

New Urbanism, Crime and the Suburbs: A Review of the Evidence

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ABSTRACT *Sustainability now influences government policy in the UK, Australia and USA and planning policy currently advocates high density, mixed-use residential developments in 'walkable', permeable neighbourhoods, close to public transport, employment and amenities. This clearly demonstrates the growing popularity, influence and application of New Urbanist ideas. This article reviews the criminological research relating to New Urbanism associated with the three key issues of permeability, rear laneway car parking and mixed-use development. These key issues are discussed from an environmental criminology perspective and challenge New Urbanist assumptions concerning crime. The article proposes that crime prevention through environmental design (CPTED) and its crime risk assessment model represents a valuable tool for New Urbanists to utilise to reduce opportunities for crime and tackle fear of crime in the community. Recommendations for future research and collaboration are discussed.*

新都市化、犯罪和城郊：评述

可持续性问题的影响如今影响着英国、澳大利亚和美国的政府决策，目前的规划政策都讲究高密、多功能的住宅区，需要步行可达、易于进入，靠近公共交通、就业和生活设施。显然，新都市化的理念越来越深入人心，影响渐大，应用渐广。

本文从三个重要方面——渗透性、后街停车和多功能——对与新都市化相关的犯罪学研究进行评述，从环境犯罪学的角度探讨这三个方面，并对新都市化关于犯罪的观点提出质疑。本文指出，通过环境设计制止犯罪（CPTED）及其犯罪风险评估模式，是新都市化主张者的法宝，他们以此降低犯罪的可能性，减少社区对犯罪的担忧。文中还讨论了对将来研究与合作的提议。

KEY WORDS: New Urbanism, crime, residential suburbs, environmental criminology, permeability, crime prevention through environmental design (CPTED)

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Introduction

In the UK, USA and Australia government policy advocating high density, mixed-use residential developments in 'walkable', permeable neighbourhoods, close to public transport, employment and amenities demonstrates the growing popularity and influence of New Urbanist ideas (Commonwealth of Australia, 1995; DETR, 1998; Office of the Deputy Prime Minister, 2004; American Planning Association, 2007).

In Australia, national guidance supporting New Urbanism is provided by the Australian Model Code for Residential Development (AMCORD) (Commonwealth of Australia, 1995). In Western Australia (WA) for example, *Liveable Neighbourhoods* (WAPC, 2004a) is the government's preferred tool for achieving sustainability in urban design and was established to guide the design and assessment of structure plans and subdivisions throughout the state. The principles are based firmly upon New Urbanist thinking and unreservedly promote walkable neighbourhoods and highly permeable residential layouts.

Armitage (2007) argues that the origins of the policy shift towards greater permeability reside in the *Agenda 21* document from the Rio Earth Summit in 1992 (United Nations Conference on Environment and Development, 1992). This promoted sustainability and the idea of encouraging people to walk and cycle, rather than drive their cars, thereby reducing congestion and pollution. New Urbanist ideas can be traced to a broad range of publications including (but not limited to): Lynch (1960), Jacobs (1961), Bentley *et al.* (1985), Duany and Plater-Zyberk (1992), Calthorpe (1993) and Fulton (1996).

The current support for New Urbanism rests upon its claims to address many of the current 'sustainability' issues facing society including: urban sprawl, car dependence, congestion, pollution, walkability, community isolation and obesity, underpinned by 'slick' professional marketing and promotional campaigns.

New Urbanism promotes compact, pedestrian-friendly, mixed-use residential developments close to amenities and public transport. It is claimed that such designs reduce crime by increasing opportunities for surveillance, encouraging walking and social interaction, and promoting a sense of community and social control (CNU, 2001). Plater-Zyberk (1993, p. 12) comments that "We believe that the physical structure of our environment can be managed and that controlling it is the key to solving numerous problems confronting government today—traffic congestion, pollution, financial depletion, social isolation, and yes, even crime."

The Charter for New Urbanism (CNU, 2001) remarks that "the revitalisation of urban places depends on safety and security", however, crime does not feature as a significant issue within the Charter, or in the literature of New Urbanism. In the light of the growing popularity of New Urbanism, this shortfall requires inspection.

Significantly, a body of research in the field of criminology, known as environmental criminology, challenges several of the assumptions of New Urbanism (Brantingham & Brantingham, 1981, 1991, 1998). In their recent text *Crime Prevention and the Built Environment*, Schneider and Kitchen (2007) present criminological evidence and discuss the key contradictions that exist between New Urbanism and the crime prevention literature. This article provides additional evidence from environmental criminology and specifically discusses these issues as they relate to suburban residential settings. The crime prevention dimensions of New Urbanism are discussed along with the criminological literature concerning permeability, rear laneway car parking and mixed-use development in residential suburbs. The article extends the review by Schneider and Kitchen (2007)

by suggesting that the crime prevention through environmental design (CPTED) process and its crime risk assessment model offers a useful tool for New Urbanists to consider.

A discussion of environmental criminology is provided to highlight some inconsistencies (not well known) with the literature of New Urbanism, which may have significant and far-reaching implications.

Environmental Criminology

Environmental criminology has its origins in 19th-century studies of ‘dangerous places’ (e.g. Mayhew, 1862). Subsequently, urban sociologists at the ‘Chicago School’ mapped the location of offenders (Park *et al.*, 1925) although the study of the location of offences (Schmid, 1960) received little attention until victimisation studies in the 1960s and 1970s shifted the focus (Brantingham & Brantingham, 1975). The work of Lynch (1960), Jacobs (1961), Angel (1968) and Jeffery (1971) popularised the idea that urban design could influence criminality. Further studies focused upon the ‘geography’ of crime (e.g. Harries, 1974; Pyle, 1974), and the fear of crime (e.g. Garofalo, 1981; Smith, 1984) and the academic discipline of ‘environmental criminology’ gradually evolved.

Environmental criminology is the study of crime as it relates to particular locations, and to the way that individuals shape their activities by place-based factors. Brantingham and Brantingham (1993) have observed how planning decisions help shape both the character and level of crime (Brantingham & Brantingham, 1981, 1984, 1991, 1998; Fowler, 1987; Brantingham *et al.*, 1990). The potential impact of crime and the fear of crime on our neighbourhoods and cities, therefore “deserve the full attention of planners” (De Frances & Titus, 1993, p. 190).

Brantingham and Brantingham (1981) argue that there are four dimensions to any crime: the law, the offender, the target and the location and environmental criminology is concerned predominantly with location. These ideas are underpinned by two related crime opportunity theories and provide an alternative perspective from which to evaluate New Urbanist thinking.

Firstly, ‘rational choice theory’ (Cornish & Clarke, 1986) asserts that most opportunistic offenders are rational in their decision-making and recognise, evaluate and respond to environmental cues. These relate to the perceived risk, reward and effort associated with the offence and environmental factors within the built environment are an integral part of this decision-making process.

Secondly, ‘routine activities theory’ argues that for a crime to take place, there must be a motivated offender, a suitable target and the absence of capable guardians (Cohen & Felson, 1979; Felson, 1987). Like most citizens, offenders have routine daily activities (work/school, visiting friends, shopping and entertainment) during which they may discover or search for potential targets (e.g. Maguire, 1982). These routine activities and travel routes form the ‘awareness space’ (Brantingham & Brantingham, 1984) of the offender (see Figure 1). Indeed, “All people, including those who commit crime, develop an awareness space ... [from which] crime targets are usually picked” (Brantingham & Brantingham, 1993, p. 10).

More permeable streets mean more access for all citizens (including potential offenders) and consequently this increases opportunities for crime (Ekblom, 1995). By restricting access to areas there are fewer opportunities for potential criminals to be present within

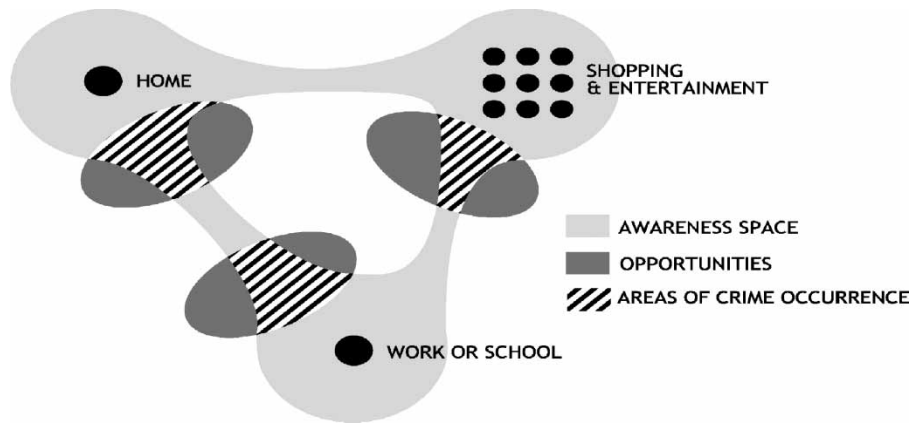


Figure 1. Awareness spaces—routine activities theory. *Source:* Adeane (2007) adapted from Brantingham and Brantingham (1981).

an area searching for targets and it allows locals to readily distinguish residents from non-residents.

In terms of street networks, Rengert (1988, p. 21) argues, "... the relative magnitude of an opportunity is proportional to its relative degree of accessibility which will partially determine its probability of being exploited". Walkable and accessible streets can therefore provide increased opportunities for crime, particularly if they are located in low density suburbs, where 'eyes on the street' are reduced.

Crimes against the person predominantly take place at home or in and around drinking establishments (e.g. Baldwin & Bottoms, 1976; Rand, 1986). Property crimes are concentrated at or near major personal attractors, where people congregate (Brantingham & Brantingham, 1993). These locations include the home, shopping centres, work/school, well-known sports areas, parks and recreation centres, transport nodes and along the routes that connect these nodes/attractors. This perspective is not generally known to most New Urbanists and planners and has increased importance given the trend to develop mixed-use, vibrant communities close to amenities and public transport.

New Urbanists argue that cul-de-sac layouts are car-oriented and pedestrian-hostile, compared to grid layouts, which enhance walkability by virtue of their permeable configuration. This walkability promotes a stronger sense of community, more social interaction and thereby lower levels of crime than is currently experienced. New Urbanism generally advocates the use of the grid street layout in preference to the cul-de-sac (Morrow-Jones *et al.*, 2004) which implies that car parking is hidden from view, often in rear lanes (Martin, 2001).

The Congress for the New Urbanism's (CNU) third principle relating to 'Block, Street and Building' asserts the importance of safety and security without specific advice on how this might be achieved. The Charter states: "Streets and squares should be safe, comfortable, and interesting to the pedestrian. Properly configured, they encourage walking and enable neighbors to know each other and protect their communities" (CNU, 2001). There is a clear commitment to interconnected networks of streets and New Urbanists view permeability as a positive design attribute since allegedly, it promotes walking and social interaction.

However, permeability is considered in somewhat negative terms by the police (Armitage, 2007), particularly in the UK, and international research in the field of crime prevention challenges this central tenet of New Urbanism. Indeed, permeability has been identified as “the level of intrusion difficulty” for an area (Schneider & Kitchen, 2007, p. 47).

According to the Charter for New Urbanism, “the design of streets and buildings should reinforce safe environments, but not at the expense of accessibility and openness” (CNU, 2001). Conversely, a typical perspective adopted by police guidance reads “access control recognises that safer places use well defined routes, spaces and entrances to provide convenient and safe movement without compromising security” (Queensland Police, 2006). Clearly, such perspectives are problematic and raise the issue of confused and contradictory policy guidance.

Notwithstanding the many laudable goals of New Urbanism, the crime prevention dimensions to this theory are limited and lack both critical discussion and systematic evaluation. This absence of a crime dimension may relate in part, to the fact that “New Urbanism strives for a kind of utopian idea” (Fulton, 1996, p. 7); where crime is presumably not a problem. Indeed, Schneider and Kitchen (2007, p. 52) observe, “. . . its [New Urbanism’s] rhetoric and aesthetically pleasing results have not, to date, demonstrated much crime prevention substance based on evidence”.

The promotion of permeability, rear car parking and mixed-use development within New Urbanist theory, is challenged when viewed from within an environmental criminological paradigm. It is argued that crime has not been effectively considered within New Urbanist theoretical frameworks and that knowledge of environmental criminology and CPTED risk assessments and principles can help refine both the application and theoretical background for New Urbanism. Lewis Mumford (1926, p. 282) wrote that one of the challenges for planning was “to bring to the foreground those things that have been left out of the current scheme of life and thought”. It is argued here that knowledge of environmental criminology is largely absent within New Urbanist ideas and although crime has not been ‘left out’ per se, New Urbanism could benefit substantially from engaging with this perspective and embracing aspects of CPTED in order to foster safer and more sustainable communities.

New Urbanism and Crime

Research has been conducted into many of the claims made by New Urbanists such as: reducing travel distances and times, increasing public transport use and reducing car dependency and promoting higher levels of physical activity and lower levels of obesity. A recent paper reviews this evidence and challenges many of the assumptions made by New Urbanism (Cozens & Hillier, 2008). However, few studies have investigated New Urbanism and the issue of crime (Schneider & Kitchen, 2007).

Several commentators (e.g. De Frances & Titus, 1993; Brantingham & Brantingham, 1998) have observed a lack of consideration of crime issues within most planning processes and although planning for crime prevention is growing in popularity and importance (Schneider & Kitchen, 2002, 2007; Cozens *et al.*, 2005) some significant and controversial issues require critical inspection. Relevant to planning generally and New Urbanism specifically, these include permeability, mixed-use development and car parking in rear lanes.

Jane Jacobs’ ideas in *The Death and Life of Great American Cities* (1961) underpin much of New Urbanist thinking. However, notwithstanding a lack of scientificism

(common to social research in this era), her observations were singularly focused on inner city areas of large American cities in the 1950s—not residential suburbs. However, until recently, New Urbanism has focused largely on suburban applications, not the city (Bohl, 2000).

Additionally, ‘eyes on the street’ was a very different phenomenon in a large 1950s inner city area than it is in residential suburbs in the early 21st century. Interior (domestic) and exterior (public) space was used in markedly different ways (Moore, 2000). Levels of car usage were significantly lower and citizens walked to schools, shops and to visit relatives (these then lived nearby). Today, interior spaces within the home are dominant, and are commonly filled with electronic multimedia technologies and entertainment (also providing more opportunities for crime). The interior is now defined as the ‘leisure action space’ for both adults and children. This has led to exterior/public spaces being less used and this withdrawal has led to them being re-labelled and re-defined, often as ‘dangerous’ spaces.

Changes in society, such as increased numbers of women in the labour force and the decline of the nuclear family (Putnam, 1995) mean that many neighbourhoods, where residents (often both parents) are at work for most of the day are effectively devoid of ‘eyes on the street’ and ‘self-policing’ potential.

Furthermore, Jacobs’ interest was in ‘personal attacks’ (Poyner, 2006) but the crime prevention concept of ‘eyes on the street’ has since been applied to all types of crime. Significantly, in *The Death and Life of Great American Cities*, Jacobs (1961, p. 26) states: “I hope no reader will try to transfer my observations into guides as to what goes on in towns, or little cities, or in suburbs which are still suburban”. A half a century later, this is precisely what New Urbanism is promoting and current planning policy around the world appears to be adopting. The criminological literature specifically relating to permeability, rear laneway parking and mixed-use development are discussed below.

New Urbanism—Crime and Permeability

Over the last 30 years research has repeatedly found that permeability increases opportunities for crime. Rubenstein *et al.* (1980) reported that heavy pedestrian flows and intense vehicular traffic were associated with higher victimisation rates. A study by Beavon *et al.* (1994) confirmed these findings and asserted that the shape of traffic intersections also influenced crime, with isolated cul-de-sacs being least accessible to crime and intersections the most accessible. Furthermore, corner houses (more frequent in grid layouts) have been found to be more vulnerable to burglary (Taylor & Nee, 1988; Hakim *et al.*, 2001).

A controversial report, *Designing Out Crime – The Cost of Policing New Urbanism* (Knowles, 2006) claims that policing costs for a 4500 housing development would be 3 times higher for permeable New Urbanist designs as compared with the non-permeable cul-de-sac layouts promoted by the UK Association of Chief Police Officer’s (ACPO) Secured By Design scheme. This report also asserts that reported crime is 5 times higher in the New Urbanist layouts investigated (Town *et al.*, 2003; Town & O’Toole, 2005). Furthermore, six of the first seven reasons burglars stated for selecting a particular property were related to access routes (Town *et al.*, 2003). However, some have argued that many of these layouts were not actually New Urbanist in theory, character or design (Steuteville, 2003).

The UK's Secured By Design scheme, which largely promotes the use of non-permeable cul-de-sac layouts, has been evaluated and results indicate that such developments reduce both crime and fear of crime (for a review see Cozens *et al.*, 2007). Modifying grid layouts using road closures has been used as a successful crime prevention strategy (Matthews, 1992; Newman, 1995, Lasley, 1998; Zavoski *et al.*, 1999) and this effectively converts the grid into a cul-de-sac. Sheard (1991) studied children's pathways in a Vancouver (Canada) suburb, finding that the introduction of new pedestrian pathways connecting the ends of cul-de-sacs led to increases in crime, since the modifications effectively created through roads for both residents and others.

Conversely, research by Hillier and Shu (2000) found that incidents of burglary were higher on more isolated properties on cul-de-sacs. However, Town *et al.* (2003) argue that many of the cul-de-sacs in the study were 'leaking' and possessed pedestrian access ways, which effectively made them through streets—at least for pedestrians.

A US Department of Justice (USDOJ) Report (Clarke, 2002) cites numerous examples of studies (Bevis & Nutter, 1978; White, 1990; Beavon *et al.*, 1994; Wagner, 1997; Bowers *et al.*, 2005), which indicate that reducing connectivity reduces crime.

Three recent studies confirm these findings (Brooke, 2004; Yang, 2006; Armitage, 2007). Brooke (2004) studied a New Urbanist development in Bradford, UK, reporting burglary rates of almost 20 times the national average. Yang (2006) analysed some 3000 incidents of recorded residential burglary across a range of street layouts finding reduced burglary rates for properties located on less permeable layouts such as cul-de-sacs. Furthermore, Armitage (2007) studied crime on 50 housing estates concluding that "properties positioned within permeable estates are more vulnerable to victimization" (p. 101).

New Urbanism, Crime and Residential Parking in Rear Laneways

Linked to the permeability debate is the issue of rear laneways and the potential access that this may provide for opportunities to commit crime. The block unit of the grid provides protection from access to rear gardens and potential access by burglars and is sometimes referred to as the 'island layout'. Here, roads surround the entire site and back gardens lie within the interior of the development, accessible only to residents. However, rear lanes and alleyways can significantly increase the vulnerability of this relatively 'secure' layout.

Rear laneways are commonly used in New Urbanism (Martin, 2001) and are often used to remove cars from view. However, they also provide offenders with easy, concealed and unchallenged access to the rear of properties and to vehicles that may not be routinely overlooked by residents. The British Crime Survey indicated that more than half of all domestic burglaries are initiated from the rear of the property (Budd, 1999). Studies suggest that laneways (at least in the UK) are synonymous with crime, fear of crime, litter and anti-social behaviour (Tilley *et al.*, 1999; Johnson & Loxley, 2001). Crucially, much car crime is linked to the location and proximity of parking areas in relation to the property. Garages/driveways located within the curtilage of the building which are visible to residents from the property have obvious advantages in comparison with car parking areas hidden from view in rear alleyways for example. According to Town *et al.* (2003), the safest location for a parked vehicle is in a private garage within the boundary of the property. The risk of theft increases significantly for cars parked in the driveway (16 times more vulnerable), in the street outside the home (52 times more vulnerable) and in public car parks (200 times more vulnerable). In the absence of specific evidence, the author suggests

that the vulnerability of cars parked in rear lanes would be significant, particularly if adjacent buildings (with appropriate activity) did not overlook the space. The vulnerability of cars parked in rear lanes may be similar to that of cars parked in public car parks.

Guttery (2002) highlights the potential crime problems associated with alleyways in providing access to the rear of properties and urges New Urbanists to consider traditional on-street parking as an option. Optimising surveillance of rear lanes using the passive surveillance provided by 'studio' apartments overlooking such lanes is one solution that has been used to reduce opportunities for crime in this context.

New Urbanism, Crime and Mixed Uses in Residential Areas

Mixed-use development is an approach used to economically and socially rejuvenate an area. In theory, mixed uses provide more pedestrian activity and 'eyes on the street' over longer time periods which discourages criminal activity. However, some research reveals that mix-use development in residential areas is "*not totally benign*" (Schneider & Kitchen, 2007, p. 51).

Brantingham and Brantingham (1993) highlight the concentration of crime at personal attractors such as the home, work/school, transport nodes and shopping centres, parks and recreation centres, and on the routes that link these 'awareness spaces'. Research by Davison and Smith (2003) established that crime was more frequent in accessible areas with commercial land use. Shopping centres, storage places, schools, service stations and restaurants tend to attract criminals as well as legitimate customers to the area. The routine activities of the community (including potential offenders) will therefore affect the incidence of crime in and around these nodes of activity.

Studies have suggested homogenous residential environments exhibit lower rates of crime than areas with mixed uses (Greenberg *et al.*, 1982; Greenberg & Rohe, 1984) challenging the 'mixed use equals safety' assumption held by New Urbanists. Residential burglary has been found to be more frequent in properties close to commercial areas (Dietrick, 1977) and a study by Wilcox *et al.* (2004) revealed businesses in residential areas exhibited an increased risk of burglary. Land-use patterns will therefore also influence the routine activities of the community and potentially influence opportunities for crime.

Yang's study (2006) found that burglaries (including repeat victimisations) are more likely to be found in mixed-use sites. Clearly, mixed use is 'not totally benign' and other strategies to reduce opportunities for crime may need to be considered to promote safety. Schneider and Kitchen (2007, p. 52) observe that there is "a growing body of literature arguing that land-use heterogeneity has a price relative to the incidence of certain types of crime".

Having discussed these three key issues of New Urbanism from an environmental criminology perspective, the article explores CPTED and its crime risk assessment model as potential tools for enhancing the safety and security of residents and users of mixed-use, permeable New Urbanist neighbourhoods.

CPTED and New Urbanism

CPTED is "*the proper design and effective use of the built environment [which] can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life*" (Crowe, 2000, p. 46). This involves using planning and design to promote territoriality and a 'sense of ownership', maximise opportunities for surveillance, control access, support

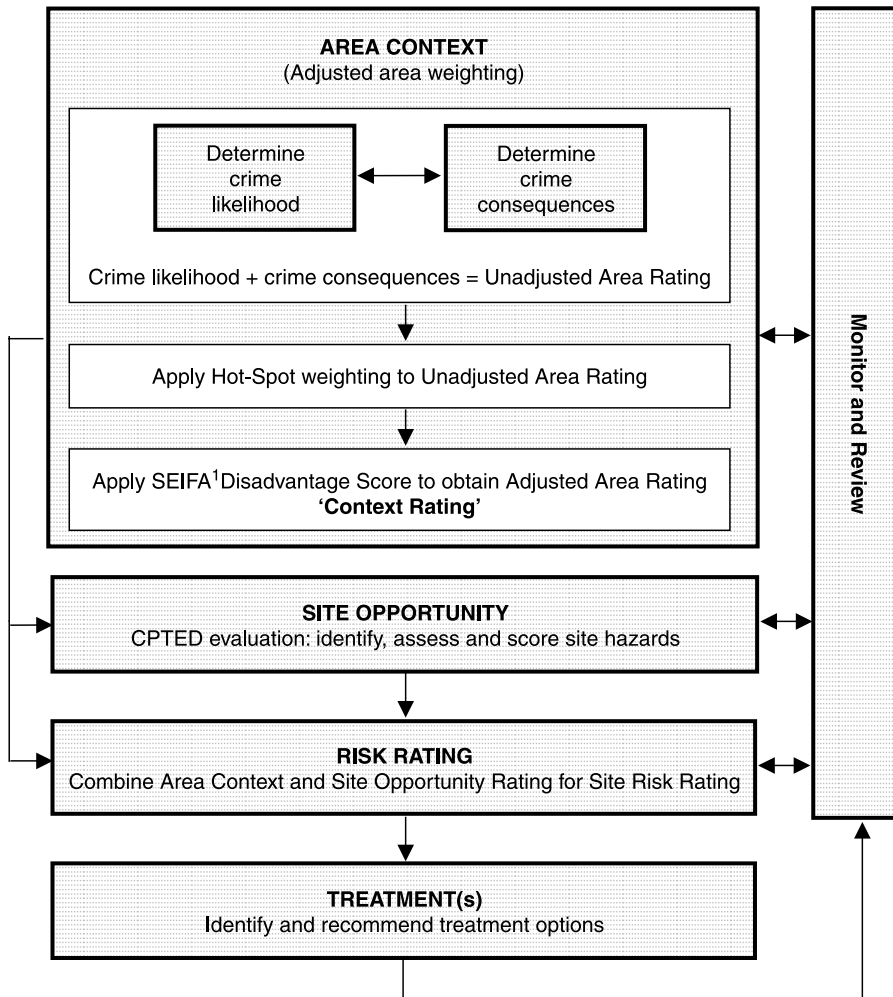
activities, maintain and manage the built environment and to harden targets via security/technology. The ideas of Jacobs (1961), Angel (1968), Jeffery (1971) and Newman's 'Defensible Space' (1973) all underpin CPTED which asserts that urban design and land use is widely associated with enhancing or reducing opportunities for crime. Although the term was originally coined by Jeffery (1971), CPTED is predominantly based on the work of Newman (Schneider & Kitchen, 2007, p. 24).

Following early criticisms (see Cozens *et al.*, 2001, for a review), CPTED has evolved into a robust subdivision within criminology (Brantingham & Brantingham, 1975). Since the presence of surveillance opportunities does not necessarily ensure that surveillance is taking place, CPTED has been refined to incorporate a social dimension to ensure that urban space does not become 'undefended' (Merry, 1981) by residents. As a result, Second Generation CPTED (Saville & Cleveland, 1997) seeks to engender positive social activities and diversity to encourage residents to take ownership of space and to take advantage of natural surveillance. This concept promotes neighbourhood commitment and community culture, cohesion and connectivity (Saville & Cleveland, 2003a,b). Second Generation CPTED uses risk assessments, socio-economic and demographic profiling (Saville, 1996; Plaster Carter, 2002) as well as active community participation (Sarkissian *et al.*, 1997; Plaster Carter, 2002).

On a global level, the United Nations Human Settlements Programme lists "changing environments that are conducive to crime" by using CPTED, as one of its implementation tools to achieve "*Safer Cities*" (UN Habitat, 2007). CPTED (also known as Designing Out Crime) is increasingly being practiced and refined as part of local, state and national government policy (Schneider & Kitchen, 2002, 2007; Cozens, 2005). These policies potentially conflict with New Urbanism and current planning policy, creating uncertainty for planning practitioners. Schneider and Kitchen (2002, p. 225) argue it is about choice and that "although there is a clear clash of ideas here, that does not mean that they cannot co-exist". Responses to these conflicts therefore "lie in context and balance" (Schneider & Kitchen, 2007, p. 17) which can be more effectively achieved by engaging with the environmental criminological literature and in applying CPTED as a local and contextual process rather than as a set of generic design principles.

A fundamental aspect to CPTED, which is often overlooked in practice, is the need to conduct a crime risk assessment before suggesting any CPTED design modifications. Environmental Impact Statements are used to assess and mitigate the impact of development on the environment and some have highlighted the requirement for crime impact assessments (Olasky, 2004) to promote healthy communities. It is argued that the CPTED crime risk assessment tool can be useful in assessing crime risk associated with new developments, including those based on New Urbanist thinking. Figure 2 illustrates a model, adapted by McCamley (2002, p. 27). The model "employs qualitative and quantitative measures of the physical and social environment to create a contextually adjustable approach for the analysis and treatment of crime".

This instrument uses local crime data to assess the likelihood and consequences of crime in a specified area. A police intelligence 'hot spot adjustment' is then applied to focus the crime analysis to the area surrounding the site. The model applies the Social Economic Index For Areas (SEIFA), which is an index developed for communities throughout Australia by the Australian Bureau of Statistics. This rating includes socio-economic indicators such as levels of educational attainment, occupation structure rates unemployment, levels of home ownership and income and is applied to the area to produce a 'context rating' (see Figure 2).



Note: 1. SEIFA is a Socio-Economic Index For Areas developed by the Australia Bureau of Statistics.

Figure 2. CPTED crime risk evaluation matrix. *Source:* Adapted from McCamley (2002).

The CPTED site analysis then assesses the design and activity management features, scoring the local built environment in terms of its CPTED qualities. These individual scores are combined to produce a site opportunity rating. This rating is then aggregated with the context rating to determine location risk. The final section of the model relates to the identification and recommendation of treatment options, a process which includes active community participation.

However, for many local governments, the application of this model may prove problematic, particularly where liaison between planners and police is not a well-established practice. Collaboration between police and planners is vital and partnerships

can potentially lead initially to the development of simpler and more effective frameworks and to the subsequent refinement of McCamley's model (2002).

Poyner (2006) suggests that the design process requires strategic thinking about the types of crimes most likely to be committed and how design can help deter such crimes. A crime risk assessment model can strengthen this strategic framework and help facilitate worthwhile collaboration between police and planners.

'*Context is everything*' is the motto of the UK's Designing Out Crime Association (www.doca.org.uk) and clearly, the specific local situation is crucial in deciding which types of development are most appropriate. However, New Urbanism's scapegoating of the cul-de-sac as the representation of all of the failings of suburban sprawl (Southworth & Ben-Joseph, 2004) effectively casts it aside as a viable design option. Indeed, Schneider and Kitchen (2007, p. 52) comment how "performance is more important in crime prevention than formulaic style". They also note the importance of context and outcome when applying ideas from one location to another (Schneider & Kitchen, 2007), and transplanting Jacobs' inner city observations (1961) to residential suburbs may not be in context and may not provide the outcomes sought by New Urbanism.

Crucially, permeability and mixed-use development in residential suburbs advocated by New Urbanism might not be as appropriate as first believed. Indeed, if population densities and pedestrian use are not adequate, lower levels of 'eyes on the street' (Jacobs, 1961) may mean that New Urbanism (and current planning policy) could potentially be designing *in* crime, rather than designing *out* crime.

Arguably, with an informed and evidence-based understanding of crime and fear of crime, planning should be able to shape crime positively, rather than negatively. Indeed, Schneider and Kitchen (2007, p. 233) argue: "If planning is about making places better for people, then it has to address those elements that make places problematic for people, and crime and the fear of crime are high up this list." However, in a recent review of the evidence in a criminological text, Armitage (2007, p. 82) argues "Rather than accepting and implementing the findings available, the ensuing years have seen an abundance of confusing and contradictory policy and guidance which have diverted practitioners' and policy makers' attention from the immediate task of reducing crime."

In Australia, planning policy supporting New Urbanism may conflict with the national commitment to CPTED, particularly in the suburbs. Indeed, in WA, it is projected that 375 000 additional new homes will be required by 2031 (WAPC, 2004b) and the preferred typology is the Liveable Neighbourhood design (WAPC, 2004a), based on New Urbanist ideas. However, an environmental criminology perspective suggests that permeable, walkable, mixed-use communities close to amenities may not necessarily deliver the 'utopian social idea' (Fulton, 1996, p. 7) of New Urbanism as effectively or appropriately to less densely populated residential suburbs as it might to vibrant, high density, inner city settings. Looking back, Jacobs' warning (1961) against the application of her observations to small cities, towns and suburbs may well prove to be prophetic.

Conclusions

This review of the environmental criminology literature indicates that more permeable residential street networks are associated with higher levels of crime than less permeable configurations such as cul-de-sacs. Mixed-use developments and parking in rear lanes in suburban residential areas have also been associated with increased levels of crime. This

may have profound implications for New Urbanist developments as they age and community dynamics change over time. Environmental criminology and CPTED can assist in anticipating, reducing and understanding these risks.

Crucially, Brantingham and Brantingham (1998, p. 53) have called for a wider consideration of environmental criminology within planning arguing, “most planning proceeds with little knowledge of crime patterns, crime attractors, crime generators, . . . or the site specific solutions that facilitate or even encourage crime”. This article has reviewed some of this knowledge and presented a criminological perspective for New Urbanists and planners to inspect.

The growing evidence of the ‘malign’ criminogenic effects of permeability, mixed-use development, laneways and rear parking are pertinent to planning and to New Urbanism. Indeed, Schneider and Kitchen (2007, p. 226) comment “. . . the preponderance of empirical evidence shows that gridiron street layouts and mixed uses are often crime facilitators, not inhibitors”.

In view of the literature, the crime dimension cannot be ignored in the development and refinement of both New Urbanism and government planning policy guidance. Indeed, if New Urbanism is to represent a strategy for creating truly sustainable and liveable communities, it must at least consider the evidence relating to crime and the fear of crime in a more systematic manner, thereby balancing more effectively, the diverse issues and needs within the community.

Bothwell *et al.* (1998) accept that increased permeability can lead to increased levels of crime but argue that this is offset by increased social controls derived from increased social interaction. However, for Schneider and Kitchen (2007, p. 52) the issue is not whether the cost of crime is outweighed by other factors, “the issue is whether they, as designers or users, bring this knowledge to the table when making their decisions”. This article has brought some of the issues to the forefront for inspection and reflection. Indeed, one of the reviewers of a previous draft of this article commented “this type of information is far from novel in criminological literature, but that is not to say that it has no value and should not be reviewed within another context”, providing a different perspective for New Urbanism and planning.

Fundamentally, New Urbanism seeks to reduce the effects of urban sprawl and *externalities* such as pollution and congestion, thereby enhancing walkability and sustainability. The issue of crime within urban sustainability has only recently been discussed (Cozens *et al.*, 1999; Du Plessis, 1999; Cozens, 2002, 2007; Dewberry, 2003) and intriguingly, Farrell and Roman (2006) suggest crime is an *externality* of development and argue that crime can also be examined as a form of pollution. Environmental criminology can provide insights relating to crime risk associated with different types of development and land-use patterns and CPTED, as a procedure, can help provide local crime risk assessments and CPTED solutions for specific urban and suburban contexts.

A range of recommendations emerge from this review for New Urbanism and the planning and development professions to consider: firstly, engaging with the existing criminological evidence on urban design and crime will promote more informed decision-making and highlight potentially problematic developments that may be more at risk from crime. Secondly, a systematic review of the evidence relating to crime and permeability, mixed land uses in residential areas and off-street parking in laneways is required. Thirdly, sponsoring a critical review of current policy, practice and performance of permeability, mixed-use development and off-street parking in laneways particularly for lower density residential suburbs will provide additional insights. Promoting inter-agency and

inter-disciplinary collaboration between environmental criminologists and planning professionals is also a worthwhile objective. Fourthly, reviewing the principles of the Charter for New Urbanism to include crime within its framework is arguably a necessary process. Finally, planners should consider operationalising the CPTED process contextually, conducting local crime risk assessments and developing CPTED solutions with the active participation of the local community.

Brantingham and Brantingham (1993, p. 22) argue:

crime is part of our way of living. It is tied to the physical distribution of people and objects, to the routine activity patterns of daily life, and to the ways in which people perceive and use information about the environment.

For planning generally, and New Urbanism specifically, reconciling the criminological evidence within current thinking will be a challenging and ongoing task. Indeed, the question now is what should New Urbanists, planners and policy makers do with this evidence? For Armitage (2007, p. 83) the evidence should “challenge those within the field to confront—as opposed to avoiding—the contentious issues surrounding housing layout and crime reduction”. This article encourages New Urbanism to consider a new perspective in striving to shape their ‘utopian idea’.

References

- Adeane, M. (2007) Personal communication via email 17 February. Drawings produced by Design Design, Perth, Western Australia. Email: Michael@designdesign.com.au
- American Planning Association (2007) Legislation and policy. Available at <http://www.planning.org/policyguides/smartgrowth.htm> (accessed 7 July 2007).
- Angel, S. (1968) Discouraging crime through city planning. Working Paper No. 75, University of California, Berkeley.
- Armitage, R. (2007) Sustainability versus safety: confusion, conflict and contradiction in designing out crime, in: G. Farrell, K. Bowers, S. Johnson & M. Townsley (Eds) *Imagination for Crime Prevention. Crime Prevention Studies Volume 21*, pp. 81–110 (Monsey, NY: Criminal Justice Press).
- Baldwin, J. & Bottoms, A. E. (1976) *The Urban Criminal* (London: Tavistock).
- Beavon, D., Brantingham, P. & Brantingham, P. (1994) The influence of street networks on the patterning of property offenses, in: R. Clarke (Ed.) *Crime Prevention Studies*, Vol. 2 (Monsey, NY: Criminal Justice Press).
- Bentley, I., Alcock, A., Murrain, P., McGlynn, S. & Smith, G. (1985) *Responsive Environments* (London: Architectural Press).
- Bevis, C. & Nutter, J. (1978) *Changing Street Layouts to Reduce Residential Burglary* (Minneapolis: Minnesota Crime Prevention Center).
- Bohl, C. (2000) New urbanism and the city: potential applications and implications for distressed inner-city neighbourhoods, *Housing Policy Debate*, 11(4), pp. 761–797.
- Bothwell, S., Gindroz, R. & Lang, R. (1998) Restoring community through traditional neighbourhood design: a case study of Diggs Town public housing, *Housing Policy Debate*, 9(1), pp. 89–114.
- Bowers, K., Johnson, S. & Hirschfield, A. (2005) Closing-off opportunities for crime: an evaluation of alley-gating, *European Journal on Criminal Policy and Research*, 10(4), pp. 285–308.
- Brantingham, P. & Brantingham, P. (1975) Residential burglary and urban form, *Urban Studies*, 12, pp. 273–284.
- Brantingham, P. & Brantingham, P. (1981) *Environmental Criminology* (Beverly Hills: Sage).
- Brantingham, P. & Brantingham, P. (1984) *Patterns in Crime* (New York: Macmillan).
- Brantingham, P. & Brantingham, P. (1991) *Environmental Criminology* (Prospect Heights, IL: Waveland Press).
- Brantingham, P. & Brantingham, P. (1998) Environmental criminology: from theory to urban planning practice, *Studies on Crime and Crime Prevention*, 7(1), pp. 31–60.
- Brantingham, P., Brantingham, P. & Wong, P. (1990) Malls and crime: a first look, *Security Journal*, 1(3), pp. 175–181.

- Brantingham, P. J. & Brantingham, P. L. (1993) Nodes, paths and edges: considerations on the complexity of crime and the physical environment, *Journal of Environmental Psychology*, 13, pp. 3–28.
- Brooke, M. (2004) Mallard Court, Bradford. Paper presented at the Architectural Liaison Officers' Conference, Leeds, UK.
- Budd, T. (1999) Burglary of domestic dwellings: findings from the 1998 British Crime Survey, *Home Office Statistical Bulletin 4/99* (London: Home Office).
- Calthorpe, P. (1993) *Ecology, Community and the American Dream* (Princeton, NJ: Princeton Architectural Press).
- Clarke, R. (2002) Closing streets and alleys to reduce crime: should you go down this road?, *Problem-Oriented Guides for Police Response Guides Series No. 2* (Washington, DC: US Department of Justice Office of Community Oriented Policing Services).
- CNU (Congress for the New Urbanism) (2001) Charter of the New Urbanism. Available at http://cnu.org/sites/files/charter_english.pdf (accessed 2 July 2007).
- Cohen, L. & Felson, M. (1979) Social change and crime rate trends: a routine activity approach, *American Sociological Review*, 44, pp. 588–608.
- Commonwealth of Australia (1995) *AMCORD: A National Resource Document for Residential Development*, (Commonwealth of Australia, Department of Housing and Regional Development).
- Cornish, D. & Clarke, R. (1986) *The Reasoning Criminal* (New York: Springer-Verlag).
- Cozens, P. (2002) Sustainable urban development and crime prevention through environmental design for the British city; towards an effective urban environmentalism for the 21st century, *Cities: The International Journal of Urban Policy and Planning*, 19(2), pp. 129–137.
- Cozens, P. (2005) Designing out crime—from evidence to action. Paper presented at Delivering Crime Prevention: Making the Evidence Work, Carlton Crest Hotel, Sydney, 21–22 November. Available at <http://www.aic.gov.au/conferences/2005-cp/cozens.html>
- Cozens, P. (2007) Planning, crime and urban sustainability, in: A. Kungolas, C. Brebbia & E. Beriatos (Eds) *Sustainable Development and Planning III. Volume 1, WIT Transactions on Ecology and the Environment*, pp. 187–196 (Southampton: WIT Press).
- Cozens, P., Hillier, D. & Prescott, G. (1999) The sustainable and the criminogenic. The case for new-build housing projects in Britain, *Property Management*, 17(3), pp. 252–261.
- Cozens, P., Pascoe, T. & Hillier, D. (2007) Critically reviewing the theory and practice of secured-by-design for residential new-build housing in Britain, in: R. Mawby (Ed.) *Burglary—Series: International Library of Criminology, Criminal Justice and Penology*, 2nd Series (Abingdon: Ashgate).
- Cozens, P., Saville, G. & Hillier, D. (2005) Crime prevention through environmental design (CPTED): a review and modern bibliography, *Journal of Property Management*, 23(5), pp. 328–356.
- Cozens, P. M. & Hillier, D. (2008) The shape of things to come: new urbanism, the grid and the cul-de-sac. *International Planning Studies*, 13(1), pp. 51–73.
- Cozens, P. M., Hillier, D. & Prescott, G. (2001) Crime and the design of residential property. Exploring the theoretical background, *Property Management*, 19(2), paper 1 of 2.
- Crowe, T. (2000) *Crime Prevention Through Environmental Design: Applications of Architectural Design and Space Management Concepts*, 2nd edn (Oxford: Butterworth-Heinemann).
- Davison, E. & Smith, W. (2003) Exploring accessibility versus opportunity crime factors. *Sociation Today: The Journal of The North Carolina Sociological Association*, 1(1) Available at <http://www.ncsociology.org/sociationtoday/raleigh.htm>
- De Frances, C. & Titus, R. (1993) The environment and residential burglary outcomes, *Proceedings of the International Seminar on Environmental Criminology and Crime Analysis* (Coral Gables: Florida Criminal Justice Executive Institute).
- DETR (1998) *Places, Streets and Movement. A Companion Guide to Design Bulletin 32: Residential Roads and Footpaths* (London: HMSO).
- Dewberry, E. (2003) Designing out crime: insights from eco-design, *Security Journal*, 16, pp. 51–62.
- Dietrick, B. (1977) The environment and burglary victimisation in a metropolitan suburb. Paper presented at the Annual Meeting of the American Society of Criminology, Atlanta, USA.
- Du Plessis, C. (1999) The links between crime prevention and sustainable development, *Open House International*, 24(1), pp. 33–40.
- Duany, A. & Plater-Zyberk, E. (1992) The second coming of the American small town, *WQ*, Winter pp. 19–48.
- Eklblom, P. (1995) Less crime by design, *Annals of the American Academy of Political and Social Science*, 539, pp. 114–129.

- Farrell, G. & Roman, A. (2006) Crime as pollution: proposal for market-based incentives to reduce crime externalities, in: K. Moss & M. Stephens (Eds) *Crime Reduction and the Law* (London: Routledge Press).
- Felson, M. (1987) Routine activities and crime prevention in the developing metropolis, *Criminology*, 25, pp. 911–931.
- Fowler, E. (1987) Street management and city design, *Social Forces*, 66, pp. 365–389.
- Fulton, W. (1996) *The New Urbanism: Hope or Hype for American Communities?* (Cambridge, MA: Lincoln Institute of Land Policy).
- Garofalo, J. (1981) Crime and the mass media: a selective review of research, *Journal of Research in Crime and Delinquency*, 18(2), pp. 319–350.
- Greenberg, S. & Rohe, W. (1984) Neighborhood design and crime: a test of two perspectives, *Journal of the American Planning Association*, 50, pp. 48–60.
- Greenberg, S., Rohe, W. & Williams, J. (1982) Safety in urban neighbourhoods: a comparison of physical characteristics and informal territorial control in high and low crime neighbourhoods, *Population and Environment*, 5(3), pp. 141–165.
- Guttery, R. (2002) The effects of subdivision design on housing values: the case of alleyways, *Journal of Real Estate Research*, 23(3), pp. 265–273.
- Hakin, S., Rengert, G. & Shachamurove, Y. (2001) Target search of burglars: a revisited economic model, *Papers in Regional Science*, 80, pp. 121–137.
- Harries, K. D. (1974) *The Geography of Crime and Justice* (New York: McGraw-Hill).
- Hillier, B. & Shu, S. (2000) Crime and urban layout: the need for evidence, in: S. Ballintyne, K. Pease & V. McLaren (Eds) *Secure Foundations: Key Issues in Crime Prevention, Crime Reduction and Community Safety*, pp. 224–248 (London: Institute of Public Policy Research).
- Jacobs, J. (1961) *The Death and Life of Great American Cities* (London: Jonathon Cope).
- Jeffery, C. (1971) *Crime Prevention through Environmental Design* (Beverly Hills: Sage).
- Johnson, S. & Loxley, C. (2001) Installing alley-gates: practical lessons from burglary prevention projects, *Home Office Briefing Note 2/01* (London: Home Office).
- Knowles, P. (2006) Designing out crime - the cost of policing new urbanism. Available at <http://www.americandreamcoalition.org/safety/policingnu/policingnu.html> (accessed 10 July 2006).
- Lasley, J. (1998) *Designing Out Gang Homicides and Street Assaults* (Washington, DC: US National Institute of Justice).
- Lynch, K. (1960) *The Image of the City* (Cambridge, MA: MIT Press).
- Maguire, M. (1982) *Burglary in a Dwelling* (London: Heinemann).
- Martin, M. (2001) The question of alleys, revisited, *Urban Design International*, part 1 6(2), pp. 76–92.
- Matthews, R. (1992) Developing more effective strategies for curbing prostitution, in: R. Clarke (Ed.) *Situational Crime Prevention: Successful Case Studies* (New York: Harrow and Heston).
- Mayhew, H. (1862) *London Labour and the Condition of the London Poor* (London: Griffin, Bohn).
- McCamley, P. (2002) Minimising subjectivity: a new risk assessment model for CPTED, *The Journal of the International Crime Prevention through Environmental Design Association*, 1(1), pp. 25–34.
- Merry, S. (1981) Defensible space undefended: social factors in crime prevention through environmental design, *Urban Affairs Quarterly*, 16(3), pp. 397–422.
- Moore, S. (2000) *Media and Everyday Life in Modern Society* (Edinburgh: Edinburgh University Press).
- Morrow-Jones, H., Irwin, E. & Roe, B. (2004) Consumer preference for neotraditional neighbourhood characteristics, *Housing Policy Debate*, 15(1), pp. 171–202.
- Mumford, L. (1926) *The Golden Day* (New York: Boni and Liverlight).
- Newman, O. (1973) *Defensible Space People and Design in the Violent City* (London: Architectural Press).
- Newman, O. (1995) Defensible space: a new physical planning tool for urban revitalization, *Journal of the American Planning Association*, 61, pp. 2149–2155.
- Office of the Deputy Prime Minister (2004) *Places: The Planning System and Crime Prevention* (London: Office of the Deputy Prime Minister, Home Office).
- Olasky, P. (2004) Crime impact statements, *Columbia Journal of Law and Social Problems*, 37(3), pp. 329–358.
- Park, R. E., Burgess, E. W. & McKenzie, D. (1925) *The City* (Chicago: University of Chicago Press).
- Plaster Carter, S. (2002) Community CPTED, *The Journal of the International Crime Prevention Through Environmental Design Association*, 1(1), pp. 15–24.
- Plater-Zyberk, E. (1993) Five qualities of good design. *ANY*, No. 1, July/August. p. 12
- Poyner, B. (2006) *Crime Free Housing in the 21st Century* (London: Jill Dando Institute of Crime Science, University College).

- Putnam, R. D. (1995) Bowling alone: America's declining social capital, *Journal of Democracy*, 6(1), pp. 65–78.
- Pyle, G. F. (1974) *The Spatial Dynamics of Crime* (Chicago: University of Chicago).
- Queensland Police (2006) Draft CPTED guidelines. Available at <http://www.police.qld.gov.au/Resources/Internet/programs/crimePrevention/documents/CPTED.pdf> (accessed 10 July 2007).
- Rand, A. (1986) Mobility triangles, in: R. Figlio, S. Hankim & G. Rengert (Eds) *Metropolitan Crime Patterns* (New York: Monsey).
- Rengert, G. (1988) The location of facilities and crime, *Journal of Security Administration*, 11(2), pp. 12–16.
- Rubenstein, H., Murray, C., Motoyama, T. & Rouse, W. (1980) *The Link Between Crime and the Built Environment. The Current State of Knowledge* (Washington, DC: National Institute of Justice).
- Sarkissian, W., Cook, A. & Walsh, K. (Eds) (1997) *The Community Participation in Practice: A Practical Guide* (Perth: Institute for Science and Technology Policy).
- Saville, G. (1996) Assessing risk and crime potentials in neighbourhoods. Paper presented at the 1st Annual International CPTED Association Conference, Calgary, 30 October–1 November.
- Saville, G. & Cleveland, G. (1997) Second-generation CPTED in schools. Paper presented at the 1st Annual International CPTED Association Conference, Orlando, FL.
- Saville, G. & Cleveland, G. (2003a) An introduction to 2nd Generation CPTED: Part 1, *CPTED Perspectives*, 6(1), pp. 7–9.
- Saville, G. & Cleveland, G. (2003b) An introduction to 2nd Generation CPTED: Part 2, *CPTED Perspectives*, 6(2), pp. 4–8.
- Schmid, C. F. (1960) Urban crime areas: Part I, *American Sociological Review*, 25, pp. 224–237.
- Schneider, R. & Kitchen, T. (2002) *Planning for Crime Prevention: A Transatlantic Perspective* (London and New York: Routledge).
- Schneider, R. & Kitchen, T. (2007) *Crime Prevention and the Built Environment* (London and New York: Routledge).
- Sheard, M. (1991) *Report on Burglary Patterns: The Impact of Cul-de-Sacs* (Delta, British Columbia: Delta Police Department).
- Smith, S. (1984) Crime in the news, *British Journal of Criminology*, 24, pp. 289–295.
- Southworth, M. & Ben-Joseph, E. (2004) Reconsidering the cul-de-sac, *Access*, 24(Spring), pp. 28–33.
- Steuterville, R. (2003) New Urbanism Does Not Promote Crime. Available at <http://www.planetizen.com/node/107> (accessed 24 January 2007).
- Taylor, M. & Nee, C. (1988) The role of cues in simulated residential burglary, *British Journal of Criminology*, 28, pp. 396–401.
- Tilley, N., Pease, K., Hough, M. & Brown, R. (1999) Burglary prevention: early lessons from the crime reduction programme, *PRCU Research Paper 1*, Available at <http://www.homeoffice.gov.uk/rds/index.htm> (London: Home Office Research, Development and Statistics Directorate).
- Town, S. & O'Toole, R. (2005) *Crime-Friendly Neighborhoods: How "New Urbanist" Planners Sacrifice Safety in the Name of "Openness" and "Accessibility"*, Available at <http://www.reason.com/news/show/36489.html> (accessed 24 January 2007).
- Town, S., Davey, C. & Wooton, A. (2003) *Design Against Crime: Secure Urban Environments by Design* (Salford: The University of Salford).
- UN Habitat (2007) *Making Cities Safer from Crime: The Safer Cities Programme, UN-Habitat. Activities Brief*, Available at <http://www.unhabitat.org/safercities>
- United Nations Conference on Environment and Development (1992) *Agenda 21* (Rio de Janeiro, Brazil: UNCED).
- Wagner, A. (1997) A study of traffic pattern modifications in an urban crime prevention program, *Journal of Criminal Justice*, 25(1), pp. 19–30.
- WAPC (Western Australian Planning Commission) (2004a) *Liveable Neighbourhoods*, Available at <http://www.planning.wa.gov.au>, 3rd edn (Perth, WA: WAPC).
- WAPC (2004b) *Network City: Community Planning Strategy for Perth and Peel* (Perth, WA: WAPC).
- White, G. (1990) Neighborhood permeability and burglary rates, *Justice Quarterly*, 7(1), pp. 57–67.
- Wilcox, P., Quinsberry, N., Cabrera, D. & Jones, S. (2004) Busy places and broken windows? Towards defining the role of physical structure and process in community crime models, *Sociological Quarterly*, 45(2), pp. 185–207.
- Yang, X. (2006) Exploring the influence of environmental features on residential burglary using spatial-temporal pattern analysis. Unpublished PhD thesis, University of Florida. Available at www://etd.fcla.edu/UF/UFE0013390/yang_x.pdf
- Zavoski, R., Lapidus, G., Lerer, T., Burke, G. & Banco, L. (1999) Evaluating the impact of a street barrier on urban crime, *Injury Prevention*, 5, pp. 65–68.

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