

What Changes to the Built Environment Can Mitigate the Health Impacts of Crime?

Answer: Crime and fear of crime are associated with a range of negative physical and mental health outcomes, affecting both the direct victims of crime as well as members of the broader community in which crime occurs.¹ Improving street lighting and installing closed-circuit television (CCTV) systems in public places – two types of “situational crime prevention” measures – are promising strategies for reducing crime and potentially its negative health impacts. However, the effectiveness of these strategies varies depending on the type of crime being addressed and the specific setting in which the intervention is implemented.² It is not clear what changes to the built environment are effective for reducing individuals’ fear of crime, as the quality of the evidence on this topic is low.

Why we conducted this review

Health and well-being have a complex relationship with crime, fear of crime, and the built environment.¹ In this review, we examine what changes to the built environment – such as the configuration of homes, streets, parks, or public transit – show promise for reducing crime or fear of crime.³ Given the negative physical and mental health outcomes associated with crime and even fear of crime, we assume that reducing crime in a community would, at least indirectly, have positive implications for the health of that community. With this in mind, we undertook this review from the perspective of a local policymaker seeking to identify effective strategies for modifying the built environment to address health concerns among residents of high-crime neighborhoods.

Supporting evidence

We identified systematic reviews examining the effectiveness of four types of interventions for reducing crime:

- **Street lighting.** A systematic review⁴ found that improved street lighting in public places reduced crime by 21 percent, particularly property crime. The impact on violent crime was small and insignificant.
- **CCTV.** A systematic review⁵ found that CCTV reduced crime by 51 percent when implemented in parking lots in the United Kingdom. In each of the reviewed studies, CCTV was implemented together with other crime prevention interventions, such as improved lighting or fencing.
- **Street modifications.** A systematic review⁶ found reductions in crime in four U.S. cities that implemented some form of street closures or traffic barriers, primarily in inner-city neighborhoods. In at least one instance, this intervention type – a “defensible space” technique – reduced both violent crime and property crime.
- **Green space.** A systematic review⁷ examining the relationship among violence, crime, and green space (such as trees, “greened” vacant lots, or other vegetation) could not draw conclusions about the strength of this relationship.

In addition, we identified one systematic review⁸ examining the effects of environmental interventions on fear of crime. While home security improvements and general environmental improvements – such as maintenance to parks or transit stations – emerged as the most promising interventions, the review authors describe the quality of the evidence as generally low.

Additional considerations

- Some of the primary research studies included in the systematic reviews lacked a matched control group, making it difficult to attribute changes in the experimental group to the particular intervention being studied.
- A number of the interventions studied were implemented alongside other interventions to reduce crime, making it difficult to isolate the impact of specific components or to understand the interactions among them.
- Some of the individual studies included in the systematic review on green space found changes to the built environment may increase crime in some contexts.⁹
- Given the limited timeframe for completing this review, the review does not include primary research studies published since the most recent systematic review, which was published in 2016.

AcademyHealth conducted this rapid evidence review over a two-week period using an established protocol that emphasizes timeliness, efficiency, and responsiveness to policymakers’ needs. It synthesizes findings from peer-reviewed systematic reviews published within the last 10 years. A primary analyst undertook and revised the review. Two additional AcademyHealth analysts and two external crime prevention experts provided input on the initial findings and draft report. Appendix 2 lists the search terms and databases used in this rapid review.

Appendix 1: Definition of Terms

Built environment—Refers to “deliberately constructed” physical spaces such as buildings and streets as well as “outdoor spaces that are altered in some way by human activity.”¹⁰

Situational crime prevention—A crime prevention approach that introduces “discrete managerial and environmental change” into the settings in which crimes occur, with the goal of deterring crime by making criminal action less attractive to offenders.¹¹ Importantly, situational crime prevention measures are tailored to specific offenses within different categories of crime (for example, distinguishing between different types of burglary, rather than applying a single prevention strategy to all burglary crimes). A number of interventions discussed in this review, including surveillance cameras, defensible space architecture, and street and traffic changes, are considered situational crime prevention strategies.

Defensible space—Refers to a crime prevention strategy developed by architect Oscar Newman in the 1970s focused on interventions that “restructure the physical layout of communities to allow residents to control the areas around their homes.”¹²

Appendix 2: Search Terms and Databases

The following list shows the basic Boolean search term strategy used for the review. Searches were modified based on search functions within each database used.

“built environment” AND (violence OR crime)

“built environment” AND (violence OR crime) AND “systematic review”

“built environment” AND safety

(housing OR buil* OR design) AND (violence OR crime) AND “systematic review”

(neighborhood OR community OR residence OR buil*) AND violence AND exposure

“crime prevention through environmental design”

(violence OR crime) AND design

(violence OR crime OR safety) and “systematic review”

(violence OR crime OR safety) AND “urban planning”

“defensible space” AND (crime OR violence)

Databases: Health Systems Evidence, the Cochrane Library, Campbell Collection, EPPI-Centre Reviews, PubMed, Web of Science Core Collection, ProQuest Social Science Database, and EBSCO Social Sciences Full Text.

Appendix 3: Included Studies

The table below summarizes the five systematic reviews identified through AcademyHealth’s search strategy. The systematic review examining the impact of environmental interventions on fear of crime is listed first, followed by the four reviews examining the effectiveness of specific interventions for reducing crime.

Author and date	Focus of review	Methods	Relevant findings	Limitations and quality of the evidence as reported by the author	AMSTAR Quality Rating ¹³
Lorenc et al., 2013 ⁸	The effectiveness of environmental interventions to reduce the fear of crime.	<p>Date range: Studies published through January 2011.</p> <p>Inclusion criteria: The authors included studies in which 1) the intervention involves a substantial change to the built environment; 2) data on any fear of crime-related outcome is reported; 3) the methodology involves a prospective intervention evaluation of any design (including randomized controlled studies and uncontrolled before-and-after studies); and 4) the study was conducted in a country that is a current member of the Organization for Economic Co-operation and Development.</p> <p>Exclusion criteria: Not specified.</p> <p>Quality or strength of evidence assessment: The authors carried out quality assessment of reviewed studies using a modified version of the Hamilton tool¹⁴, finding the overall study quality to be generally low. They attribute this to two primary factors: 1) the large number of uncontrolled studies, and 2) the incomplete reporting of methods.</p>	<p>Studies included: 47 studies (36 studies conducted in the United Kingdom, 10 in the United States, and one in the Netherlands).</p> <p>Effect on crime and violence: The authors synthesized findings according to seven categories of interventions represented in the reviewed studies. They conclude that while the evidence suggests some environmental interventions may have the potential to reduce fear of crime, the evidence is not conclusive. Among the interventions studied, home security improvements and general environmental improvements appear most promising for reducing fear of crime, while installation of closed-circuit television (CCTV) systems appears least promising.</p> <p>Home security improvements: All five of the studies in this category were conducted in the United Kingdom; some studies combined security improvements with a range of other security and non-security improvements. Two controlled studies found reductions in fear by 15 percent and 16 percent, respectively; among the uncontrolled studies, one study found a similar reduction in fear of crime and two studies found no change.</p> <p>Installation or improvement of street lighting: The authors describe the evidence regarding lighting as mixed. Among the 16 studies in this category (nearly all conducted in the United Kingdom), four studies with controlled designs and 10 with uncontrolled designs looked at the effect of improving lighting at an area level on fear of crime. Reductions in fear documented in the uncontrolled studies generally were not replicated in the more rigorous studies.</p> <p>Installation of CCTV systems: Of the six studies in this category, half were controlled studies and nearly all were conducted in the United Kingdom. In the one</p>	<p>The authors note that the evidence reviewed has “considerable” limitations and they describe the study quality as generally poor.</p> <p>The authors attribute this in part to the number of reviewed studies that lacked robust designs with adequately matched control groups.</p> <p>In addition, the authors noted wide variation in the outcome measures used by reviewed studies to assess “fear of crime,” limiting what can be inferred from results.</p>	8/11

Author and date	Focus of review	Methods	Relevant findings	Limitations and quality of the evidence as reported by the author	AMSTAR Quality Rating ¹³
			<p>U.S. intervention examined, CCTV was installed in a New York City public housing project, with footage transmitted to residents' televisions. That study found improvements in some fear outcomes and adverse changes in others. Overall, the evidence reviewed suggests CCTV is not effective in reducing fear of crime, though the authors note that the quality of evidence is limited.</p> <p><u>Multi-component interventions for crime prevention:</u> The nine studies in this category evaluated large-scale programs that used multiple intervention types – e.g. installation of CCTV, security and lighting improvements, initiatives not related to the built environment – to address crime or the fear of crime. Review authors described the evidence as mixed, with the controlled studies in the group showing both positive and adverse trends regarding fear.</p> <p><u>Housing improvement and relocation:</u> The seven studies in this category, all carried out in the United Kingdom, examined interventions involving housing renovation, housing relocation, or some aspects of both. Three controlled studies showed small, non-significant improvements in fear of crime, while results varied across the remaining uncontrolled studies, from significant reductions in fear to no change to significant adverse effects in fear.</p> <p><u>Area-based regeneration initiatives:</u> Two studies examined large-scale urban regeneration programs in the United Kingdom. Neither study documented a clear trend in fear outcomes.</p> <p><u>Small-scale environmental improvements in public areas:</u> The two studies in this category involved the cleaning and repainting of a bus station in England and the installation of new gym equipment and general environmental improvements in urban parks in Southern California. Both studies found improvements in at least some fear of crime outcomes.</p>		
Bogar and Beyer, 2016 ⁷	The relationship between urban green space, crime, and violence.	<p>Date range: 2001-2013</p> <p>Inclusion criteria: Studies must be peer-reviewed primary research studies published in English and in the United States. Only</p>	<p>Studies included: 10 studies.</p> <p>Effect on crime and violence:</p> <p>Given the small number of studies included in the review and the significant variation across these studies, it is not possible to draw any overarching</p>	The small number of studies reviewed makes it difficult to draw conclusions about the relationships among urban green space, crime and violence.	4/11

Author and date	Focus of review	Methods	Relevant findings	Limitations and quality of the evidence as reported by the author	AMSTAR Quality Rating ¹³
		<p>quantitative or mixed methods studies with a United States study location were included. The review was not limited to certain types of green space or certain types of crime or violence.</p> <p>Exclusion criteria: Studies were excluded if they: employed only qualitative measures; took place in a rural setting; did not include crime or violence as the outcome; or did not include neighborhood/community green space as an isolated variable within multivariate neighborhood characteristics.</p> <p>Quality or strength of evidence assessment: The authors included only quantitative or mixed-methods studies published in the peer-reviewed literature; otherwise quality assessment was not specified.</p>	<p>conclusions about relationships among urban green space, crime and violence.</p> <p>Among included studies, the authors observed 19 instances of reductions in crime or violence related to green space, and nine instances of increases in crime or violence related to green space. The authors categorized results according to the types of crime and violence examined by included studies:</p> <p><u>Property crimes:</u> Five studies documented decreases in property crimes such as burglary, vandalism, and robbery; two studies found increases in such crimes. <u>Nuisance crimes:</u> One study found a decrease in disorderly conduct, while two studies found increases in disorderly conduct, illegal dumping, and narcotics use and distribution. <u>Intrafamily violence and aggression:</u> The one study examining effects on intimate partner violence found a decrease in aggression against partners. <u>Violent crime:</u> Only one study found an increase in violent crime (robbery with and without a gun), while four studies found a decrease in violent crime across four different measures.</p> <p>Five studies found a decrease in total crime, compared with only one study documenting an increase.</p>	<p>The studies included in the review varied across several dimensions, including: study design; study location (locations across the U.S. West Coast, South, Midwest, and East Coast); type of green space (e.g. trees, greened vacant lots, only vegetation); and type of crime and violence outcomes and measures.</p> <p>In addition, the authors observed wide variations in the units of analysis across reviewed studies, particularly the definition of “communities,” which included apartment building complexes, neighborhoods, cities, and city and county boundaries, depending on the study.</p>	
<p>Welsh et al., 2010⁶</p> <p>For the purposes of this Rapid Evidence Review, we focus only on the results relevant to defensible space.</p>	<p>The effects of security guards, place managers, and defensible space on crime in public places.</p>	<p>Date range: Not specified.</p> <p>Inclusion criteria: Studies were included if: 1) the surveillance measure in question was the main focus of the intervention; 2) there was an outcome measure of crime; and 3) the evaluation design was of high methodological quality (with the minimum design involving before-and-after measures of crime in experimental and comparable control areas).</p>	<p>Studies included: 12 studies (five focused on security guards, two on place managers, and five on defensible space).</p> <p>Effect on crime and violence:</p> <p>The review authors conclude that there is fairly strong evidence that the “defensible space” technique of street closures or barricades is an effective approach for preventing crime in inner-city neighborhoods.</p> <p>Four of the five defensible space evaluations included in the review were carried out in the United States and all involved some type of street or traffic modification to reduce crime:</p>	<p>Of the 12 studies included in the review, half involved other interventions in addition to the main surveillance measure of interest. Among the five defensible space studies, two studies involved other interventions.</p> <p>Only half of the reviewed studies included measures to assess whether the intervention had displaced crime to other areas, or whether</p>	<p>5/11</p>

Author and date	Focus of review	Methods	Relevant findings	Limitations and quality of the evidence as reported by the author	AMSTAR Quality Rating ¹³
		<p>Exclusion criteria: Not specified.</p> <p>Quality or strength of evidence assessment: The authors included only studies of high methodological quality; most of these studies included some type of comparable control area, ruling out some of the major threats to internal validity. Otherwise quality assessment was not specified.</p>	<p>- Compared to control areas, the city of Miami Shores, Florida, experienced a significant decrease in burglary, larceny, and theft of vehicles two years after implementing 67 street closures and barricades across the city in an effort to curb crime and traffic problems.</p> <p>- Two years after the Los Angeles Police Department installed traffic barriers in a 10-block area of inner-city neighborhoods experiencing heightened levels of gang-perpetrated violence, the area experienced significant reductions in homicide and assault.</p> <p>- A St. Louis, Missouri, neighborhood that implemented traffic modifications experienced slower growth in the crime rate relative to an adjacent neighborhood.</p> <p>- Compared to control areas, a neighborhood in Dayton, Ohio, that implemented street closures experienced substantial reductions in both property and violent crimes.</p> <p>The authors of all four evaluation studies attribute the reduction in crime to increased “natural surveillance” by residents who felt safer being outside (and may have served as a deterrent to potential offenders concerned about being detected or interrupted).</p> <p>The fifth study in this group was conducted in the United Kingdom and evaluated an initiative to incorporate crime prevention techniques into the design of public housing. The authors conclude that, with only one evaluation of the initiative, is not possible to draw conclusions about the effectiveness of this approach.</p>	<p>the benefits of the intervention had diffused to other areas.</p>	
<p>Welsh and Farrington, 2009 ⁵</p>	<p>The effects of closed circuit television (CCTV) surveillance cameras on crime in public places.</p>	<p>Date range: Not specified.</p> <p>Inclusion criteria: Studies were included if: 1) CCTV was the focus of the intervention; 2) there was an outcome measure of crime; 3) the evaluation design was of high methodological quality (with the minimum design involving before-and-after measures of crime in</p>	<p>Studies included: 44 studies (34 studies carried out in the United Kingdom, four in the United States, and one each in Canada, Norway and Sweden).</p> <p>Effect on crime and violence: Most of the studies included in the review examined the effects of CCTV use in four types of public settings: city and town centers, public housing, public transport, and car parks (or parking lots). The remaining three studies were carried out in residential areas and at a hospital. Forty-three</p>	<p>Important information about the CCTV intervention – such as the number and location of cameras – was sometimes missing from reviewed studies, making it difficult to assess why some CCTV interventions were more effective than others in reducing crime.</p>	<p>5/11</p>

Author and date	Focus of review	Methods	Relevant findings	Limitations and quality of the evidence as reported by the author	AMSTAR Quality Rating ¹³
		<p>experimental and comparable control areas); and 4) the total number of crimes in each area before the intervention was at least 20 (to allow for sufficient statistical power to detect changes in crime).</p> <p>Exclusion criteria: Not specified.</p> <p>Quality or strength of evidence assessment: The authors included only studies of high methodological quality; otherwise quality assessment was not specified</p>	<p>percent of the programs examined in the studies involved other interventions in addition to CCTV. The major crime types reported were violence (including robbery) and vehicle crimes (including thefts of and from vehicles).</p> <p>The authors conclude that public area CCTV reduces crime in some circumstances, with the highest quality research suggesting that CCTV is most effective in reducing crime in car parks, particularly vehicle crimes. Results from the four intervention settings are described below:</p> <p><u>City and town centers:</u> Half of the reviewed studies were carried out in city and town centers, and most involved use of CCTV for active monitoring (in which security personnel monitored camera footage in real time). Based on data from the 20 studies for which effect sizes could be calculated, the authors found that CCTV led to a small but non-significant reduction in crime in these settings.</p> <p><u>Car parks:</u> The six evaluations in this category were conducted in the United Kingdom between the early 1980s and early 2000s. All of the programs studied supplemented CCTV with other interventions, such as improved lighting or fencing. When the authors combined odds ratios across the six studies, they found crime decreased by 51 percent in experimental areas compared to control areas.</p> <p><u>Public housing:</u> Of the nine evaluations carried out in public housing, two were conducted in the United States and all involved active monitoring. Three included other interventions in addition to CCTV. Based on data from the eight studies for which effect sizes could be calculated, the authors found that CCTV led to a small but non-significant reduction in crime.</p> <p><u>Public transport:</u> The four studies in this category examined interventions in underground railway systems outside the U.S. Here the authors found that CCTV led to a sizeable but non-significant reduction in crime, noting that a substantial reduction in robberies and thefts in one of the studies likely contributed to the large average effect size.</p>	<p>Because nearly half of the programs examined included CCTV and other interventions, it is difficult to isolate the individual effects of different components. It is also difficult to know how CCTV interacts with other interventions to affect crime.</p> <p>Of the 41 studies included in the meta-analysis, 34 were carried out in the United Kingdom, where the use of CCTV to prevent crime appeared more effective than in other countries. The authors identify several factors beyond the CCTV intervention itself that may contribute to this difference, such as differences among the studies in the duration of the follow-up period for assessing an intervention's impact.</p>	

Author and date	Focus of review	Methods	Relevant findings	Limitations and quality of the evidence as reported by the author	AMSTAR Quality Rating ¹³
<p>Welsh and Farrington, 2008 ⁴</p>	<p>The effect of improved street lighting on crime in public places.</p>	<p>Date range: Studies published through December 2006.</p> <p>Inclusion criteria: The authors included studies in which 1) improved street lighting was the primary intervention; 2) crime was an outcome measure; 3) the total number of crimes in an area prior to the intervention was at least 20 (to allow for sufficient statistical power to detect changes in crime); and 4) the study used an evaluation design that involved before-and-after measures of crime in experimental and control areas.</p> <p>Exclusion criteria: The 19 studies excluded from the review either lacked a comparable control area for assessing the impact of the street lighting intervention and/or did not include crime as an outcome measure.</p> <p>Quality or strength of evidence assessment: The authors included only studies involving before-and-after measures of crime in experimental and control areas, with the control area needing to be at least “minimally reasonably comparable” to the area in which the intervention was implemented. Otherwise quality assessment was not specified.</p>	<p>Studies included: 13 studies (eight studies carried out in the United States and five in the United Kingdom).</p> <p>Effect on crime and violence:</p> <p>The authors conclude that improved street lighting is effective in reducing crime in some circumstances. Across the 13 studies reviewed, the authors found that crimes decreased by 21 percent in experimental areas subject to a street lighting intervention, compared to similar control areas with no such intervention. Improved street lighting was followed by significant reductions in property crime, though not in violent crime. In the three studies in which street lighting interventions were followed by an increase in crime, the results were not statistically significant.</p> <p>The strongest evidence for the effectiveness of street lighting interventions came from the five evaluations conducted in the United Kingdom.</p> <p><u>United Kingdom:</u> The five evaluation studies conducted in the United Kingdom were carried out in the 1990s in a variety of settings, including residential neighborhoods, a parking garage, and a market. Looking across the studies, the authors found that crimes decreased by 38 percent in areas subject to a lighting intervention compared to control areas. In one of the five studies, the effects of improved lighting were confounded with other improvements at the intervention site (a parking garage), such as fencing and the construction of an office near the garage entrance.</p> <p><u>United States:</u> Among the eight evaluation studies conducted in the United States, all but one date to the 1970s. In most of the studies, the intervention was carried out in a residential neighborhood. Half of the evaluations found improved street lighting to be effective in reducing crime, while the four remaining studies found no effect. The authors note that it is not clear why the U.S. studies produced different results, though they observe that the effective studies tended to measure both daytime and nighttime crimes, while</p>	<p>The authors note that it is difficult to test for publication bias among the 13 studies included in the review.</p> <p>While each of the reviewed studies includes before-and-after measures of crime in experimental and comparable control areas, no studies to-date have used randomized controlled experiments – the gold standard of evaluation designs – to examine the impact of lighting on crime.</p> <p>In many of the reviewed studies, the control area was adjacent to the experimental area, which creates the opportunity for “program contamination” from the experimental area to the adjacent control area.</p>	<p>6/11</p>

Author and date	Focus of review	Methods	Relevant findings	Limitations and quality of the evidence as reported by the author	AMSTAR Quality Rating ¹³
			the ineffective studies tended to measure the impact on nighttime crimes only.		

Endnotes

1. For an examination of the interactions among health, crime, and the built environment, see Lorenc T *et al.* Crime, fear of crime, environment, and mental health and wellbeing: mapping review of theories and causal pathways. *Health Place*. 2012 July;18(4):757-765.
2. Appendix 3 contains additional details regarding the contexts in which specific crime prevention strategies have been shown to be effective (or not). As John Eck and Rob Guerette note, “general evidence about effectiveness should be applied in the context of specific evidence about a place’s crime problem.” For additional information, see Eck JE and Guerette, RT. Place-Based Crime Prevention: Theory, Evidence, and Policy. In DP Farrington and BC Welsh, editors. *The Oxford Handbook of Crime Prevention*. Oxford, U.K.: Oxford University Press; 2012. p. 354-383.
3. For a review of the literature on crime and the built environment, see MacDonald J. Community Design and Crime: The Impact of Housing and the Built Environment. *Crime and Justice*. 2015 September; 44(1):333-383.
4. Welsh BC and Farrington DP. Effects of improved street lighting on crime. *Campbell Systematic Reviews* 2008:13.
5. Welsh BC and Farrington DP. Public Area CCTV and Crime Prevention: An Updated Systematic Review and Meta-Analysis. *Justice Quarterly*. 2009 December; 26(4):716-745.
6. Welsh BC *et al.* Reconceptualizing public area surveillance and crime prevention: Security guards, place managers, and defensible space. *Security Journal*. 2010 October; 23(4):299-319.
7. Bogar S and Beyer KM. Green Space, Violence, and Crime: A Systematic Review. *Trauma, Violence, & Abuse*. 2016 April;17(2):160-171.
8. Lorenc T *et al.* Environmental interventions to reduce fear of crime: systematic review of effectiveness. *Systematic Reviews*. 2013 May;2(30).
9. For a discussion of the ways surveillance measures may increase crime, see Welsh BC *et al.* Effectiveness and Social Costs of Public Area Surveillance for Crime Prevention. *Annual Review of Law and Social Science*. 2015 November;11:111-130.
10. For the purposes of this review, we use the definition of built environment developed by the American Academy of Pediatrics, available from: <http://pediatrics.aappublications.org/content/123/6/1591>
11. Clarke RV. Introduction. In Clarke RV, editor. *Situational Crime Prevention: Successful Case Studies*. 2nd ed. Monsey, N.Y.: Criminal Justice Press; 1997. p. 1-45.
12. Newman O. Creating Defensible Space. U.S. Department of Housing and Urban Development, Office of Policy Development and Research. 1996 April. Available from: <https://www.huduser.gov/publications/pdf/def.pdf>
13. Authors of this Rapid Evidence Review calculated this AMSTAR score using “A Measurement Tool to Assess Systematic Reviews” AMSTAR Checklist available from: http://amstar.ca/Amstar_Checklist.php
14. For a description of the tool see National Collaborating Centre for Methods and Tools. *Quality Assessment Tool for Quantitative Studies*. Hamilton, ON: McMaster University; 2008. (Updated 13 April, 2010) Available from: <http://www.nccmt.ca/resources/search/14>