focused on serious property, personal, or drug crimes. Only 20 percent of the evaluations examined minor offenses, such as property damage, vandalism, minor thefts or incivilities.

As in earlier chapters, evaluations were graded using the scientific methods score (1=correlations between tactics and crime and studies without pre-intervention measures; 2=pre-post designs without control places; 3=pre-post designs with controls or time-series designs with at least five time periods prior to the intervention; 4=studies of interventions in a large sample of places compared to similar places without interventions; and 5=randomized controlled experiments). The modal score was 3, but a

substantial number of evaluations only scored 2. There were few studies at either extreme (1 or 5).

Table 7-1: SUMMARY OF EVALUATIONS Reports Examined 78
Percent of Interventions

Interventions Examined	99	100%	
Funded by OJP agency*	6	6%	
Setting & Crimes Study U.S. Setting		40	40%
Violent Crime	31	31%	
Drug Dealing	6	6%	
Serious Crime	52	53%	
Minor Crime	20	20%	
Scientific Methods Score 1 -- correlation/cross section		7	7%
2 -- before/after (b/a)	36	36%	
3 -- b/a with control & 50 time series		51%	
4 -- large sample quasi-exper.	4	4%	
5 -- randomized experiments	2	2%	
Evidence of Crime Change Down		89	90%
Up	2	2%	

* Including predecessor agencies within the Department of Justice.

GENERAL FINDINGS

These evaluations are consistent with the hypothesis that opportunity blocking at places can prevent crime, at least under some circumstances. Ninety percent of the evaluated interventions displayed evidence of crime reduction effects. Often these reductions were large. As we will see, these findings are consistent across a variety of evaluation designs, settings, and interventions. Although few of them have been replicated at a strong level of scientific evidence, there is good reason to invest in further testing of these tactics. Do these tactics displace crime? We will delve into this issue at the end of this chapter, but for now we will state that displacement seldom overwhelms prevention effects.

How much can we conclude about specific types of intervention, at specific places, against specific crimes? The answer is, we usually cannot be confident about what works where. We will discuss this finding in greater detail later in this chapter. We looked at nine types of places in four broad categories: In the following sections we describe the results of evaluations at residential places; money spending places (retail stores, banks and money handling businesses, and bars and drinking establishments); transportation places (public transportation facilities, parking lots, and airports); and other public places (open urban spaces and public coin machines). The nine types of places examined were not selected on theoretical grounds. They were selected because these were the places for which evaluations existed. Clearly, our knowledge about place-focused tactics is limited to a relatively few place types. Within each category we examine look at a variety of crime prevention tactics.

APARTMENTS AND RESIDENCES

Places where people live are the subject of this section. We will examine six types of interventions at residential properties, many of which are in public housing in Great Britain and the United States. Public housing complexes have become notorious for high crime rates in the United States. Dunworth and Saiger (1994) found that public housing complexes in three cities had higher rates of violent crimes and drug arrests than nearby neighborhoods or surrounding cities, but there was a great deal of variation among housing projects within each of the cities. We will see that crime in British public housing estates can also be a problem. First we will look at efforts to reduce crime by restricting movement through apartment complexes. Next we will look at improving security by improving locks and barriers on windows and doors. Third, we will examine property marking. Improving watching of residences is the subject of the fourth section. In the fifth section we will look at the effectiveness of multiple tactic interventions to prevent burglaries at dwellings with a history of burglary. Finally, we will turn our attention to methods to compel place managers to reduce drug dealing on their rental property. Table 7-2 summarizes the evaluations of crime prevention in residential settings.

Restricting Pedestrian Access and Movement

Oscar Newman's *Defensible Space* (1972) stimulated interest in the link between the built environment and crime in residential areas. Newman compared two public housing complexes and asserted that the differences in design were the principal reasons for the differences in crime. The limited number of places observed and the failure to take into account other differences (most notably the age distribution of tenants) suggests that his conclusions may have been overstated (Mawby 1977; Mayhew 1979; Merry 1981; Taylor, Gottfredson, and Brower 1980). Newman expanded on his ideas in a later book (1980). Other studies of the influence of design have compared more sites (Coleman 1985; Poyner 1983; Poyner and Webb 1991). All pointed to the association of design features and crime, particularly features that allow unfettered movement through residential complexes. Two of these evaluations examine changes in residential sites that break up large residential complexes into smaller components.

Newman (1980; 1996) reports on the effect of changes to the Clawson Point public housing complex in the Bronx. The complex was changed by reducing the number of pedestrian routes through the project, creating separate areas within the complex, improving lighting, and enhancing the surface appearance of the buildings. Newman (1996) reports a 54 percent decline in the crime rate and a 62 percent decline in the rate of serious crime (burglary, robbery and assault). No control group was used.

Poyner (1994) describes a retrospective evaluation of the effect of the removal of elevated walkways connecting buildings in a British public housing complex. The walkways were thought to facilitate robberies of residents. He reports a reduction in purse snatching, but no reduction in burglaries. An entry phone was installed at one entrance and this too may have contributed to the decline in purse snatches. Although auto thefts declined, Poyner was unable to determine if this was due to the removal of the walkways or the presence of construction workers while the removal was underway. There was no comparison to control places.

Restricting the movements of pedestrians was also part of a 1991 effort to reduce crime in several of Chicago's worst public housing buildings (Popkin et. al. 1995b). The approach included door-to-door police inspections of all units within the buildings. Ground floor entrances were enclosed in new lobbies and guard stations were installed along with metal detectors. Residents were issued identification cards and asked to present them when entering the buildings. In addition to housing authority and private security guards, the Chicago Public Housing Authority organized tenant patrols. Finally, a set of drug prevention services were provided tenants.

Popkin and her colleagues (1995b) attempted to evaluate this program. They interviewed a sample of residents in two complexes and asked them if conditions had improved, remained the same, or became worse following the interventions. The surveys found that 74 percent and 88 percent of respondents (depending on the complex) said shootings and fighting in their building had declined. It also found that 40

percent and 64 percent of the residents interviewed said drug dealing in their building had declined. These retrospective assessments by residents were a substitute for pre-treatment measures of crime and drug problems. The lack of control groups and true pre-treatment measures of crime, along with the implementation of multiple simultaneous interventions means that we cannot determine if the restrictions on pedestrian access contributed to improvements.

Collectively, these evaluations are suggestive of possible beneficial effects of reducing pedestrian movement through large public housing complexes. The weak designs used to evaluate these interventions temper our confidence in these types of interventions.

Target Hardening

Providing locks and improved security to access points is a commonly used burglary prevention tactic. The installation of improved locks and doors at two English public housing complexes was evaluated by Tilly and Webb (1994). Both studies used a pre-post design compared to a control area. In one complex burglaries declined 59 percent. In the other, burglaries decline over 90 percent relative to the control area.

The displacement of burglars to less protected locations is commonly raised as a threat to the effectiveness of place-focused interventions. Patricia Allatt (1984) has been one of the few evaluators to explicitly test for displacement effects. In addition to identifying the target residences which received improved ground floor entrance security, she examined the residences in the area immediately adjacent to the target area. And she used a control area that was far enough from the treatment area that it would not be contaminated by displacement. She found that burglaries in the target area increased by 9 percent one year after implementation, but in the control area burglaries had increased 77 percent. This suggests the program may have reduced potential burglaries, compared to what they would have been in the absence of the program. Burglaries increased 86 percent in the displacement area, but relative to the control area this was only a 9 percent increase over what could have been expected without the program. Thus, she was able to determine that displacement may have occurred, but was small relative to the overall program effect on the target area.

Target hardening appears to reduce burglaries without major displacement effects. However, with only two studies, more rigorous evaluations would make valuable contributions to our knowledge of what works in place-focused crime prevention.

Property Marking

A third approach to controlling burglaries is to make burglary targets unattractive to offenders. Laycock (1985; 1991) reports on the evaluation of a property marking campaign in two isolated Welsh communities. She reports a 40 percent decline in burglaries at residences where people said they engaged in property marking compared to the control group of non-participating residences. These results might be due to property marking, but the results could also occur if less vulnerable residents

participated in the program and more vulnerable residents did not participate. Gabor (1981) also evaluated property marking in a Canadian neighborhood. He found a 75 percent increase in seasonally adjusted burglaries per dwelling unit by comparing the 24 months before the program to 18 months after the property marking. Clearly, with two contradictory studies we cannot be confident that property marking is an effective method for reducing burglaries to residences.

Closed-Circuit Television (CCTV)

CCTV was used in fifteen housing complexes for elderly residents in Manchester, England. Chatterton and Frenz (1994) report a decline in burglary and burglary attempts of 79 percent across all complexes. Again, natural trends in burglary were not reported due to the absence of control places. This single weak study is insufficient as a basis for crime prevention policy. We will return to the use of CCTV in other settings.

Multi-tactic Interventions and Repeat Victimitizations

Crime prevention in residential settings often involves the implementation of a variety of measures. Evaluations of such interventions usually cannot estimate the relative effectiveness of the component parts, but they can show whether prevention is possible. Meredith and Paquette (1992) examined a multiple tactic approach to controlling burglaries in a Canadian apartment building. The program included apartment watch (like neighborhood watch but for apartment dwellers), target hardening, property marking, lighting improvements, and an assortment of other interventions. Reported burglaries dropped 82 percent from the year before to the year after the prevention measures were put in place. No control group was used, so again this drop may have been due to a general trend toward fewer burglaries in the surrounding area.

A growing body of evidence suggests that a few victims are involved in a large proportion of victimizations (Farrell 1995). Most of the research on this topic has been conducted in Great Britain, where programs to reduce burglaries of dwellings have been based these findings. The Kirkholt public housing complex has received considerable attention in England because evaluations indicated that focusing on residences with previous burglaries is effective (Forrester, Chatterton, and Pease 1988; Forrester, et. al. 1990; Pease 1991; Tilly 1993a). A number of interventions were used at each targeted residence, including target hardening and organizing residents in surrounding homes to watch the burgled house. However, two tactics deserves special mention. Like many low income publicly subsidized projects in England, the residences in Kirkholt had coin-operated gas meters. Residents put coins in the meter to get a preset amount of gas for heating and cooking. Officials periodically empty these meters, but for weeks the meters can contain a great deal of cash. These meters were the target of many of the burglaries in Kirkholt and removing them was an important tactic in the project. Another part of the Kirkholt repeat victimization project was organizing the residents surrounding burgled dwellings to watch the victimized home. This was referred to as "cocoon neighborhood watch" because instead of organizing the entire neighborhood, the police

focused only on the people living around at-risk places (Forrester, Chatterton, and Pease 1988; Forrester, et. al. 1990).

The 40 percent decline in burglaries in the first year following the start of the program, and subsequent decline over the next three years (controlling for seasonality and surrounding area burglary trends) cannot be attributed to any single tactic (Forrester, Chatterton, and Pease 1988; Forrester, et. al. 1990). Thus, we do not know which tactics worked.

Another repeat victimization program in Great Britain used a graded response to repeat victimization (Anderson, Chenery, and Pease 1995a; 1995b). Residents that reported a single burglary received a "bronze" response. This included crime prevention advice from the police, cocoon neighborhood watch, and improvement in dwelling security. If a resident was a victim of a second burglary within a year the police stepped up patrolling of the location, and put warning stickers on the dwelling. This was the "silver" response. If a third burglary was reported within a year then the "gold" response was put into place. This included the use of video surveillance of the location and even more intense police patrols. Anderson, Chenery and Pease (1995b) report a 19 percent reduction in burglaries relative to changes in burglary in the surrounding area.

Repeat victimization and crime prevention programs based on repeat victimizations are interesting. Because housing projects in Great Britain and the United States have important differences (the presence of coin-operated gas meters is just one example), research in the United States should be undertaken to determine if repeat burglaries are a problem in the United States, and if repeat victimization responses are effective. The National Institute of Justice is currently sponsoring studies examining repeat victimization.

Reducing Drug Dealing and Crime in Private Rental Places

Despite the fact that the management of private rental housing has only recently been examined as a crime risk factor, we have strong evidence that improving management of rental properties can reduce drug related crime. A study of retail drug dealing locations in San Diego found that smaller apartment buildings were more likely to be selected by drug dealers than the larger buildings, primarily because owners of the smaller buildings had less management resources to control the behaviors of place users (Eck 1994; 1995). Spelman (1993) studied residential locations that had been abandoned by their owners and found that they were magnets for crime. The effectiveness of compelling place managers to control the behaviors of people that use their properties has been the subject of a number of evaluations.

The civil law has been the primary tool used to make owners of private rental property evict drug dealers or make physical changes to their property. Hope (1994) describes three case studies from St. Louis where police officers influenced the changing of ownership of drug houses. Calls for service from blocks with the houses declined 54 percent to 94 percent relative to nearby blocks, suggesting a decline in drug selling.

Most efforts to influence landlords threaten civil action, but do not typically result in the transfer of property ownership or the seizure of property. Nuisance abatement programs threaten court action to seize property unless owners take action to curtail drug dealing. Three evaluations of nuisance abatement programs were found.

Lurigio and colleagues (1993) evaluated an abatement program run by the State's Attorney Office in Cook County, Illinois. They compared the perceptions of residents living near 30 abated properties to the perceptions of residents on nearby untreated blocks. They found no difference in perceptions. If the abatement program did reduce drug dealing or related crime, nearby residents did not notice it. The weakness of this design is that it does not have a true pre-treatment measures of crime, but only perceptions of change.

Green (1993; 1995; 1996) examined changes in drug arrests, police field contacts, and citizen calls around 275 abated drug dealing sites in Oakland, California. Relative to citywide changes in these measures, Green found a 15 percent decline in arrests, a 38 percent decline in field contacts, and a 14 percent decrease in citizen calls.

Finally, Eck and Wartell (1996) report on the results of a randomized controlled experiment using threatened property seizure in San Diego, California. No landlords were taken to court and no properties were seized. Instead, following police drug enforcement, owners of properties in one randomly selected group received a letter from the police ("letter" group). Owners of properties in another randomly selected group met with a narcotics detective and a city codes inspector ("meeting" group). Owners of properties in a third (control) group received no follow-up contact from the police or the city. Drug offenders who were lease holders were more likely to be evicted from the properties in meeting group. Further, for the six month period following treatment, the properties in the meeting group had a significantly lower number of reported crimes. The letter group also had a decline in crimes, but it was not significantly different from the control group or the meeting group.

Three of the four studies report some reduction in crime or calls for service at treated drug properties or the block around the properties. The three studies that reported the positive findings were more rigorous than the single study showing no results. Thus we can be reasonably confident that holding owners responsible for drug dealing on their property may reduce drug related crime.

Conclusions About Residences

Collectively, there is reason to be optimistic about the efficacy of opportunity blocking tactics in residential settings. As a group, these evaluations -- from the weakest to the strongest -- suggest that improvements in crime reduction can be achieved. Nevertheless, it is difficult to be precise about what works, at which types of residential sites, and against which crimes. One set of tactics, however, does have a limited number of rigorous evaluations. Nuisance abatement is a place-focused tactic that

"works." With the evidence available we are relatively certain that holding private landlords accountable for drug dealing on their property by threatening abatement reduces drug related crimes. A weaker body of evidence suggests that reducing the ability of people to move freely about large public housing complexes can reduce crime.

Addressing repeat victimization deserves more attention in the United States but there is insufficient evidence to recommend that this tactic be applied wholesale at this time. Nevertheless, research on repeat victimization prevention in housing and other settings will be useful for public housing authorities, police agencies, and private landlords. Finally, by that standards used in this report, the evidence for target hardening is weak so it is of unknown effectiveness. Of particular concern is the lack of significance tests in target hardening evaluations that could provide evidence that observed crime reductions were not due to chance. More rigorous evaluations need to be conducted to improve our confidence in this tactic.

Table 7-2: RESIDENCES STUDY SCIENTIFIC TACTIC SETTING RESULTS
 METHODS SCORE Allatt 1984 3 target British 52% reduction
 hardening public relative to
 housing controls in
 burglary

Anderson, Chenery, Pease 1995a; 1995b	3	graded response depending on number of prior burglaries	British public housing (Huttersfield)	19% reduction in burglary relative to control
Chatterton & Frenz 1994	2	cctv including dummy cameras	elderly housing complexes, Manchester, Great Britain	79% decline in burglary and attempt burglary
Gabor 1981	3	property marking	residential dwellings, Canada	75% increase in burglary
Laycock 1985, 1991.	3	property marking	public housing, Great Britain	40% reduction in burglary
Tilly & Webb. 1994	3	improving doors and windows	Birmingham security of pubic housing, Great Britain	59% reduction in burglary

	3	improved door locks and removal of prepayment meters	Bradford public housing, Great Britain	91% reduction in burglary
Forrester, Chatterton, & Pease 1988; Forrester, Frenz, O'Connell & Pease 1990. Pease 1991. Tilly 1993a.	3	removal of pay gas meters; Cocoon neighborhood watch; security survey and hardware installation	Public housing, Great Britain	40% reduction in burglary in one year; continued drop over next three years
Meredith & Paquette 1992	2	crime watch (and target hardening)	apartment building	82% drop in burglary, little drop in other crimes
Popkin, et. al. 1995a; 1995b	1	guards, design changes, enforcement, identification cards, and other changes	Two high rise public housing buildings, Chicago	40% to 64% drop in drug dealing; 74% to 88% drop in shootings and fighting
Newman 1996	2	restricting pedestrian movement and other design changes	Bronx public housing	54% drop in reported crime. 62% drop in burglary, robbery, & assault
Poyner 1994	3	closing walkways connecting buildings and installation of entry	London public housing	reported reduction in purse snatches

phone

Eck & Wartell 1996	5	nuisance abatement	private rental property, San Diego CA	59% drop relative to controls in reported crime for most stringent intervention, 51% drop for less stringent intervention not significant
Green 1993; 1995; 1996	4	nuisance abatement	private residential properties with drug dealing in Oakland, CA	15% decline in arrests, 38% decline in field contacts, & 14% decline in calls
Hope 1994	3	closing or selling of property	3 addresses used for drug dealing in St. Louis, MO	54%, 67% and 95% reduction in calls for service
Lurigio, et. al. 1993	2	nuisance abatement	residential properties in Cook County, IL	no difference between treated and untreated blocks relative to drug dealing

RETAIL STORES

Places that sell goods to the public are frequent crime sites. The theft of goods represents a large proportion of these crimes. Some of these thefts are committed by patrons and some by employees. In addition to thefts, robberies of store clerks and burglaries after store hours can also be problems. In this section we examine all of these crime types. First we will look at convenience store robberies. Much has been written on this topic, but most of it describes correlational studies with very small samples, comparing stores with and without robberies. As we will see, the number of evaluations of interventions is limited. We will then turn to burglaries and robberies in other retail settings. Third, we will examine credit card fraud. The largest group of studies involves shoplifting prevention. Finally, we will look at thefts by employees.

Convenience Store Robberies

Although convenience stores have received considerable attention in the crime prevention literature, robberies of these retail establishments peaked around 1980-81, declined through 1983 and remained stable for the next 10 years at around 16,000 per year. Over the same period, the number of such stores has increased and gas station robberies have trended upward (Bellamy 1996). Comparisons of convenience stores with and without robberies have been carried out for over two decades. These studies attempted to find store features that are associated with few or no robberies. The studies generally suffer from three major scientific problems. First, they usually examine a variety of store features using a small sample of stores. Since these features are often correlated with each other, it is difficult to determine which features are related to robberies. Second, since the store features and robberies are measured at about the same time, it is unclear if the features preceded the robberies (and could possibly have influenced the chances of the crime) or whether the robberies cause store managers to change the store's features. Finally, most convenience stores have no robberies, but a few have many robberies. Crime prevention measures may work in the few stores with repeated robberies but have no influence on the other stores (Crow and Bull 1975). It is not surprising, therefore, that these studies can arrive at contradictory findings.

One of the most debated questions is whether two clerks reduces the risk of robberies. Hunter and Jeffrey (1992) cite a number of studies showing that stores with fewer robberies are associated with two clerks being on duty. LaVigne (1991) provides evidence that the number of clerks is unrelated to robberies. Another study, conducted by Robert Figlio, compared 230 convenience stores with two or more clerks on duty at night, to 346 stores with only one clerk on duty, and examined a subsample of one-clerk stores before and after they shifted to two clerks. The evaluation found no impact on robberies by the switch to two clerks, compared to similar stores that did not increase the number of clerks from one to two. However, for stores with robberies prior to the switch, two clerks did reduce the chances of a robbery (National Association of Convenience Stores 1991).

The Gainesville (Florida) Police Department evaluated a city ordinance requiring two clerks to be on duty. The police department found that convenience store robberies declined immediately after the ordinance took place (Clifton 1987). Wilson (1990) reviewed the initial evidence and found that a plausible rival explanation for the decline in robberies was the arrest of active offenders responsible for a rash of convenience store robberies just before the ordinance took place. Although the short term reduction may have been due to these arrests, robberies of these stores in Gainesville continued to decline for seven years following the ordinance and the arrests of the repeat offenders (Bellamy 1996). The controversy surrounding this ordinance, and Florida-wide efforts to increase the number of clerks, may have sensitized the convenience store industry and the police to this problem. Thus, many other changes could have created the long term reduction. Changes in stores' operations may also have been responsible for the reduction in robberies. Thus we cannot be certain the decline was due to the two clerk rule.

One of the first randomized experiments in crime prevention was undertaken over 20 years ago to determine if prevention measures in convenience stores reduced robberies. Crow and Bull (1975) matched 120 stores according to previous robberies and other characteristics. These stores were randomly assigned to either a control group or a prevention group. The type of prevention was selected based on site visits, so it was not possible to determine what type of prevention had what effects. The treated stores with two or more previous robberies had 30 percent fewer robberies after treatment than the untreated stores with two or more previous robberies.

In a later convenience store study, cameras and silent alarms did not appear to prevent robberies when 55 convenience stores in Columbus, Ohio and New Orleans, Louisiana receiving these devices were compared to 53 stores in Dayton, Ohio and Baton Rouge, Louisiana not receiving them (Crow and Erickson 1984). In the treated stores signs announcing the equipment were posted. These changes were accompanied by publicity in the treatment areas. No significant changes in robberies were found.

The National Association of Convenience Stores (1991) reported on two other interventions evaluated by Robert Figlio. The installation of interactive CCTV (allowing communication between the clerk and the personnel watching the TV monitor in a remote location) reduced robberies in 189 stores by a statistically significant 31 percent in the first year following the installations. By the second year, the reduction had shrunk to 15 percent, which was not statistically significant. No control stores were used in the analysis. One chain of 81 stores installed color video monitors that were visible to patrons and staff. Robbery rates were reported to have declined by 53 percent a year after installation. Again, no control stores were used.

The convenience store industry has conducted some of the most sophisticated crime prevention experiments available. These studies suggest that there are two types of stores, those with few or no robberies where crime prevention efforts are unlikely to influence future robberies, and a fewer number of stores with several robberies where prevention efforts may be more productive.

Burglary and Purse Snatching in Other Retail Places

Burrows and Speed (1996) report on an effort to curb "wire-cut" burglaries of electronics stores. Since alarm systems in these stores are connected to a remote monitoring station, burglars cut the telephone lines before entering. Electronically monitoring the integrity of the phone lines appears to have reduced losses from these types of burglaries. Unfortunately the authors only show a graph of the data without reporting the figures for burglaries or losses. Trends in wire-cut burglaries were compared to other types of burglaries and indicated that the decline was unlikely to be due to a general decline in burglaries, independent of the preventive tactic studied.

"Ram-raiding" involves crashing a vehicle (often stolen) into the front of a retail establishment and then removing valuable products. The costs of the damage to the store are considerable and often exceed the costs of the stolen merchandise (Jacques

1994). This is a problem in Great Britain, but its extent in the United States is unknown. Jacques (1994) reports that the installation of metal shutters in six large retail establishments cut burglary costs 53 percent (from an average of 20,892 pounds sterling to 9613 pounds sterling). In one store, burglars shifted to a roof entry thus providing evidence of limited displacement in burglary tactics. No control stores were examined.

Thefts from shoppers at retail places can also be a problem. In shopping markets in one British city, women's purses were being taken from their shopping bags. The aisles of the markets were widened to reduce the bumping of patrons that facilitated the thefts. Poyner and Webb (1992) report that a comparison of reported thefts for the three years prior to the changes to the two years after, showed a 44 percent decline in these offenses. Simultaneous changes in nearby markets makes them unsuitable as control places, so we have no evidence about background trends.

Credit Card Fraud

Three evaluations examined attempts to prevent credit card fraud at the point of sales. All three involved staff training and increased attention to customers. Two studies describe providing clerks with more information about potential offenders, either through liaison with law enforcement authorities (Masuda 1993) or by providing computer-aided identification of shoppers wishing to use credit cards to pay for purchases (Masuda 1996). Both evaluations compared pre-program losses to post-program losses, but did not use control stores. Losses declined 82 to 90 percent.

A British experiment in lowering the limit for unauthorized credit card purchases along with improved information exchange about possible offenders may have reduced fraud losses by 25 to 41 percent nationwide, depending on the length of the pre-treatment period used (Webb 1996).

Although these studies did not use strong evaluation designs, they consistently report that tightening restrictions on credit card use and use of information about people with a history of credit card fraud can reduce this crime. Such findings underscore the point that many losses by retailers are due to choices about how to conduct their business. Challenger's (1996) evaluation of refund fraud reduction reinforces this point. Refund fraud involves the return of stolen goods for a refund. The store ends up paying for the merchandise twice, the first time at the wholesale price and the second time at the retail price. Challenger (1996) reports that requiring proof of purchase may reduce the losses from this form of theft. For confidentiality reasons, he does not report the amount of losses for stores involved in the evaluation.

Shoplifting

Here we will look at several methods for preventing shoplifting. Two interventions, electronic article surveillance and ink tags, have received multiple evaluations. Electronic article surveillance (EAS) involves placing tags on merchandise that only

clerks can remove at time of payment. If a clerk does not remove the tag and the shopper leaves the store, the tag causes an alarm to sound. EAS technology improves employee surveillance of goods. Ink tags deface the merchandise if it is removed from the store without paying. This destroys the value of the goods to thieves.

Five evaluations of EAS were reviewed and each reported reductions in crime events or shrinkage. All compared crime or shrinkage (unaccounted for declines in inventory) before the installation of EAS to the same measures after, and all used a control store to measure background trends. The reduction in shrinkage varied from 32 percent (Bamfield 1994) to 80 percent (DiLonardo 1996). Farrington and colleagues (1993) report even greater reductions in shoplifting in the two stores they examined (76 to 93 percent). Furthermore, EAS was found to be more effective than security guards (no improvement) or store redesign (50 to 80 percent improvement) (Farrington et. al. 1993). Unfortunately, with one exception (Farrington et. al. 1993) significance tests were not reported so we cannot determine the probability that the reported reductions were due to chance.

Ink tags may also reduce shoplifting, but we have fewer studies and they used weaker evaluation designs. DiLonardo and Clarke (1996) report on two quasi-experiments involving ink tags. Both used repeated inventory counts to measure inventory reduction before and after the installation of the tags. In the first study, 14 new stores were compared to the chain-wide average. Shrinkage was reduced 14 percent in the new stores. In the second study, ink tags were installed in four stores, but no control stores were used. Shrinkage declined by 47 percent. As we will see below, repeated inventory counts have been linked to reduced employee theft, so we cannot be certain that the changes reported in these two ink tag studies are due to the ink tags or the method of measuring shrinkage.

The final shoplifting evaluation is a case study of a single store where the problem was minor thefts by elementary school children. A combination of individual and collective rewards were offered the children for refraining from stealing small items. The period before the program, program period, and a period after the program ended were compared. Shoplifting of targeted items declined by 58 percent and profits increased 42 percent during the program period compared to the periods before and after the program.

Shoplifting appears to be controllable by the use of EAS technology, and possibly ink tags. If more evaluations had used significance tests we could have classified EAS as "works." In the absence of this information EAS must be placed in the "do not know" category. Limited evaluations of other approaches suggest that there may be alternative approaches as well. The single study that examined the value of guards found that they were of no assistance in reducing shoplifting, but as Farrington and colleagues (1993) point out, this may be due to an implementation failure.

Employee Theft

Masuda (1992) examined the effectiveness of increasing the frequency with which articles at great risk of theft are counted. Since the increased inventory counts were unknown to shoppers but were known to store employees, it is reasonable to assume that the 100 percent reduction in shrinkage he found was due to the deterrence of employees. The 85 percent reduction in non-target item shrinkage may be attributable to a diffusion of benefits effect. However, the absence of an uncontaminated control makes it difficult to determine if this reduction was an unexpected program effect or evidence of declining shrinkage independent of the intervention.

Table 7-3: RETAIL STORES STUDY SCIENTIFIC TACTIC SETTING RESULTS
 METHODS SCORE Crow & Bull 5 variety convenience stores with 2 prior
 1975 stores robberies had 30%

			fewer robberies relative to controls	
Crow & Erickson 1984	4	surveillance cameras	convenience stores	No significant change in robberies
National Association of Convenience Stores 1991	4	two clerks	convenience stores	15% reduction in robberies over 2 year period in high robbery stores
	2	cctv	convenience stores	15% reduction in robberies over 2 year period
	2	video monitors for patrons and staff	convenience stores	53% reduction in robberies
Poyner & Webb 1992	2	widening aisles in open market	public market in Birmingham, Great Britain	44% reduction in thefts from purses
Burrows & Speed 1996	3	electronic monitoring of phone lines	electronic retail stores	noticeable decline in wire cut burglaries but amount difficult to determine from chart provided

Jacques 1994	2	metal shutters	electronic retail stores	53% drop in losses due to ram-raiding burglaries
Masuda 1993	2	profiling offenders, training, liaison with law enforcement	chain retail store	82% decline in credit card fraud losses
Masuda 1996	3	computer aided positive identification at point of sales	retail stores	90% reduction in credit card fraud losses
Webb 1996	2	lowering limits for use of credit cards, improved information exchange, and other tactics	point of sales in retail establishment nationwide in Great Britain	25% to 41% decrease in credit card fraud losses nationwide
Challinger 1996	3	requiring proof of purchase for refund, and related procedures to prevent refund fraud	retail stores	decline in losses and reports.
Bamfield 1994	3	EAS to prevent shoplifting	retail stores	32% reduction in shrinkage
DiLorenzo 1996	3	EAS to prevent shoplifting	retail stores	47% decline in shrinkage over 5 years
	3	EAS to	retail stores	80% decrease when

		prevent shoplifting		installed. When reinstalled over 80% decline repeated.
	3	EAS to prevent shoplifting	retail stores	52% decrease in shrinkage
DiLonardo & Clarke 1996	3	ink tags to prevent shoplifting	retail stores	14% reduction in inventory shrinkage
	3	ink tags replace EAS to prevent shoplifting	retail stores	47% decline in inventory shrinkage
Farrington et.al. 1993	3	uniformed guards	retail stores in Great Britain	No measurable impact on shoplifting
	3	store redesign	retail stores in Great Britain	58% drop in shoplifting at one store and 80% decline in another in target items stolen.
	3	tagging	retail stores in Great Britain	76% reduction in shoplifting at one store and 93% reduction in another in target items stolen.
McNees, Schnelle, Kirchner, & Thomas 1980	3	awards for compliance to prevent shoplifting by elementary school children	single convenience store	58% decline in shoplifting of targeted items. Estimated increase in profits of 42% during program
Masuda 1992	2	increased frequency of	retail stores	Elimination of shrinkage for

inventory
counts to
prevent
employee
theft

targeted products,
85% decline in
shrinkage of
non-targeted
products

BANKS AND MONEY HANDLING PLACES

The robbery of banks and other places that provide money handling services is a serious problem in many countries. In this section we will examine evaluations of security measures in U. S. and Swiss banks, British post offices, and Australian betting shops.

Guards may prevent bank robberies. A study of 236 banks in the Philadelphia area found one less robbery per year at banks with guards compared to banks without them, controlling for the surrounding area, police response time, proximity to major streets, and other prevention measures used. Screens protecting tellers and cameras were not associated with fewer robberies (Hannan 1982). Since these tactics are often found together, the evidence about the effectiveness of any specific measure is weak. Though this is a correlational study, the evaluator made special efforts to control for temporal order. Information about security measures came from surveys administered by the Federal Reserve and only crimes reported after the survey were used in the analysis. Because we can be sure that the interventions were installed prior to the crimes, this evaluation was given a scientific methods score of 2.

Two other studies provide better evidence that screens protect clerks from robberies. A study of over 300 Swiss banks found that banks with screens had a 52 percent lower robbery rate than banks without them (Grandjean 1990). Ekblom (1987, 1988) examined the installation of bullet proof barriers to protect post office clerks. He estimated that the barriers reduced robberies from 55 percent to 65 percent, net of changes in control group robberies. Both studies found evidence for displacement, but even accounting for displacement, robberies declined substantially.

Clarke and McGrath (1990) examined the effects of time-lock cash boxes and safes on Australian betting shop robberies. Relative to control places, robberies may have been reduced by 52 to 139 percent. The results may be highly unstable given that there were three interventions throughout a 10-year period.

An examination of a drop in the number of bank robberies in Victoria, Australia asserts that this was due to the installation of screens protecting clerks, guards, cameras, and other security devices (Clarke, Field, and McGrath 1991). After increasing from 1979 through 1987, the number of bank robberies dropped to levels similar to those found in earlier years. Similar patterns of growth and rapid decline were found in bank robberies in an adjacent state and in robberies of other businesses. It is unclear whether the

protective measures were installed only in Victoria's banks and when they were installed.

We do not know what works to prevent crimes at banks and other money handling places because the scientific methods scores for the interventions are either below 3 or significance tests were not reported. These evaluations suggest the possibility that guards, bullet proof screens, and secure cash containers might reduce crimes, but more rigorous evaluations are needed to draw firm conclusions.

Table 7-4: BANKS AND MONEY HANDLING PLACES STUDY SCIENTIFIC TACTIC SETTING RESULTS METHODS SCORE Clarke & 3 time-lock Betting shops

Author	Score	Methods	Setting	Results
McGrath. 1990		cash boxes and safes	in Australia	52% to 139% robberies declined
Clarke, Field & McGrath 1991	1	security screens, and other measures	Banks in Victoria, Australia	drop in bank robberies
Eklom 1987 1988	3	counter screen barriers in front of clerks	Post offices in London	55% to 65% reduction in robberies
Grandjean 1990	2	bulletproof screens for tellers	Banks in Switzerland	52% reduction in robberies
Hannan 1982	2	security guards, screens and cameras	Banks in Philadelphia, PA area	reduction of one robbery per year for most robbery prone banks due to guards

BARS, TAVERNS AND DRINKING ESTABLISHMENTS

There is a consistent research literature that points to a relationship between the presence of bars and crime in the surrounding area (Roncek and Bell 1981; Roncek and Pravatiner 1989; Roncek and Meier 1991; Block and Block 1995). Despite this reputation, most bars may be relatively crime free while a few may be hotspots of crime (Engstad 1975; Sherman, Schmidt, and Velke 1992; Homel and Clark 1994). The behavior of bartenders and bouncers may be contribute to violence in these places

(Homel and Clark 1994) and changes in bar management practices (from server training and changes in legal liability of bartenders) may reduce assaults (Putnam et. al. 1993), drunk driving (Saltz 1987), and traffic accidents (Wagenaar and Holder 1991).

Two Australian programs to reduce violence created agreements among pub managers to improve the training of bouncers, reduce crowds of youths, and improve relationships with police, along with other tactics (Homel et. al. 1997). In one evaluation observers reported a 53 percent reduction in assaults per 100 hours of observation in the first year of the program. The prevention effects decayed over time. Three years after implementation the reduction had declined to 15 percent. No control pubs were observed (Homel et. al. 1997). The other evaluation examined serious assaults at downtown pubs for the year before and four years after the management accord, and compared these changes to the same period for six other cities in the same state. Serious assaults declined 40.5 percent in the target city but increased 14.3 percent in the control cities (Felson, et. al. 1997).

The consistent results from Australia and the United States summarized in Table 7-5, suggest that changing the management of drinking places is a promising method for prevention of drinking-related offenses.

Table 7-5: BARS AND TAVERNS STUDY SCIENTIFIC TACTIC SETTING RESULTS

METHODS	SCORE	Felson, et. al. 1997	3 pubs in Geelong Australia	code of bars and establishments net controls	60% decline in serious assaults,
Homel, et. al. 1997	2	training for bouncers, code of practice in Australian town	bars and drinking establishments	53% decline in assaults/100 hours of observation 1st year after implemented, but only 15% decline compared to 3 years after	
Putnam, Rockett, & one Rhode 1993	3	training of alcohol outlets in vehicle crash police enforcement	alcohol sales related Island community	decline in alcohol assaults & injuries, relative to control communities	Campbell servers and
Saltz, 1987	3	changing serving policies and	Navy enlisted club in California	Over 50% reduction in driving when drunk	

training

PUBLIC TRANSPORTATION

Two types of public transportation have been the subject of evaluations: buses and subways. Evaluations investigated prevention measures directed at four types of crime: crimes against riders; attacks on staff; fare evasion; and vandalism. The types of interventions have been quite varied, ranging from complete system design to volunteer citizen patrols.

Incivilities and Crimes Against the Public

The Washington, D.C. Metro System has been singled out in crime prevention literature as having been designed to prevent crime (LaVigne 1997) and is sometimes contrasted with the New York City subway system which gained a reputation for crime in the 1970's (Sloan-Howitt and Kelling 1990; Dwyer 1991). "Designing in" crime prevention may be effective, but it is difficult to determine if a design is effective. LaVigne (1997) compared the Washington, D.C. Metro to three other urban rail transit systems and found that it had less crime than the other systems. She also compared subway station crime to crime in the areas above-ground. If the system had no influence on crime then the above-ground crime levels and station crime levels should be correlated. If the system design prevented crime, then there should be no relationship between station and above ground crime. LaVigne (1997) found that, except for assaults, ground level and station crime were not correlated. Although this is not a strong research design, it is the best evidence available that system design influences crime patterns.

To improve passenger confidence in the safety of the New York subway system, an intensive cleanup program was undertaken to remove graffiti from all train cars and stations. Rapid cleanup would deprive vandals of the benefit of seeing their graffiti (Sloan-Howitt and Kelling 1990). By treating the physical appearance of the system, it was hoped that this would make the public feel safe and bring more people into the system. More riders would increase the number of people watching out for each other, and this could drive down crime. This chain of events is expected according to the "broken-windows" hypothesis (Wilson and Kelling 1982). Sloan-Howitt and Kelling (1990) show that graffiti was virtually eliminated, and despite increased police attention to graffiti, arrests for this offense also declined.

A similar effort was carried out by the Victoria (Australia) transit system which includes trains, trams and buses. The Victoria program involved rapid repair and cleaning of vandalized equipment, along with stepped up police enforcement. Carr and Spring (1993) show that train availability increased 45 percent and reported crimes against persons declined 42 percent.

Another comprehensive program to clean up a problematic transit facility has been described by Felson and colleagues (1997). The title of their paper, "Redesigning Hell," suggests the state of disrepair into which the New York Port Authority Bus Terminal had fallen. Sixty-three interventions were made at the terminal, at about the same time. These included closing off spaces, improving shopping, cleaning, increased enforcement, and other measures to remove situations that facilitated offending or increase the number of patrons and their ability to watch each other. Although robberies and assaults declined in the station, they also declined in the surrounding area. Outside crime control efforts or diffusion of crime control benefits to the surrounding area may account for these parallel trends. Annual surveys of patrons that began with the cleanup in 1991 show declines in incivilities and disorder.

Vandalism against buses is another problem in transit systems. Poyner (1988) describes how the installation of CCTV on a portion of a bus fleet was followed by reduced vandalism throughout the fleet. There was also a public information campaign directed at the group of people most likely to be responsible for the damage, school children. Poyner (1988) attributes the diffusion of benefits from the targeted buses to the entire set of buses, to offenders' confusion over which buses had the CCTV. Unfortunately, this evaluation only describes trends in vandalism after CCTV was installed.

Kenney (1986) evaluated the effectiveness of Guardian Angel patrols at stations by comparing crime changes to control stations without these patrols. He found that these citizen patrols had no discernible impact on crime in the patrolled stations. This may be because the base rates of crime in the stations were too low to detect an effect (Kenney 1986).

Webb and Laycock (1992) also found no evidence that the Guardian Angels reduced crime in the London Underground. They did find that the installation of CCTV in London Underground stations reduced robberies 11 to 28 percent, relative to control stations without CCTV. Twenty-two months of data before CCTV installation and 26 months after installation at selected stations were compared.

On the whole, we have limited information about how to prevent incivilities and crime against transit. In part this is due to the difficulty in assessing system-wide designs and comprehensive changes. Selecting a control system and disentangling the effects of multiple interventions is very difficult. Rapid cleanup and repair to deprive offenders of the pleasure of seeing their graffiti appears to be effective, but the evidence to date is weak.

Attacks On Bus Drivers

The two evaluations of attacks on bus drivers provide evidence that these crimes can be reduced. The rise in robberies of bus drivers in the late 1960's and early 1970's prompted New York City officials, along with transportation officials in other U.S. cities, to remove accessible cash that was the target of the robbers. They required passengers

to give exact fares and prohibited bus drivers from giving change. Fares were put in secure boxes. Chaiken, Lawless, and Stevenson (1974) reported a 90 percent reduction in bus driver robberies following these changes. The Stanford Research Institute (1970) reported similar results in its review of the effect of exact fare systems in 18 other cities (Clarke 1992, page 216).

If the target of the attack cannot be removed, then maybe it can be protected. A bus company in northern England used two approaches to protect its drivers from assaults by riders (Poyner and Warne 1988). The first was to simplify the fare system so it would be less aggravating. They also installed protective screens around bus drivers. Assaults on drivers declined 90 percent following the installation of screens. Assaults on all employees fell during this period, but not as much as it fell for drivers (37 percent).

Fare Evasion

Transit systems suffer from people who try to enter without paying the correct fare. Fare evasion can simply mean jumping gates or moving through entries without paying, or it can involve the use of slugs in gates or ticket machines. Three evaluations examined the redesign of gates or ticket machines to curtail fare evasion. All three report evidence suggesting declines in this form of theft. Clarke (1993) reports an increase in ticket sales of 10 percent, relative to control stations where new automatic gates were not installed. Clarke, Cody and Matarajan (1991) show that one form of slug use was totally eliminated by modifying ticket machines so they would not accept a type of coin for which a slug could be substituted. This was a system-wide change so no control stations were available. Finally, Weidner (1997) gives results of the effect on fare evaders of the installation of new gates in the New York City subway. While arrests declined in the target station, they increased in adjacent control stations. Whether this was due to changes in police enforcement, displacement, or background trends cannot be determined from the evidence provided.

Two evaluations examined personnel changes to reduce fare evasion. Increases in ticket takers at a Canadian ferry terminal may have reduced fare evasion by 20 percent, although there were no control sites to assess background trends (DesChamps, Brantingham, and Brantingham 1992). A Dutch effort to reduce fare evasion in three cities decreased fare dodging by 18 to 78 percent. Authorities recruited over 1100 unemployed young people to monitor ticket use on the buses, trains and trams in the three cities. This report (vanAndel 1986) claims that there was also a 60 percent decline in assault on and harassment of patrons. Like the Canadian study, there was no control group.

Conclusions about Transportation System Prevention

Although there are several evaluations of crime prevention in transportation settings, we know relatively little about the effectiveness of these interventions. This is in part due to the variety of crime types that are applicable to transportation systems. It is also due to the number of settings (buses, trains, and stations) within the system, as well as the

variety of victims (patrons, staff, and facilities). Thus a large number of studies are needed to learn what works to prevent crime in transit systems. However, there are methodological complications that make learning about crime prevention effectiveness quite difficult. Many of the systems are large and there are few, if any, plausible control settings are available to measure background trends. Places within systems are linked, so internal changes to part of a system can influence crime in other parts of the system. If untreated parts of the system are used as controls, diffusion of benefits or displacement effects can confound the findings. We cannot, therefore, identify, with reasonable certainty, any specific tactic against specific crimes, that can be said to "work" across similar settings in other cities.

Table 7-6: PUBLIC TRANSPORTATION FACILITIES STUDY SCIENTIFIC TACTIC SETTING RESULTS METHODS SCORE LaVigne 1 subway system

Washington, 1997	1	system design may design DC metro subway	prevent crime	
Carr & Spring 1993	2	improved cleaning and vandalism repair; patrolling public system, Victoria, Australia	45% improvement in transportation train availability. 42% reduction in crimes against persons	
Felson et. al. 1997	3	63 different tactics about the same time	Port Authority Bus Terminal, New York City compared to surrounding area; reductions in incivilities	reduction in robberies & assaults but not implemented
Kenney 1986	3	Guardian Angels	subways	no detectable impact on crime
Poyner 1988	1	cctv	buses	steady decline in vandalism
Webb & Laycock 1992	3	cctv (and other tactics)	stations on London Underground	11% to 28% reduction in robberies
Chaiken, Lawless, & Stevenson 1974	2	exact fare requirement	buses in New York City	90% decline in robberies of bus drivers

Poyner & Warne 1988	2	protective screens for drivers	buses in Cleveland, Great Britain	90% reduction in assaults on drivers
Clarke 1993	3	automatic gates to prevent fare evasion	London Underground	10% increase in ticket sales
Clarke, Cody & Matarajan 1991	2	modification of ticket vending machines	London Underground	elimination of problem of slug use within 4 months of modification
DesChamps, Brantingham, & attendants to Brantingham 1992	2	increase in rush hour check tickets, training in fraud detection	ferry terminal	20% reduction in fare evasion rate
vanAndel 1989	2	recruiting over 1100 young unemployed people as public transit monitors	buses, metro trains and trams in 3 large cities in the Netherlands	18% to 72% decrease in fare dodging depending on city and mode of transport, 60% decline in attack or harassment victimizations
Weidner 1997	3	installation of new fare gates	stations on New York City subway	fare evasions declined in target station

PARKING LOTS AND GARAGES

Evaluations of crime prevention in parking lots and garages examined changes in people who watch cars. These people were often security guards, although one evaluation looked at placing a taxi business near the entrance to a parking garage to increase informal guardianship (Poyner 1991). Another set of interventions used close-circuit television to centralize watching.

Guards and Security Attendants

Four evaluations are available reporting on the effectiveness of adding security guards to parking lots. Four showed reductions in car-related crimes (Barclay et. al. 1996; Laycock and Austin 1992; Poyner 1994; and Poyner 1991) and one found no improvement (Hesseling 1995). Although these studies suggest auto thefts and thefts from automobiles might be prevented by increasing people who watch lots, there are two important caveats. Poyner (1991) notes that parking lot strategies that control access may curb thefts of vehicles, but may be ineffective at controlling thefts from vehicles. The failure of Hesseling (1995) to find a reduction in thefts from vehicles may be due to the way the guards were deployed. Thus, what the guards do may be as important as their deployment. Second, none of these studies examined personal violence against people using parking facilities. In conclusion, because of the mixed results of the evaluations, we do not know if guards or security attendants prevent crimes in parking lots.

Closed-Circuit Television

There are seven evaluations from Great Britain of the effects of CCTV on vehicle crimes (thefts of vehicles, thefts from vehicles, and damage to vehicles), but no evaluations of its effect on other crimes in parking facilities (Poyner 1992; Tilly 1993c). The weakest of the evaluations found no effect (Coventry lots, in Tilly 1993c). The other six evaluations found varying levels of decline in vehicle crimes. In the CCTV parking lots evaluated, thefts from vehicles declined 46 to 94 percent, and thefts of vehicles dropped 18 to 89 percent, depending on the evaluation. We do not know if these results can be replicated in the United States. There is no empirical basis for recommending CCTV to prevent parking lot violence. The results suggest that CCTV should be tested in high vehicle crime parking lots within the United States. Because of the lack of significance tests we must classify CCTV in parking facilities as having "unknown" prevention effectiveness.

Conclusions About Parking Facilities

Evaluations in parking lots and garages outside the United States consistently support the hypotheses that guards and CCTV reduce vehicle-related property crime. Though several CCTV studies had scientific methods scores of 3, they lacked of significance tests. Therefore, CCTV's effectiveness in parking lots is "unknown." These studies do not report on violent crimes in parking lots, including robberies and car-jacking. The highly crime-specific nature of intervention effectiveness suggests that we must be careful drawing inferences about the effectiveness of interventions to places and setting where they have not been tested.

Table 7-7: PARKING FACILITIES STUDY SCIENTIFIC TACTIC SETTING RESULTS
METHODS SCORE Barclay 3 security commuter 53% reduction in
et. al. guards on parking lot car thefts/ month
1996 bikes

Hesseling 1995	3	guards in Rotterdam	parking area thefts from automobiles relative to control	2% increase in
Laycock & Austin 1992	3	security attendant	parking area	52% to 60% in auto theft reduction
Poyner 1994	2	guard	parking area thefts. Amount cannot be estimated	Reduction in auto
Poyner 1991	3	restricting foot access, improved lighting, increased guardianship	parking garage vehicles, 35% reduction in thefts of vehicles	29% increase in thefts from
	3	cctv	parking lots in thefts from cars	71% & 94% reduction
Tilly 1993c	3	cctv	parking lots, Hartlepool, Great Britain from autos	75% reduction in theft of autos, 60% reduction in theft
	2	cctv	one parking lot, Hull, Great Britain	45% reduction in damage to autos, 89% reduction in theft of autos, and 76% reduction in theft from autos
	2	cctv	one parking lot, Lewisham, Great Britain	75% reduction in auto crimes
	3	cctv	one parking lot, Bradford, Great Britain	73% to 78% reduction in theft from autos, 49% to 75% reduction in

thefts of autos

- | | | | |
|---|------|---|--|
| 2 | cctv | one parking lot, Wolverhampton, Great Britain | 18% reduction in thefts of autos, 46% reduction in thefts from autos |
| 2 | cctv | 5 parking lots, Coventry, Great Britain | no discernible pattern in auto crimes |

AIRPORTS

Aircraft hijacking by armed passengers has been a problem since World War I. Wilkinson (1977) has documented the worldwide trends in this problem. From 1948 (when records were first kept) through 1957 there were 15 attempts worldwide and none involved aircraft originating in the United States. In the next decade there were 48 hijackings worldwide (23 of them North American originating flights). In 1968, the number of world-wide aircraft hijackings began an explosive climb. There were 38 that year, and 82 the next. In response, policy makers implemented a number of strategies, including treaties to ensure the return of hijackers and aircraft. By 1973, hijacking attempts had dropped to 22 worldwide and 2 in the United States (Wilkinson 1977).

Since several interventions were put into place over a short time period during the early 1970s, it is difficult to determine which tactics made the greatest contribution to the decline. Sky marshals (armed nonuniformed security guards) were assigned to selected flights beginning in 1970. To thwart parachuting from aircraft, modifications were made to the rear doors of Boeing 727's and DC 9's to prevent them from being opened in flight (Landes 1978). In early 1973, the U.S. and Cuba signed a treaty that required each country to extradite or punish hijackers (Landes 1978).

Landes (1978) attempted to determine the effectiveness of sky marshals and passenger screening. He used a time series analysis of 64 quarter years and 143 incidents. He also controlled for hijacking of aircraft originating from foreign airports to remove worldwide trends in skyjacking and attempted to remove the effects of the Cuba treaty. He provides evidence for an 82 percent decline in U.S. hijacking due to the combined effects of the Cuba treaty, sky marshals, and passenger screening. He then estimated the contribution of the three policies: screening was the cause of a decline of 45 percent, sky marshals created a 28 percent decline, and the remainder (9 percent) was probably attributed to the Cuba treaty.

Two other studies, using annual data for different time periods and weaker evaluation designs, also found large declines in aircraft hijacking in the United States following passenger baggage screening (Wilkinson 1977; Eastal and Wilson 1991). These studies did not attempt to estimate the effects of different hijacking programs.

The variation in aircraft hijacking from year to year and the virtually simultaneous implementation of multiple prevention methods at airports around the world make it difficult to come to definitive conclusions regarding any particular intervention. Nevertheless, the weight of the evidence supports the effectiveness of passenger screening.

These findings are important. First, they demonstrate the potential utility of opportunity blocking against highly determined offenders. Second, they illustrate some of the difficulties of evaluating place-focused prevention (multiple simultaneous interventions, detecting reductions in rare events, and the difficulty of finding control places). And third, they may have implications for other places.

What do these findings about the use of metal detectors to screen for weapons at airports tell us about their deployment at other places? These devices have been used to enhance the security of court buildings, schools, government offices, and public housing. Are they effective? From an empirical perspective, we can only say we do not know. Evaluations are scant and weak. A New York City study of the use of metal detectors found that weapon carrying in schools with metal detectors (n=19) was lower than in schools without the devices (n=96), but there were no differences in assaults within or outside these schools (Centers for Disease Control and Prevention 1993). This evaluation has a scientific methods score of four, and although there was a decline in risk-factors for violence, there was no significant decline in violence. In the residential places section we noted an evaluation of a multi-tactic intervention in a particularly troubled set of public housing buildings (Popkin, et. al. 1996). Metal detectors were a part of this program, but it is impossible to determine what, if any, influence they had because so many other things were implemented at the same time. We cannot, therefore, be confident about the transferability of this tactic to other, very different settings.

Table 7-8: AIRPORTS STUDY SCIENTIFIC TACTIC SETTING RESULTS METHODS

SCORE	Eastal & Wilson. 1991	2	passenger screening and with metal detectors	US Airports	64% reduction in hijacking of originating passenger aircraft flights
	Landes 1978	3	passenger screening and with metal detectors	US Airports	45% reduction in hijacking of passenger aircraft flights
		3	sky marshals		28% reduction in

			hijacking of passenger aircraft
Wilkinson 1977	3	passenger screening with metal detectors	airports 41% reduction in hijacking of passenger aircraft in US, 3% drop world-wide

OPEN PUBLIC SPACES

The places considered in this section are open spaces in cities, including street corners and segments. Four types of interventions will be examined. The first is the control of problem offenders. The second is improved lighting. The fourth is the use of closed-circuit television (CCTV). Finally, we examine street closures and rerouting.

Controlling Problem Offenders

Two efforts to control public drinking as a means to reduce assaults and incivilities in downtown areas provide evidence that controlling problem offenders may be effective. Ramsay (1990; 1991) reports on the banning of public drinking in one English town. Comparing the year before and the year after the ban (with no control group) he found no changes in assaults, but surveys of people using the area suggest that there may have been a reduction in incivilities. A Swedish effort to reduce disorder at an annual festival reported a decline in drunkenness and disorderly conduct arrests following the prohibition of public drinking, banning high risk offenders, and the closing of a popular camping site (Bjor, Knutsson and Kuhlhorn 1992). This study compared arrests at the previous year's festival to arrests at the festival with the restrictions, without control area comparisons.

Lighting

Lighting campaigns seek to enhance the ability of people to provide protection for each other. In 1979, the predecessor agency of NIJ, the National Institute of Law Enforcement and Criminal Justice, reported on a review of 60 lighting evaluations. The authors of this review concluded:

"Is street lighting an effective approach in the reduction and deterrence of crime? The answer is inconclusive. The paucity of reliable and uniform data and the inadequacy of available evaluation studies preclude a definitive statement regarding the relationship between street lighting and crime." (Tien, et. al. 1979, page 93, emphasis in the original)

Almost twenty years later, we know little more about the effectiveness of lighting.

In the 1980's, a borough in London upgraded all of its street lighting. Atkins, Husain and Storey (1991) compared reported crimes the year before the relighting to the year following for 39 sections of the borough. No control areas were used, so background trends in crime cannot be assessed. No systematic changes in crime were detected. Surveys of residents of one area found no changes in perceptions of security.

A Scottish study of relighting in a Glasgow neighborhood and a small town near Glasgow found that there was a short term reduction in victimizations that varied from 32 percent to 68 percent, depending on how victimization was measured (respondent victimizations, victimization of respondents' children, victimization of other family members, victimization of friends, or car victimization). Reported crime dropped 14 percent. The evaluators compared a three-month period prior to relighting to a three-month period following (Ditton and Nair 1994). No control group was used and the results for the two neighborhoods were combined.

Finally, we need to consider three separate evaluations, with similar designs, undertaken by Painter (1994). She examined lighting improvements on two separate street segments and a footpath, all located in "crime prone" areas within London. Pedestrians were interviewed before and after the lighting improvement. All interviews were conducted after dark and were completed within 6 weeks of the relighting. No interviews were conducted in control areas. Substantial reductions in robberies, auto crimes, and threats were reported in two sites (86 percent, 79 percent). These crimes were eliminated in the third site, but the number of crimes before relighting was small so this could have been the result of other factors.

Not much has changed since Tien and his colleagues (1979) gave their critical assessment of the impact of lighting on crime. In part this is due to the lack of research on lighting, particularly in the United States. However, the limited research on lighting continues to use weak designs (typically without control areas) which fail to substantially reduce our uncertainty about the effect of lighting on crime. We may speculate that lighting is effective in some places, ineffective in others, and counter productive in still other circumstances. The problematic relationship between lighting and crime increases when one considers that offenders need lighting to detect potential targets and low-risk situations (Fleming and Burrows 1986). Consider lighting at outside ATM machines, for example. An ATM user might feel safer when the ATM and its immediate surrounding area are well lit. However, this same lighting makes the patron more visible to passing offenders. Who the lighting serves is unclear.

Closed-Circuit Television

Closed-circuit television (CCTV) enhances the ability of a designated guardian to watch people in an area and to call for police intervention if potential trouble is detected. This is supposed to increase the risks of offending, but only if the CCTV surveillance is well known to the people who use the area. This project was unable to locate any published scientific evaluations of the use of CCTV in urban areas of the United States.

Three CCTV evaluations have been reported in Great Britain (Brown 1995). As deployed, a set of video cameras are posted in center city areas and monitored at a central station. The cameras cover many, but not all locations in the target area. Finding locations with clear unobstructed views, year round, can be difficult. CCTV cameras were installed around the town center of Newcastle-upon-Tyne in late 1992 and early 1993. Using a time series of 23 months prior to the installation of cameras, four months during, and 14 months after, and comparing CCTV covered areas to uncovered areas in the same period, Brown (1995) found that burglaries declined by 18 percent, auto thefts dropped 9 percent, thefts from autos went down 11 percent, and other thefts declined 7 percent. No effect was found for robberies.

Brown (1995) used a similar design to assess the impact of CCTV in Birmingham. He compared reported crime 12 months before, two months during, and 30 months after installation to control areas. Unfortunately, no figures were provided with the reported charts, but visual inspection of the time-series charts provided suggests reductions in robbery, burglary, and thefts. Similar results were reported for another town center in Great Britain, King's Lynn. Four quarters of reported crime before installation were compared to seven quarters after. A control area was used. Again, the data was not given, but visual inspection of the charts suggests reductions in burglary, assaults, thefts from vehicles, and thefts of vehicles. Significance tests were not reported in any of these case studies.

The effectiveness of CCTV in open spaces is unknown due to the lack of significance tests. Given recent interest in the use of CCTV in the United States, this tactic should be given a high priority for rigorous evaluations. Absent evaluation results from installations in the United States, the level of uncertainty about CCTV effectiveness is too high to advocate its use except to test its effectiveness.

Street Closures

Research has suggested that areas with easy access have more crime than areas with street layouts that restrict access (White 1990; Beavon, Brantingham and Brantingham 1994). Oscar Newman (1982) reported on crime and its association with privately owned streets with limited access. He compared these streets in a St. Louis neighborhood to nearby publicly owned, free access streets and found that the private streets had less crime. In this section we will examine five evaluations that support the hypothesis that closing and rerouting automobile traffic can reduce crime.

In 1986 the citizens of Miami Shores, Florida (just outside Miami, in Dade County) voted to increase taxes to fund closing off 67 streets (Atlas and LeBlanc 1994). The closings took place between July 1988 and March 1991. The evaluation compared changes in reported crime within the town to the changes in the same crimes in the surrounding county and Miami. Mean 1986 and 1987 crimes (before installation) were compared to the mean number of reported crimes in 1991 and 1992 (Atlas and LeBlanc 1994). There were no significant changes in reported robberies and aggravated assaults within Miami Shores compared to the two control jurisdictions. Relative to changes in Dade County,

reported burglaries significantly declined at least 8 percent. Larcenies and auto theft in Miami Shores also declined significantly, relative to changes in Miami and Dade County.

Newman (1996) reports the results of a street closure program in a Dayton, Ohio neighborhood. The Five Oaks neighborhood is a half-mile square area containing 2,000 homes on a grid street layout. Streets were closed off so that the area was subdivided into small areas and so one could not drive directly through the area. Newman (1996) summarized the City of Dayton evaluation results. Police-reported crime statistics showed that crime in the city rose one percent, but that total crime in the target neighborhood declined 26 percent, and violent crime declined 50 percent. Significance tests were not reported. Citizen surveys reported that over half of the residents felt crime had declined. Newman also reports that housing values increased after having declined prior to the street closures.

Two efforts to curb prostitution activity in London neighborhoods used road closures and rerouting coupled with increased police enforcement. In the Finsbury Park area police had steadily increased enforcement for two years prior to changes in the street closures. However, with the changes in the streets, "Soliciting and curb-crawling virtually disappeared and the area was transformed from a noisy and hazardous 'red-light' district into a relatively tranquil residential area." (Matthews 1992, page 94). Reported crime declined 50 percent for the 12-month period after the street closures compared to the previous 12 months. Observations of the area suggest that most of the prostitutes left the area but did not displace to adjacent neighborhoods (Matthews 1992).

In the Streatham neighborhood of London, street closures were also used in conjunction with increased police enforcement. Matthews (1993) reports a decline in traffic flow along key streets. Although police enforcement was maintained, arrests of "curb-crawlers" seeking sexual services declined by two-thirds (comparing the first quarter of 1990, after the program, to the first quarter of 1988, before the program began). Interviews of residents suggests a decline in noticeable prostitution activity, although some of this activity may have shifted to the periphery of that area.

The final evaluation of street closures was a retrospective analysis of the Los Angeles Police Department's Operation Cul-De-Sac. In 1990 the Los Angeles Police Department installed traffic barriers on 14 streets in a South Central Los Angeles neighborhood with a high level of drug activity, shootings and homicides. Much of the violence was created by disputes over drug sales locations by local gang members. The barriers were designed to make the driveup purchase of drugs more difficult and prevent drive-by shootings. This effort was part of a larger law enforcement effort to suppress these crimes. Two years following the installation of the barriers, the barriers were abandoned and then removed as the police became embroiled in the controversy surrounding the Rodney King beating.

The evaluation of the Los Angeles Police Department project compared reported crimes in the neighborhood for four quarters before the barriers were installed, the eight

quarters while they were being maintained, and 16 quarters after the program was abandoned (Lasley 1996). Reported crime for the four adjacent areas was also examined. If one uses the surrounding beats as control areas, the net effect of the installation of the barriers (before, compared to during) was that homicides decreased 65 percent. In fact, during the two years when the barriers were installed there was only a single killing in the target area. Once the barriers were no longer maintained and were removed (comparing the installed period, to the after period) homicides rose 800 percent, relative to the surrounding area killings. Total violent crimes (homicide, rape, street robbery, aggravated assault and purse snatching) declined from the pre-program period to the two years during the program (8 percent for the first year and 37 percent for the second year) and then rose again after the program fell into disuse. At the same time the surrounding areas remained relatively stable. Lasley attributes most of the decline in violent crime to changes in aggravated assaults. Significance tests were not reported for any of these comparisons.

Closing streets makes offenders' escapes more problematic. In the case of prostitution cruising and drive-by shootings, the offenders are likely to follow a circular driving pattern in their search for targets. By making circular driving patterns more difficult and increasing the chances offenders will find themselves at the end of a dead end street, criminal behavior may be thwarted.

The street closure evaluations used moderately strong designs and their conclusions are consistent with theory and prior research. This gives us confidence that this approach to curbing crime should be classified as "promising." In at least three of the programs (the two London prostitution cases and the Los Angeles drive-by shooting case), the street closures were undertaken along with police crackdowns. Matthews (1992) hypothesizes that street closures and enforcement may be more effective when used together than when used separately and enforcement should be used prior to street changes. This opportunity-blocking tactic for controlling crime in open urban areas deserves more attention by, particularly since it might reduce violence under some circumstances.

Conclusions for Open Urban Places

Four types of tactics were considered in this section. There is limited evidence that controlling offenders, particularly public drinking, might be useful. However, the evaluations are small in number and weak in design, leaving its effectiveness unknown.

Lighting has received considerable attention. Yet, evaluation designs are weak and the results are mixed. We can have very little confidence that improved lighting prevents crime, particularly since we do not know if offenders use lighting to their advantage. In the absence of better theories about when and where lighting can be effective, and rigorous evaluations of plausible lighting interventions, we cannot make any scientific assertions regarding the effectiveness of lighting. In short, the effectiveness of lighting is unknown.

The installation of CCTV in urban areas might be a fruitful area for research, but its effectiveness is unknown. Though several evaluations had scientific methods scores of 3, the absence of significance tests limits what we can claim for the effectiveness of this tactic. We cannot recommend the adoption of this tactic, except for purposes of testing.

Finally, compared to the other tactics examined, street closure evaluations have been conducted with greater rigor. We also have evaluation evidence that is consistent with theory and research. This tactic appears to be promising and deserves greater attention, particularly in high crime areas.

Table 7-9: OPEN PUBLIC PLACES STUDY SCIENTIFIC TACTIC SETTING RESULTS

METHODS	SCORE	Tactic	Setting	Results
Bjor, Knutsson, & Kuhlhorn 1992	2	ban on public drinking & high risk offenders & closing of a parking site	Open spaces of downtown area, Sweden	8% reduction in drunkenness arrests 64% reduction in disorderly conduct arrests
Ramsay 1991 Ramsay 1990	2	ban on public drinking	Open spaces of a British downtown area	No change on assaults 33% reduction in insults from strangers
Atkins, Husain, and Storey. 1991	2	lighting	39 sections of London	no systematic effect of lighting
Ditton & Nair 1994	2	lighting	Glasgow neighborhood	32% to 68% reduction in victimizations. 14% reduction in reported crime
Painter 1994	2	lighting	London	86% reduction in street robberies, auto crimes, and threats
	2	lighting	London	78% reduction in street robberies, auto crimes, and threats

	2	lighting	London	100% reduction in street robberies, auto crimes, and threats (base rates too small to be meaningful)
Brown 1995	3	cctv	town center, Newcastle upon Tyne Great Britain	decline in burglary (18%), criminal damage (9%), auto theft (7%), theft from auto (11%), other theft up (7%).
	3	cctv	town center, Birmingham, Great Britain	charts suggest reductions in robbery, burglary, and theft but do not allow calculation of reductions
	3	cctv	town center, King's Lynn, Great Britain	charts suggest reductions in burglary, assaults, thefts from autos, and thefts of autos but do not allow calculation of reductions
Atlas, and LeBlanc 1994	3	street closures	Florida town	8% decline in burglary, drops in larceny and autotheft. No change in robbery or aggravated assault
Lasley 1996	3	street barricades	Los Angeles, CA	65% reduction in homicides
Matthews 1992	2	street closures	Finsbury & Park, London	reduction in prostitution

	rerouting	activity	
Matthews 1993	2 street closures & rerouting	Streatham, London activity	reduction in prostitution
Newman 1996	3 street closures	Dayton, OH	26% reduction in reported crime and 50% reduction in violent crime

PUBLIC COIN MACHINES

Parking meters and public telephones are the principal subject of this section. These devices occupy small but important places in cities and are subject to fraud and vandalism. The six studies we will examine here show reductions in property offenses due to changes in the physical structure (target hardening) or operations of these devices.

Two evaluations examined the effectiveness of strengthening the material used in public telephone cash boxes. Target hardening was supplemented by other prevention measures in both instances. In Britain, electronic monitoring of phone booths helped identify attacks quickly and act as a deterrent (Barker and Bridgeman 1994). The evaluators reported a 49 percent reduction in attacks on cash compartment attacks as a result of these changes. Australian evaluators claimed a comparable reduction in vandalism incidents following a combined target hardening and rapid repair program (Challinger 1991). Both studies have weak designs due to their absence of control places.

Fraudulent use of public telephones has been addressed in two studies. In both, new systems were installed that prohibited calls that prior analysis suggested were likely to be fraudulent. At the New York Port Authority Bus Terminal, international calls were blocked, keypads were disabled to prevent routing calls through outside automated systems, and the number of available phones were reduced and relocated (Bichler and Clarke 1997). Calls and number of minutes of phone use declined from the pre-intervention period to the post-intervention period. This is indirect evidence of a drop in fraudulent phone use because one cannot distinguish between reduced legitimate phone use due to increased inconvenience to users and reduced illegitimate phone use.

LaVigne (1994) evaluated the effects of restricting inmate access to phones at Rikers Island, a New York City jail facility. The Department of Corrections restricted inmate phone use to control the costs of fraudulent calls. Not only did phone costs go down, but phone related fights among inmates declined, controlling for overall trends in fights and changes in inmate population.

Finally, Decker (1972) examined the effectiveness of a target hardening method to prevent slug use in parking meters (i.e., installation of meters that reject certain types of slugs and display the last coin inserted). Rates of slug use were measured in 10 areas of New York. Slug use declined in all areas. In another study, Decker (1972) looked at the effectiveness of warning labels on parking meters. He found short-term reductions in slug use for some labels, but overall the labels were less effective than meters that reject slugs.

These evaluations imply that target hardening is a promising method for reducing theft and vandalism. When evaluators looked for displacement effects, they were not found. LaVigne's (1994) evaluation suggests that illegal use of some facilities might stimulate other more serious criminal behavior and blocking minor offenses might reduce other more serious crimes. The Rikers Island evaluation is an illustration of the possible diffusion of crime prevention benefits (Clarke and Weisburd 1994).

Author(s)	Year	Scientific Method	Tactic	Setting	Results
Bridgeman	1994	2	target hardening, electronic monitoring	Barker & 2 public telephones in Great Britain	49% reduction in vandalism/ theft
Wilson	1988;	2	hardened coin boxes, and other changes, and rapid repair	Australian public telephones	48% reduction in vandalism
Challinger	1991				
Bichler & Clarke	1996	3	removing dialing capacity and disabling telephone keypads to prevent pay phone toll fraud	Port Authority Terminal, Manhattan	37% reduction in calls and 72% reduction in minutes of phone use. No displacement found
LaVigne	1994	3	restrictions on inmate phone use and phone system	Rikers Island, New York	46% reduction in telephone related fights. 49% reduction in phone costs

Decker 1972	4	installation of slug parking meters in New York rejecting parking meters & two labels, but no warning signs on parking meters	reduction in slug use due to changes in meters. Short term reduction with long term effect of any labels
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SCIENTIFIC CONCLUSIONS

Blocking crime opportunities at places can reduce crime, under some circumstances. Over 90 percent of the interventions reported evidence of crime reduction following the installation of an opportunity blocking tactic. This evidence is encouraging but it must be tempered by three considerations.

First, we know little about the place- and crime-specific effects of these tactics. That there is a great deal of uncertainty about what works, at which places, against which crimes, should not distract us from the broader finding that opportunity blocking tactics at places can be productive. We will address specific tactics below.

Second, 94 percent of these evaluations are case studies of a very few sites, typically a single site. We cannot treat the 99 interventions as a random sample of all interventions of this type. These may have been evaluations of programs that were far more likely to succeed than is typical. Nevertheless, authors of many of the evaluations asserted that their places were hotspots of crime and had resisted other interventions, such as police enforcement. Thus, the interventions may have tackled tougher problems than would be found at the average place.

Third, many of the evaluations studied the effect of multiple interventions implemented at about the same time. Even when the effects of a single tactic were identified, it was sometimes reported that other changes had occurred that could confound the evaluation results. Thus we might learn that crime was prevented, but we do not know what caused the prevention. The large number of multiple interventions deserves some explanation. Many of the efforts evaluated were the result of some form of problem-solving process in which a specific crime problem was analyzed and a set of appropriate solutions were implemented. This must be contrasted with efforts undertaken to test the efficacy of a particular prevention measure in a particular setting. Problem-specific interventions may have a greater likelihood of success than generic interventions, but we may have more difficulty learning from them. Later we will return to the subject of problem-solving and situational crime prevention.

Fourth, the scientific rigor (as shown by the scientific methods score) supporting the conclusions is usually moderate at best, and is frequently weak. Forty-three percent of

the studies did not use control places or measure crime for a minimal number of pre-intervention time periods. Only 6 percent of the evaluations compared the same intervention in at least 20 places and used control places. There were only two randomized controlled experiments among the studies examined. Often evaluators did not report significance levels for crime reductions, so we cannot determine the chances that the results were due to random changes in crime. In summary, a typical evaluation of a place-focused intervention involves a before-after comparison of a prevention tactic at a single location, compared to a roughly similar location or the surrounding area.

The Effects of Displacement are Limited

There is little reason to believe that side effects from place-focused efforts are greater than the intentional effects. Further, some of these side effects enhance prevention, rather than undermine it. There are two side effects: displacement of crime and diffusion of prevention benefits.

One reason for community resistance to place-focused prevention (or any area specific tactic) is the fear of the displacement of crime from the target places to other, presumably safer, locations nearby. Displacement can take on a number of forms. Offenders can change locations. They can change the times of offending. They can change the target of their criminal behavior. They can adopt new behaviors to attack the same targets. And they can switch the type of crime they commit. Fear of displacement is often based on the assumption that offenders are like predatory animals (they will do whatever it takes to commit crimes just as a rat will do whatever it takes to steal food from the cupboard).

In the last 10 years there have been four reviews of the empirical evidence and theoretical underpinnings for displacement. Theoretical explorations based on a rational choice perspective (Cornish and Clark 1986) find no basis for believing offenders always completely displace if they cannot attack their favorite targets (Cornish and Clark 1987; Barr and Pease 1990; Eck 1993; Barnes 1995; Bouloukos and Farrell 1997). Reviews of empirical studies examining place-focused prevention, police enforcement, and other preventive tactics in the United States, Canada, Great Britain, continental Europe, and Australia, find that there is often no displacement, but when displacement occurs it does not overwhelm other gains from blocking crime opportunities (Cornish and Clark 1987; Barr and Pease 1990; Eck 1993; Hesseling 1995). There is no evidence to suggest that these interventions increase crime by displacing it. There have been only a very few examples where something close to 100 percent displacement has been observed (for example, 100 crimes are prevented at one set of targets, but there is an increase of 100 crimes at similar targets). Displacement far less than 100 percent is not uncommon (for example, 100 crimes are prevented against one set of targets but there is an increase of 30 crimes against other targets, yielding a net reduction of 70 crimes). But usually, evaluators who have looked for empirical evidence of displacement have found little evidence of displacement. Concern about displacement is usually based more on pessimism than empirical fact.

It is possible that more displacement would be found if evaluators were more diligent in their search for it. Most prevention evaluations do not report on possible displacement effects and when they do, the evidence used is almost always weaker than the evidence used to support the main findings. Still, if the evidence for limited displacement is weak, the evidence for large amounts of displacement is even weaker.

Prevention Benefits Can Spread

Overlooked in our concern about displacement is the possibility of just the opposite effect, diffusion of crime prevention benefits (Clarke and Weisburd 1994). For example, Scherdin (1992) reported that when magnetic tags were put in books in a university library, book theft declined. But so did the theft of audio and video tapes which were not tagged. Thieves apparently were unaware of which items were protected. We have noted several other examples of possible diffusion of benefits effects in the evaluations examined in this chapter (Felson et. al. 1997; LaVigne 1994; Masuda 1992; Poyner 1988). Evidence for diffusion of benefits is weaker than evidence against displacement, largely because few people have looked for it. Nevertheless, this possibility cannot be rejected on empirical or theoretical grounds. In fact, there are good theoretical reasons to believe diffusion of benefits might be common. Diffusion is the flip side of the coin of crime contagion. Contagion suggests that when offenders notice one criminal opportunity they often detect similar opportunities they have previously overlooked. Crime then spreads. The broken-windows theory (Wilson and Kelling 1982) is an example of a contagion theory. Thus under some circumstances offenders may be uncertain about the scope of prevention efforts and avoid both the blocked opportunities and similar unblocked opportunities. When this occurs, prevention may spread.

There is Much Uncertainty About Place- and Crime-Specific Tactics

Table 7-11 summarizes the place-specific findings described in detail in the body of this chapter. Each evaluated intervention was put into one of four categories. Tactics that "work" had to have two or more positive studies with a scientific methods score of 3 or more and had to report the statistical significance of the findings. Only one tactic, nuisance abatement to control drug dealing and related crime at private rental places, received this classification.

To be classified as "does not work" an intervention had to meet the same qualifications as "works" but the findings reported no relationship between the intervention and crime. The scientific methods used were insufficient to detect tactics that did not work, so we have no tactics in this category. With improved knowledge from more rigorous evaluations some of the tactics in the "unknown" category might move into this category. Most tactics may be effective at some type of place and against particular crimes, but it is unlikely that all tactics are effective at all places against all crimes. The absence of tactics in the "does not work" category reveals our ignorance.

"Promising" tactics had to have at least one evaluation with a scientific methods score of 3 that used significance tests, and showed that crime declined. If significant tests had

been reported some tactics of "unknown" effectiveness might have been classified as "promising." Seven interventions had sufficient scientific evidence to be classified as "promising." Putting metal detectors in this category reveals the limits of the application of standard social science research methods. Few would question the efficacy of metal detectors and passenger screening to prevent aircraft hijacking, but because this tactic has not been widely studied and many of the studies use weak research methods, we cannot put this tactic in the "works" category. We can be far less certain about its effectiveness in other settings. Street closures may be another tactic that is underrated because of a lack of rigorous evaluations, particularly the absence of significance tests.

The "unknown" category contains the majority of interventions. Many of these interventions had multiple studies showing positive effects, but the evaluations had scientific methods scores less than 3, or did not report significance test results. Examples of these tactics include CCTV in open spaces and parking lots, and EAS in retail stores. Other tactics had several weak studies reporting conflicting results. Lighting in open areas is an example of this type of tactic. Finally, some tactics may not prevent crime. Cameras were found to be ineffective at preventing robberies of convenience stores in a single rigorous test. In a less rigorous analysis, cameras were found to be unrelated to bank robberies.

Clearly there is much to learn if we are to develop a set of well-tested interventions that can be applied to specific problems. Most cells in Table 7-11 empty and the places listed are only a small set of places with crime problems. Even when we have tactics that work or look promising, they have only been tested against a limited set of crimes.

Table 7-11: SUMMARY OF PLACE SPECIFIC-FINDINGS Works Does Not Work

Promising	Unknown	Residential nuisance	target
abatement		hardening	
		restricting movement	
		guards	
		CCTV	
		cocoon watch	
		property marking	
Commercial stores		multiple	EAS
	clerks	CCTV	
	store design	target	
		hardening	
		frequent inventory counts	
		prohibiting offenders	
		electronic	

		monitoring ink tags guards cameras restricting movement	
banking & cameras money handling		target hardening guards	
bars & server taverns	training		
Transport public transportation		removing targets rapid cleanup design informal watching	
parking lots		CCTV guards restricting movement	
airports	metal detectors guards		
Public Setting open spaces	closures	street prohibiting offenders controlling drinking lighting	CCTV
public facilities	target hardening	removing targets signs	

Situational Crime Prevention and Problem-Solving are Promising

This chapter has described what we have learned about the effectiveness of specific tactics to prevent crimes at specific types of places. It is based on the assumption that if we know the type of place and the type of crime, we should be able to recommend a specific tactic that can prevent crimes of this type and this place. We have seen limited evidence that this assumption is valid.

There is another approach to addressing crime problems, however, that may also be valid. Rather than look for a generic solution to a specific crime problem at a place, one could undertake a thorough examination of the problem and then craft a unique set of interventions to address this problem. Such an approach is advocated by both situational crime prevention (Clarke 1992) and problem-oriented policing (Goldstein 1990). Many of the evaluations examined multiple simultaneous interventions that addressed specific problems at places. In these projects the selection of tactics was preceded by some form of crime analysis. Their evaluations are examinations of the effectiveness of problem-solving and situational crime prevention. Additionally, one of the two randomized experiments was a study of problem-solving (scientific methods score=5). Stores in the treatment groups did not get a standard intervention, but had an on-site diagnosis and a recommendation of a set of tactics that fit the circumstances (Crow and Bull 1975). Repeat victimization evaluations (Anderson, Cheery and Pease 1995; Forrester, Chatterton and Pease 1988) are also a form of problem-solving because the complex interventions were based on site-specific analysis (both with scientific methods scores=3). It is difficult to determine how many of the studies reviewed in this chapter should be considered as problem-solving or situational crime prevention efforts, but almost half provide evidence they can be interpreted in this light. This implies that we have relatively strong evidence for the effectiveness of problem-solving and situational crime prevention. At minimum, these complementary strategies are a promising approach to crime prevention.

EFFECTIVENESS OF DOJ PROGRAMS

There is no single program within the Department of Justice that funds place-focused prevention. Instead, place-focused prevention tactics may be scattered throughout a variety of program areas. Within the Byrne Formula Grant Program, place-focused tactics may be funded under the domestic drug control, community crime prevention, property crime prevention, law enforcement effectiveness, and public housing purpose areas. These areas comprise \$151.8, or about 8 percent of all Byrne Funds for fiscal years 1989 through 1994 (Dunworth, Haynes and Saiger 1997). We do not know what proportion of these funds actually went to place-focused tactics, but it is probably very small. Within the Local Law Enforcement Block Grant Program for 1996 through 1997, \$50 million has been allocated to security measures and crime prevention. This comprises about 14 percent of the program total. Once again, we cannot determine how much of these funds go to place-focused crime prevention.

Programs to foster problem-solving and situational crime prevention efforts at places may be effective. The NIJ sponsored the earliest research on problem-solving in

Madison, Wisconsin (Goldstein 1990) and Newport News, Virginia (Eck and Spelman 1987). The Bureau of Justice Assistance has funded a number of programs that applied problem-solving, including the Problem-Oriented Approach to Drug Enforcement, the Systems Approach to Crime and Drug Prevention, and the Comprehensive Gang Initiative. The COPS program, with its focus on the police problem-solving with communities, could make good use of place-focused crime prevention. Improving the ability of police and communities to identify and analyze problems and then craft effective prevention methods to alleviate these problems may improve police effectiveness.

Though police problem-solving has received much attention in the United States, the police are not the only social institution that uses problem-solving to prevent crime problems. Improving the ability of small businesses, social organizations, community groups, and non-criminal justice public agencies to craft problem-specific solutions to crime problems would have the effect of democratizing crime prevention. Two types of knowledge are required for such efforts. First, people addressing crime problems at places must know how to go about identifying problems, analyzing the causes of problems, crafting feasible solutions, and determining if the problems have declined. Second, these people need knowledge about what place-focused prevention have been tried and which have been found to be effective. Congressional support for developing both sets of knowledge might improve the ability of private and public institutions to prevent crime.

To the extent that Department of Justice program funds are used to support nuisance abatement to prevent drug dealing and related crime, these funds are probably being used in an effective manner. The Bureau of Justice Assistance has singled out three programs (Boston's Safe Neighborhood Initiative, Lansing's Neighborhood Reclamation program, and Los Angeles's FALCON Narcotics Abatement Unit) involving nuisance abatement as particularly innovative (Bureau of Justice Assistance 1995).

Nuisance abatement points out a very important fact about place-focused prevention. Most place-focused prevention takes place at privately owned locations. If these owners do not employ prevention measures at their places, then mechanisms are required to induce them to undertake relevant prevention measures. Nuisance abatement provides a threat in order to compel the installation of prevention. A positive alternative is landlord training. Landlord training programs provide information to landlords to help them manage their properties and prevent drug dealing. Unfortunately, this positive approach has not been evaluated so we do not know how effective it is, either in absolute terms or relative to nuisance abatement.

IMPROVING EFFECTIVENESS THROUGH EVALUATION AND RESEARCH

Providing citizens and businesses, as well as local governments, with scientifically based information on crime prevention may be more productive than directly funding such programs. Such information can only be provided by a program of rigorous

research.

What should a research program look like? First, it must enlist the active participation of the people and organizations that own and control places. Some basic research can be undertaken using police records, other public data bases, and surveys. Most systematic evaluation and experimentation involving changes to the characteristics of places will require the cooperation of the businesses and property owners.

Second, a place-focused research and evaluation program should build a body of theoretically sound and rigorously tested interventions. The program should address six questions:

1. Where is each type of crime most likely to occur?
2. What place characteristics protect places from crime or facilitate crime?
3. What innovative prevention tactics come from problem-solving and situational crime prevention efforts?
4. What methods for analyzing problems and developing prevention tactics are particularly useful for local decision makers?
5. Which tactics are found effective, based on impact evaluations with scientific methods scores not less than 3?
6. Of those tactics that appear promising based on impact evaluations in single sites, which survive multi-site evaluations with scientific methods scores of 4 and 5?

The Drug Market Analysis Project (DMAP) is a useful example of how demonstration, research and evaluation can work together. In five cities (Jersey City, Hartford, Pittsburgh, Kansas City, and San Diego) NIJ funded the development of advanced computer mapping. These efforts improved police ability to analyze their crime and drug problems and they supported basic research into drug market places and rigorous evaluations of interventions to control drug dealing.

DMAP also addressed another research priority. A place-focused research program should foster improvements in scientific methods used in evaluations. All evaluations should employ control groups or interrupted time-series designs, unless there are overwhelming reasons why such controls cannot be employed. Further, significance tests and effect sizes should be reported. NIJ's new Crime Mapping Research Center has the potential to expand on what was learned through DMAP and to extend our knowledge of effective place-focused tactics.

Special efforts need to be made to address side effects: displacement and diffusion of benefit. These side effects can contaminate control groups and confound evaluation

results. If crime displaces into control places then program effects can be overestimated. If crime prevention diffuses into control places then program effects will be underestimated. In neither case can diffusion or displacement effects be estimated. Evaluation protocols for separating control places and displacement/diffusion places need to be required for all federally funded research. Additionally, these side effects should be the subject of research to determine the conditions under which they are most likely to occur and what can be done to reduce displacement and facilitate diffusion.

Several place-focused interventions should be given priority for testing to determine if they are effective at controlling violence. These include street closures around retail drug markets, CCTV at locations that are hotspots for robberies and assaults, landlord training programs to curb drug related violence in apartment buildings, and metal detectors in schools and public housing with high violent crime rates. Research into the relationship between lighting and violent crime needs to be conducted. Such research should examine how offenders use lighting, the circumstances under which lighting facilitates crime, and the conditions under which lighting is associated with low crime rates. Evaluations could then be undertaken at places where this earlier research suggested that lighting improvements might be effective. Finally, studies should examine how repeat victimization, repeat crime places, and repeat offenders are related.

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