

Urban Planning and Environmental Criminology: Towards a New Perspective for Safer Cities

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ARTICLE

Urban Planning and Environmental Criminology: Towards a New Perspective for Safer Cities

PAUL MICHAEL COZENS

Abstract

At a time of ever-increasing urbanization, research consistently indicates that crime and the fear of crime are key concerns for society and that safety is a vital feature of what is considered a high-quality sustainable environment. This paper critically inspects the theories and evidence from the field of environmental criminology and interrogates some of the safety assumptions underpinning planning policy in the UK, the USA, and in Australia, particularly those policies promoted by New Urbanism. It is argued that planning professionals need to consider and understand this new perspective for safer and sustainable cities, rather than relying on assumptions that are not supported by any systematic evidence.

Introduction

The ubiquitous issues of crime and the fear of crime continue to represent endemic problems for post-industrial urban societies. In the UK, for example, crime has increased on average by 5.1% per year since 1918 (Home Office, 1999). Notwithstanding a significant downward trend in the UK, since 1995 (Home Office, 2010), and the variation of crime patterns in the UK, the USA and Australia, the issue of crime remains a major concern for governments, the police, businesses and the community, particularly the prevention of offences. Investigating the urban ‘stage’, where (and when) crime is located, can therefore contribute much to our existing knowledge and understanding of crime and assist in the creation and maintenance of safer, vibrant and more sustainable urban communities. Indeed, there is a growing body of research that links urban sustainability with crime (Du Plessis, 1999; Cozens, 2002, 2007a, 2008a; Knights *et al.*, 2002; Dewberry, 2003; Armitage, 2007; Glasson & Cozens, 2011). It is increasingly recognized that a sustainable community is one that is both safe and perceived by its residents to be safe from crime. As a potential tool

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for delivering such outcomes, crime prevention through environmental design (CPTED) strategies, guidance and policies have been increasingly adopted throughout countries in the developed world and in many developing countries (Schneider & Kitchen, 2007; Cozens, 2008b). Although this development is positive, it has nonetheless been argued that planners need a broader understanding of environmental criminology and patterns and trends in crime as they relate to the built environment. Indeed, Brantingham and Brantingham (1998, p. 53) have asserted that ‘most planning proceeds with little knowledge of crime patterns, crime attractors, crime generators, the importance of edges, paths and nodes or the site specific solutions that facilitate or even encourage crime’.

In terms of the broader aims of sustainable development, government policy in many countries now advocates high-density, mixed-use residential developments in ‘walkable’, permeable neighbourhoods (Commonwealth of Australia, 1995; Department of the Environment Transport and the Regions, 1998; Office of the Deputy Prime Minister, 2004; American Planning Association, 2007).

Dempsey (2008) lists a range of features that have long been promoted in urban planning and design as socially beneficial, including high residential densities, mixed land uses, accessibility, connectedness and permeability, legibility, attractiveness, inclusiveness, maintenance, safety and character. In the USA and Australia, such ideas are promoted within the general concept of ‘new urbanism’. Crucially, Dempsey (2008) asserts that such claims are not underpinned by any systematic empirical evidence and that the promotion of one ‘quality built environment’ aspect competes with another, or indeed, against several others.

This paper argues that the sponsorship of permeable neighbourhoods, mixed-use residential developments and higher densities¹ can come into conflict with the promotion of safety from crime in particular. Moreover, Schneider and Kitchen (2007, p. 46) observe that ‘almost all agree that there is no objective empirical evidence to support new urbanism’s claims to prevent crime’.

This paper analyses the criminological evidence relating to these specific features of a ‘quality built environment’ and discusses the key theories within environmental criminology, which can enhance understanding of crime issues within planning and encourage a more informed dialogue across the disciplines of planning, architecture, urban design and criminology.

Sustainability, Crime and CPTED

The crime dimension to sustainability has only recently been subject to widespread scrutiny (Napier *et al.*, 1998; Vanderschueren, 1998; Du Plessis, 1999; Cozens *et al.*, 1999; Cozens, 2002, 2007a; Glasson & Cozens, 2011) and sustainability protocols arguably do not adequately represent realistic or appropriate indicators of the levels of crime or the fear of crime (Cozens, 2007a, 2008a). It is argued that a sustainable urban environment is one where the inhabitants ‘should not have cause for fear for their personal safety and the safety of possessions’ (Du Plessis, 1999, p. 33). Clearly, the level of crime and violence are powerful indicators of social sustainability and an ‘unsustainable’ community is commonly characterized by notions of poverty, homelessness and increased levels of crime. Research also indicates that safety and security are primary and immediate concerns for the

urban poor in both developed and developing countries (Napier *et al.*, 1998; Vanderschueren, 1998).

Increasingly, place-based approaches such as CPTED (Crowe, 2000), also known as designing out crime, are being deployed by governments to reduce opportunities for crime within their cities and urban spaces (Schneider & Kitchen, 2007; Cozens, 2008c).

CPTED is based upon the concept of defensible space: ‘a range of mechanisms; real and symbolic barriers, strongly-defined areas of influence, and improved opportunities for surveillance; that combine to bring an environment under the control of its residents’ (Newman, 1973, p. 3). The routine maintenance of the built environment is also important (Newman, 1973; Wilson & Kelling, 1982) and can foster a sense of territoriality, ownership and pride within the community enhancing safety (for a review of the evidence associated with CPTED, see Cozens *et al.*, 2005).

Following criticisms in the 1970s and 1980s (for a review see Cozens *et al.*, 2001), defensible space ideas have been developed and refined and are now commonly referred to as CPTED, which expands to also include the dimension of ‘activity support’ (for a review, see Cozens, 2008b). This refers to the use of urban design and signage to encourage intended patterns of usage of urban space (Crowe, 2000). CPTED argues that ‘the proper design and effective use of the built environment can lead to a reduction in the fear of crime and the incidence of crime, and to an improvement in the quality of life’ (Crowe, 2000, p. 1).

Thompson and McCue (2008, p. 9) argue that ‘a safe environment is the foundation of a healthy city’ and that CPTED is a useful tool for promoting health and active living principles (Cozens, 2007b). But this requires a knowledge of where and when specific types of crime concentrate within the city and how this might contradict or work against some of the other design features of a good quality built environment (Cozens 2009a, 2009b). More specifically, planners should be aware of what the criminological evidence indicates about crime and permeable street configurations, mixed-use developments and higher densities and how land-use patterns and crime interact. Knowledge of the principles of CPTED is insufficient in isolation, and it is arguably inappropriate to apply potential CPTED solutions (treatments) without understanding the spatial and temporal dynamics of the immediate and local crime problems (diagnosis). Furthermore, it is suggested that the limitations of CPTED are not commonly understood and that CPTED ideas are also being manipulated to conform to and support the principles of new urbanism (Cozens, 2009a, 2009b).

In terms of the limitations of CPTED, research has demonstrated how the social dynamics of an area, and particularly fear of crime, can affect the effectiveness of Newman’s ideas and CPTED (see Figure 1).

‘Defensible space’ is urban space that is ‘capable of being defended’ by residents, but can become ‘undefended’ as a consequence of fear of crime (see for, example, Merry, 1981). Furthermore, the same space can become defended and exploited by those who would seek to use it for their own illegal purposes (e.g. gangs and drug dealers). This is referred to as ‘offensible space’ (Atlas, 1991). Finally, urban space can become ‘indefensible’ (Cozens *et al.*, 2002), whereby it is ‘incapable of being defended’ by residents (e.g. urban riot). As the social

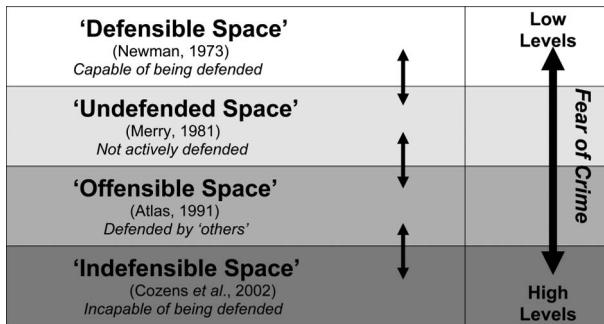


FIGURE 1. A taxonomy of defensible space and fear of crime. *Source:* Cozens et al. (2002).

dynamics of a space changes, the effectiveness of 'defensible space' both in theory and application will also change. This social dimension has also been reflected in the development of second-generation CPTED (for a discussion see Saville & Cleveland, 1997).

A detailed review of CPTED is beyond the scope of this paper and has been discussed elsewhere (see Cozens et al., 2001; Cozens 2008b). However, a recent trend involves the integration of CPTED ideas into comprehensive local strategies that consider the social, political and economic complexities of crime and violence at different scales (e.g. individual, family, community, society). Whitzman's (2008) work is an example of this trend towards using a combination of different kinds of programmes (e.g. situational crime prevention, social development programmes and community crime prevention programmes). This trend is also reflected in the UN-Habitat Safer Cities Programme (2006), launched in 1996, at the request of African mayors who were seeking to address urban violence by developing prevention strategies at city level. CPTED is being increasingly integrated with broader strategies that encompass other sectors and departments within local authorities.

Given the importance of 'evidence-based policy-making', evaluation of integrated programmes is very important. A review by Sherman et al. (1997, 2002) revealed that although 90% of place-based crime-prevention evaluations showed some evidence of crime reduction effects, most failed to meet the highest methodological and evaluative standards. Furthermore, these were spread across a large range of environmental settings/situations, such as residential, limiting access and movement, target hardening, property marking, retail stores, banks, bars and taverns, public transport, open spaces and CCTV. The authors discuss the difficulties of evaluating multi-tactic interventions and argue that we 'cannot estimate the relative effectiveness of the component parts, but they can show whether prevention is possible' (Sherman et al., 1997, p. 9). Crucially, Sherman et al. (1997) identify street closures around retail drug markets as a placed-focused intervention that they argue should be given priority for testing.

However, innovative comprehensive programmes such as those outlined above are not yet common practice, and clearly they will be difficult to evaluate.

Moreover, CPTED principles are still predominantly promoted within local, state or national guidelines, which make little reference to the crime risk assessment processes or to integrated approaches.

The planning profession would benefit from less use of a formulaic approach to CPTED and more consideration of environmental criminology. This is particularly recommended in countries and states where the police are not routinely involved in urban planning process at the development approval stage.

In Western Australia, for example, although a range of policy initiatives firmly support the use of CPTED (for example, Bell Planning Associates, 2004; Office of Crime and Prevention, 2004, 2007; Western Australian Planning Commission, 2006a, 2006b), the police are not routinely involved in the development approval process. This raises serious questions regarding planners' capacity to understand crime patterns and problems and how they might apply CPTED knowledge. Furthermore, it is argued that such policy guidance is often overly simplistic and is not sufficiently underpinned by the opportunity theories of environmental criminology (Cozens, 2009a, 2009b). These theories are discussed below, along with a brief introduction to the field of environmental criminology.

Although some innovative programmes do conduct in-depth crime analyses (e.g. the Birmingham Safer Neighbourhoods Programme, winner of the European Crime Prevention Awards in 2004 [see www.justitie.nl], and the UN-Habitat Safer Cities Programme), it is argued that most applications of CPTED do not go beyond the basic promotion of CPTED principles. This is particularly the case in locations where there is no collaboration between planners and the police. However, others stakeholders and participatory processes involving residents at the local level (including fear of crime surveys) can provide useful 'bottom-up' approaches to run alongside the existing 'top-down' strategies. Although the integration of monitoring and evaluation components within crime-prevention strategies has increased in recent years, arguably, key performance indicators for measuring crime and the fear of crime are still limited.

Ultimately, however, 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'. Since the planning profession does not traditionally study the temporal and spatial location of crime (or the fear of crime), we therefore, need to look across academic disciplines to the insights, theories and evidence from the field of criminology.

Environmental Criminology

Environmental criminology is defined as '... the study of crime, criminality, and victimisation as they relate *first*, to particular *places*, and *secondly*, to the way that individuals and organisations shape their activities by *placed-based* or *spatial factors*' (Bottoms & Wiles, 1997, p. 305). Research consistently reveals that crime is not randomly distributed across urban space, but rather different types of crime cluster at certain locations and at certain times. Indeed, following consistent research findings (Brantingham & Brantingham, 1975, 1984, 2008; Nasar & Fisher, 1993; Eck *et al.* 2005; Clarke & Eck, 2007; Kinney *et al.*, 2008) Johnson

and Bowers (2010, p. 89) have recently observed ‘... that crime is concentrated in space is now accepted as commonplace’.

The mapping of the distribution and demography of crime has a relatively extended history and there has been a long and continuous study of ‘dangerous places’ since the 19th century. This research represents the intellectual foundations of environmental criminology (for example, Guerry, 1833; Quetelet, 1835; Fletcher, 1849; Mayhew, 1862). These early ideas were known as the ecology of crime and were concerned with both where criminals *lived* and where offences *occurred*. In America, urban sociologists at the ‘Chicago School’ mapped the location of offenders (Park *et al.*, 1925; White, 1932; Lottier, 1938; Shaw & McKay, 1942) although the study of the location of offences (Schmid, 1960) received little attention until victimization studies in the 1960s and 1970s shifted their research focus (Brantingham & Brantingham, 1975). Several researchers highlighted the existence of dangerous places; known as ‘rookeries’, ‘slums’, or ‘dreadful enclosures’ (Walter, 1972; Damer, 1974), where criminality was perceived to flourish.

Significant research by authors such as Lynch (1960), Jacobs (1961), Angel (1968), Jeffery (1971), Newman (1973) and Brantingham and Brantingham (1975, 1981) popularized the idea that urban design could influence criminality. Further studies focused upon the ‘geography’ of crime (for example, Pyle, 1974; Harries, 1974; Brantingham & Brantingham, 1975), and the fear of crime (for example, Garofalo, 1981; Smith, 1984) and the academic discipline of environmental criminology gradually evolved in the late 20th century.

The spatial distribution of offences and offenders throughout the city is not random and some places experience a disproportionate amount of crime. These ‘hot spots’ of crime have received increasing attention in recent years (for example, Nasar & Fisher, 1993), with some suggesting that the potential impact of crime and fear of crime on our towns and cities ‘deserve the full attention of planners’ (DeFrances & Titus, 1993, p. 190).

Environmental criminology therefore concentrates on the spatial location of crime and the fear of crime and how individuals’ behaviour is influenced by place-based factors. It is underpinned by three related crime opportunity theories that provide an alternative perspective from which to consider the issues of permeable urban configurations, mixed-use developments and higher densities and to promote cross-disciplinary dialogue and more informed and consequently, potentially more effective, decision-making.

Cornish and Clarke’s (1986) ‘rational choice theory’ argues that most opportunistic criminals are rational in their decision-making and recognize, evaluate and respond to a variety of environmental cues. These are environmental factors and signals within the built environment, which relate to the perceived risk, rewards and effort associated with an offence and are central to the offender’s decision-making process.

Cohen and Felson’s (1979) ‘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 (see also Felson, 1987). Crime is therefore more likely at this conjunction of criminal opportunity (Ekblom, 2008). Offenders, like most citizens, have routine daily activities (work/school, visiting friends, shopping and

entertainment) during which they might discover or search for potential targets (for example, Maguire, 1982). These routine activities and travel routes form the ‘awareness space’ (Brantingham & Brantingham, 1984) of the offender (see Figure 2).

Indeed, Brantingham and Brantingham (1993, p. 10) argue that ‘all people, including those who commit crime, develop an awareness space ...[from which] crime targets are usually picked’.

Brantingham and Brantingham’s (1981, 1984) ‘crime pattern theory’ seeks to understand the search and selection processes that criminals use and analyses how people and objects associated with crime move about in space and time. Crimes against the person predominantly take place at home or in and around drinking establishments (Fattah, 1991) while property crimes are concentrated at or near activity nodes and attractors, where people congregate (Brantingham & Brantingham, 1993, 1998, 2008; Kinney *et al.*, 2008). These locations include the home, shopping centres, work/school, sports areas, parks and recreation centres and along the routes that connect these nodes. Indeed, in *Crime and Everyday Life*, Felson and Boba (2010) observe how daily life is divided into different types of settings, which can generate significant amounts of crime. The riskiest settings are:

- Public routes (especially footpaths, parking facilities and unsupervised transit areas).
- Recreational settings (especially bars and some parks).
- Public transport (especially stations and their vicinities).
- Retail stores (especially for shoplifting).
- Educational settings (especially at their edges).
- Offices (especially when entered for theft).
- Human support services (especially hospitals with 24-hour activities).
- Industrial locations (especially warehouses with ‘attractive’ goods).

Situational crime prevention (SCP) utilizes the physical dimensions to CPTED, but focuses on existing, specific crime problems, rather than on anticipating crime

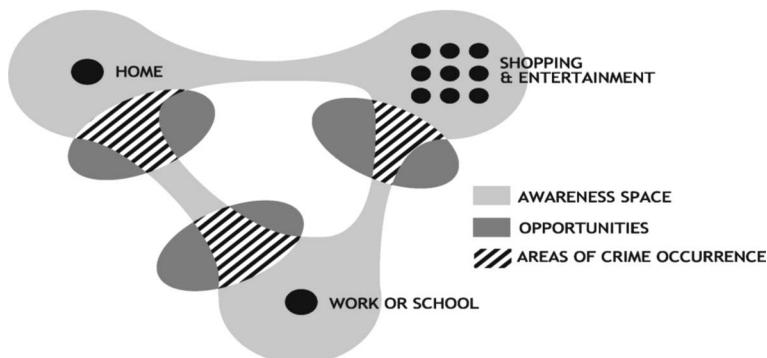


FIGURE 2. Awareness spaces—routine activities theory. *Source:* Cozens (2008c) adapted from Brantingham and Brantingham (1981).

problems for new developments on the basis of past experiences with similar designs. SCP is also closely aligned with environmental criminology and adopts the problem-solving methodology of problem-oriented policing (Goldstein, 1990). Action research is a central theme for both these approaches whereby the problem is studied, hypotheses about the key determinants are developed, a range of solutions are identified, selected measures are operationalized and results are evaluated (Clarke, 2008).

The concept of SCP derives from the British Home Office's crime-prevention strategy in the 1960s and 1970s (Clarke & Mayhew, 1980; Clarke, 1992, 1997). It operates predominately at the micro-scale, is crime specific and can be multi-tactical, and is heavily influenced by opportunity theories, which underpin environmental criminology. Clarke (1997) extended early SCP ideas (for example, Clarke & Mayhew, 1980) and developed 16 elements to SCP. These were recently expanded to 25 (Cornish & Clarke, 2003), and clearly extend beyond traditional physical intervention strategies such as CPTED (see Table 1).

SCP now extends beyond opportunity to include temptations, inducements and provocations. Recently, Wortley (2008) developed the SCP categories of reducing provocations and removing excuses into a framework of 16 Situational Precipitators (for more discussion, see Cornish & Clarke, 2003). There are four ways that the immediate environment might potentially precipitate criminal behaviour. Environmental cues can *prompt* criminal behaviour, while social forces can exert *pressure* on individuals and encourage offending. Situational factors can weaken moral prohibitions and *permit* criminal behaviour, and the immediate environment can also *provoke* criminal behaviour. A study by Cozens and Greive (2009) discusses some of these crime precipitators as they relate to urban governance issues and a lack of integrated planning in an entertainment district within the night-time economy. These include, for example, poor public transport facilities and taxi ranks, a concentration of large venues and a lack of toilet facilities.

Clearly, different land uses (and the urban governance that regulates them) are associated with both different types and different levels of crime in diverse and dynamic ways—and at different times of the day, week, season or year. Indeed, Brantingham and Brantingham coined the phrase 'environmental backcloth', which refers to:

the uncountable elements that surround and are part of an individual and that may be influenced by or influence his or her criminal behavior ... This working backcloth would also explicitly include the physical infrastructure of buildings, roads, transit systems, land uses, design and architecture, as well as the people located within that physical infrastructure. (Brantingham & Brantingham, 1993, pp. 6–7)

The environmental backcloth also influences the routes taken to nodes that are selected as locations for routine activities (such as school, work places, shopping, etc.). It is therefore suggested that planners need to positively engage with these theories and the evidence from environmental criminology.

TABLE 1. Situational crime prevention

	Reduces opportunities for crime		Reduces opportunities and motivations for crime	
	Increase the effort	Increase the risk	Reduce the rewards	Reduce provocations
Target harden	Extend guardianship	Conceal targets	Reduce frustration and stress	Set rules
Control access to facilities	Assist natural surveillance	Remove targets	Avoid disputes	Post instructions
Screen exits	Reduce anonymity	Identify property	Reduce emotional arousal	Alert conscience
Deflect offenders	Utilize place managers	Disrupt markets	Neutralize peer pressure	Assist compliance
Control tools/weapons	Strengthen formal surveillance	Deny benefits	Discourage imitation	Control drugs and alcohol

Source: Adapted from Cornish and Clarke (2003).

Furthermore, crime has been suggested as representing an ‘externality’ of development and a form of pollution (Roman & Farrell, 2002). Indeed, in relation to crime and specific types of land-use, Farrell and Roman (2006) argue that alcohol manufacturers and licensees make extensive profits, but do not bear any of the social costs of this crime pollution—or this ‘externality’ of this type of land-use development. Clearly, there are crime risks *to* new urban developments (provided by the local environmental backcloth) and crime impacts *of* such developments.

A crime risk assessment elates to incoming threats from elsewhere, whilst a crime impact assessment refers to exported threats from one’s own activity. Ekblom defines crime risk assessment as:

an endeavour to systematically and rigorously identify the crime risks ‘out there’ which may face some proposed new entity for which we are responsible: a place (such as a new building), product (e.g. a new model of car), service (e.g. a new kind of internet delivery service), business model (e.g. a new kind of banking) ... or anything else which could become embroiled in crime in some way. (2008, p. 1)

A crime impact assessment ‘is the counterpart where the focus shifts to considering the criminogenic or criminally harmful consequences of one’s *own* proposals’ (Ekblom, 2008, p. 1). Conducting a crime impact assessment therefore involves ‘scrutinising any proposal for action (such as a new product, place, service or even law) in terms of its likely effect in the wider world ‘out there’, on the range of known causes and risk factors of crime’ (Ekblom, 2008, p. 2). It is argued that a deeper understanding of the theories and evidence from environmental criminology can enhance planners’ appreciation of both crime risks *to* new developments and the crime impacts *of* such developments (see Figure 3).

This understanding of crime risks and crime impacts can arguably contribute towards a more holistically constructed consideration of crime—and encourage planners to think beyond a simplistic, formulaic approach to CPTED. Having discussed some key theories in environmental criminology, this paper now briefly discusses some of the assumptions about promoting safety from crime, which are commonly advocated by the planning profession.

Planning Assumptions: Safety and Quality Environments

In planning practice in 2010 there are apparently three key theoretical assumptions about safety from crime: permeable street configurations, mixed-use developments and high densities.

The issue of street permeability has become central to considering how to deliver less crime and more sustainable urban design. There are two distinct perspectives to this topic: the ‘encounter’ model and the ‘enclosure’ model (Dovey, 1998). The ‘enclosure versus encounter’ debate has been raging since the 1970s and the theoretical foundations are largely grounded in the observations of Jacobs (1961) and the research and perspectives of Newman (1973) and Hillier (1973), respectively.

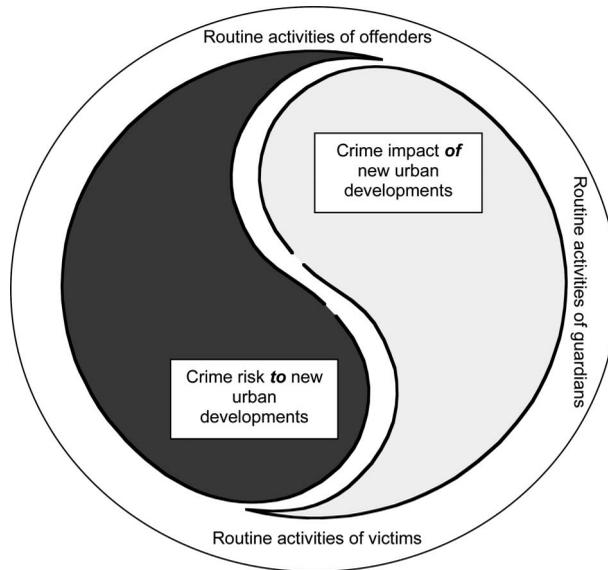


FIGURE 3. Crime risks *to* and crime impacts *of* different urban land uses. *Source:* Author.

According to the ‘encounter model’ (Dovey, 1998), permeable streets are safer since they encourage walking, social interaction and increased levels of ‘eyes on the street’ (see also Jacobs, 1961). From this perspective the presence of strangers (as additional eyes on the street) is regarded as a positive element, whereby they can help to informally police spaces, while the inhabitants police the strangers. It is this perspective that is supported by recent international planning policy, including New Urbanism.

The proponents of the ‘enclosure model’ argue that limiting permeability, by controlling access to strangers, means that residents can more readily distinguish strangers and potential criminal behaviour, and thereby reduce opportunities for crime. Derived from Newman’s (1973) defensible space, these ideas have been adopted as an agenda for enclosure, retreat and privatization (Dovey, 1998) rather than promoting openness and accessibility. However, Schneider and Kitchen (2007, p. 40) argue it is an oversimplification to suggest that defensible space ‘endorses segregated space as inherently safe or that surveillance is its single defining criterion’.

Dempsey (2008) observes how a well-connected and permeable built environment is considered as a feature of high quality in the form of small street blocks (Jacobs, 1961; Bentley *et al.*, 1985; Aldous, 1992). Small blocks provide more varied routes for pedestrians and allow easier movement (Jacobs, 1961; Bentley *et al.*, 1985; Aldous, 1992; Carmona *et al.*, 2003). Gehl (1971, 2001) makes the assumption that well-connected pedestrian routes become well used and are preferred over deserted or low-volume routes. Therefore, the assumption is that permeable streets are safer since their increased usage results in more ‘eyes on the street’ (Jacobs, 1961) and enhanced levels of community safety.

Although there is a general consensus that mixed land uses are more desirable than purely residential settings, since they offer services and facilities close to residents (Jacobs, 1961; Grant, 2002; Burton & Mitchell, 2006), Dempsey (2008) notes that there is no agreement on precisely how this mix is constituted. Mixed-use developments are assumed to provide more potential activity and more 'eyes on the street' (Jacobs, 1961) over extended time periods, thereby enhancing personal and community safety and reducing crime.

High residential densities now represent a significant, albeit contentious feature of sustainable urban environments (Urban Task Force, 1999). Hypothetically, advantages include equitable access to key services within walking distance and a strong local identity (Jacobs, 1961; Llewelyn-Davies, 2000). Furthermore, higher densities potentially mean more 'eyes on the street' and therefore lower levels of crime and enhanced levels of personal safety. However, again, consensus is not evident regarding whether high densities are consistently a positive feature of the built environment. They may not be preferred by residents (Churchman, 1999), they may not provide good access to open spaces (Burton, 2000) and others argue passionately that low-density environments can also be of high quality (Nicholson-Lord, 2003). However, global environmental and demographic pressures on land and housing suggest the need for higher densities, and this approach has been adopted by governments in order to increase land-use efficiency and drive sustainable urban development agendas (Commonwealth of Australia, 1995; Department of the Environment Transport and the Regions, 1998, 2000; Office of the Deputy Prime Minister, 2004; American Planning Association, 2007). This is in spite of a lack of consensus on how high 'high-density' is or how high it should be (Rudlin & Falk, 1995; Jenks & Dempsey, 2005). There are also important differences between population density and housing density, and high-density housing does not necessarily automatically imply high population densities.

Dempsey (2008) observes that safety is also an accepted and well-recognized feature of high-quality environments (Jacob, 1961; Newman, 1973; Llewelyn-Davies, 2000; Cozens, 2002; Carmona *et al.*, 2003; Office of the Deputy Prime Minister, 2004). If citizens feel safe, they are more likely to actively utilize urban space, which also contributes towards the vitality and sustainability of the built environment.

In recent years, there has been an increasing awareness and application of place-based crime-prevention initiatives as part of the planning and development process. Indeed, Designing Out Crime and CPTED ideas are being applied in the UK (Cozens *et al.*, 2004), in Australia (Cozens *et al.*, 2008) and at a global level (Schneider & Kitchen, 2007; Cozens, 2008c).

It has been argued that planners have a limited knowledge of environmental criminology (Brantingham & Brantingham, 1998), and particularly 'where' and 'when' specific types of crimes concentrate. For local government in the UK, for example, it appears that the planning policy shift to more permeable street configurations has resulted in confusion, conflict and contradiction (Armitage, 2007), since the crime-prevention advice provided by the police (see www.securedbydesign.com) advocates minimal permeability. The role of the police in the development approval stage in the UK therefore ensures that some knowledge of crime patterns and CPTED can inform the decision-making process.

In jurisdictions where the police are not routinely involved (in Western Australia, for example), such knowledge is unlikely to be considered and assumptions about safety are likely to underpin the development approval process.

Moreover, Demsey (2008, p. 256) points out 'while there is no consensus on how a safe built environment should or can be designed, there is widespread agreement that safety is an essential feature of high quality built environments'. If this is indeed the case, built-environment professionals (and particularly architects, planners and urban designers) should arguably possess a more critical and detailed knowledge of how crime and the fear of crime are intricately interwoven within the mosaic of the city.

Having discussed theories from environmental criminology and contrasted these with planning assumptions about safety from crime, this paper now examines the criminological evidence associated with permeability, mixed-use development and higher density living to critically inspect these elements of a high-quality built environment.

The Evidence on Permeability

Research has consistently found that permeability increases opportunities for crime. Beavon *et al.* (1994) reported that heavy pedestrian and vehicular traffic flows were associated with higher victimization rates and that the shape of traffic intersections also influenced crime. Isolated cul-de-sacs were least accessible to crime, and grid-like intersections were the most accessible to crime. Furthermore, corner houses, which are more frequent in grid layouts, have been found to be significantly more vulnerable to burglary (Taylor & Nee, 1988; Hakim *et al.*, 2001).

'Designing Out Crime: The Cost of Policing New Urbanism' (Knowles, 2006) claims that policing costs for a permeable New Urbanist housing development of 4, 500 homes would be three times higher than non-permeable cul-de-sac layouts promoted by the UK Association of Chief Police Officer's Secured By Design scheme. Knowles (2006) also indicated that reported crime is five times higher in the New Urbanist layouts investigated (Town *et al.*, 2003; Town & O'Toole, 2005). Furthermore, in surveys, six of the first seven reasons burglars stated for selecting a particular property for victimization were related to access routes (Town *et al.*, 2003). The UK's Secured By Design scheme has been evaluated, and results indicate that such developments reduce both crime and fear of crime (for a review see Cozens *et al.*, 2004, 2007). Significantly, Secured By Design largely promotes the building of non-permeable cul-de-sac layouts.

Modifying grid layouts using road closures has been used as a successful crime-prevention strategy in several studies and this effectively converts the grid layout into a cul-de-sac (Matthews, 1992; Newman, 1995, Lasley, 1998; Zavoiski *et al.*, 1999). Sheard (1991) studied walkways in a Vancouver (Canada) suburb, finding that newly introduced pedestrian pathways connecting the ends of cul-de-sacs led to increases in crime. Again, these modifications effectively increased permeability and created through-routes for both residents and other users. Furthermore, research by Cozens and Love (2009) investigated pedestrian access ways in Western Australia and argues that levels of permeability can be manipulated at

specific locations to increase or decrease local accessibility and to promote community safety.

In a report for the US Department of Justice Clarke (2002) cites numerous examples of studies, which indicated that reducing connectivity reduces crime (for example, Bevis & Nutter, 1978; White, 1990; Beavon *et al.*, 1994; Wagner, 1997; Bowers *et al.*, 2005). Furthermore, three recent studies all confirm these findings (Brooke, 2004; Yang, 2006; Armitage, 2007).

Brooke (2004) studied a development in Bradford, UK, exhibiting new urbanism principles and reported that burglary rates were 20 times higher than the national average. Yang (2006) investigated over 3, 000 residential burglaries across a range of street configurations finding lower rates of burglary for properties located on less permeable layouts such as cul-de-sacs. Furthermore, Armitage (2007) analysed crime on 50 housing estates in the UK and also found that properties on permeable estates are significantly more vulnerable to burglary. Indeed, 37 studies are cited that strongly indicate increased levels of crime are associated with more permeable street networks (Cozens, 2010). A recent review of the literature by Johnson and Bowers (2010) found that most research suggests permeability is associated with greater crime risks.

Johnson and Bowers (2010) also conducted a large research study of crime and permeability (118, 000 homes and 12, 806 burglaries) using multi-level models controlled for sociodemographic variables. Their findings support most existing research and indicate that permeability and connectedness carries a greater burglary risk. They reflect on the policy implications, observing 'permeability should be limited to that necessary to facilitate local journeys and sustainable transportations' (Johnson & Bowers, 2010, p. 106).

The Evidence on Mixed-use Developments

Mixed-use development is generally promoted by planners, especially in New Urbanism. In theory, mixed-uses provide more pedestrian activity and 'eyes on the street' over longer time periods, which discourages criminal activity. Mixing land-use (largely residential and commercial/retail) is suggested as a means of increasing diversity in neighbourhoods since otherwise homogeneous areas of land use would be abandoned or left unsupervised during certain times. Integrating residences with businesses therefore assists in increasing the 'eyes on the street' (Jacobs, 1961) and improving safety. However, Schneider and Kitchen (2007, p. 51) claim that there are multiple studies, which reveal that mixed-use development in residential areas is 'not totally benign'.

From an environmental criminology standpoint, Brantingham and Brantingham (1993, 2008) observe 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'. Mixed-use developments are likely to contain a variety of land uses, which could potentially provide increased and more diverse opportunities for crime. Indeed, shopping centres, storage places, schools, service stations and restaurants tend to attract criminals as well as legitimate users to an area. The routine activities of the community (including potential offenders) will therefore affect the incidence of

crime in and around these nodes of activity, which are systematically more concentrated in mixed-use developments.

Studies have demonstrated that homogeneous 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 and inherent in current planning policies.

Schneider and Kitchen (2007) highlight empirical work in the USA that suggests, in mixed-use neighbourhoods in particular, increased vehicular and pedestrian flows can result in 'social cocooning' among residents, reducing the potential for interaction and for recognizing strangers (Baum *et al.*, 1978; Appleyard, 1980; Taylor & Harrell, 1996). Mixed-use neighbourhoods are also potentially more criminogenic by virtue of their proximity to a range of different land-uses, which might 'generate' crime (Luedtke & Associates, 1970; Buck *et al.*, 1993) and provide accessibility to potential and motivated offenders (Brantingham & Brantingham, 1981). Land-use patterns will therefore also influence the routine activities of the community and potentially influence opportunities for crime.

A study by Davison and Smith (2003) reported that crime was more frequent in accessible areas with commercial land use, and residential burglary was reported to be more frequent in residential properties close to commercial areas (Dietrick, 1977). Furthermore, research by Wilcox *et al.* (2004) revealed that businesses in residential areas exhibited an increased risk of burglary. Yang's (2006) research, which investigated some 3,000 burglaries, found that burglaries are more likely to occur in properties located 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'. Schneider and Kitchen (2007, p. 226) observe that although many New Urbanist communities are aesthetically attractive, 'the preponderance of empirical evidence shows that gridiron street layouts and mixed uses are often crime facilitators, not inhibitors'. Furthermore, Brantingham and Brantingham (2008, p. 91) have recently discussed mixing land uses, as supported by planning policy in the UK, the USA and Australia, and comment that 'this planning practice will increase the activity in some nodes and is likely to produce a clustering of crime'. A recent review of the literature on mixed-use development and crime by Savage and Souris (2008) discuss a range of studies which suggest that mixed-use developments are associated with increased crime risks (for example, Miethe & McDowall, 1993; Kurtz *et al.*, 1998; Sampson & Raudenbush, 1999; Sampson *et al.*, 2002). Significantly, the authors note that 'it was striking to discover how consistent the findings indicate that mixed-land use ... is associated with higher levels of crime' (Savage & Souris, 2008, p. 9).

The Evidence on High-density Living

In theory, higher densities should provide more 'eyes on the street' and therefore more potential for capable guardianship and lower levels of crime. However,

higher densities also mean more targets and opportunities available for crime in a given area and potentially more offenders.

Theories from Durkheim (1893) and Wirth (1938) have long since underpinned the idea that industrialization, the rapid development of urban centres and high population densities were associated with the development of a sense of 'anomie' and social alienation, which can be destabilizing to the individual and the community. Later, Calhoun's (1962) 'crowding theory' argued that as densities increased, so did violence and aggression. Some of these ideas resonate with Newman's (1973) work on public housing estates in the USA, where the predominance of unassigned public spaces and the large number of people sharing common entrances allegedly contributed to higher rates of crime. The impersonal design of these projects and the lack of informal surveillance and a sense of 'ownership' and territoriality were also important factors in explaining higher levels of crime and anti-social behaviour (Newman, 1973).

The psychological experience of high-density living conditions (or crowding) is associated with various physical, psychological and behavioural problems, including increased levels of crime (Gove *et al.*, 1977). High-density urban areas within the city generally experience higher crime levels than less-densely populated suburban areas, while sparsely populated rural areas often exhibit the lowest levels of recorded crime (Bottoms & Wiles, 1997). Rubenstein *et al.* (1980) reported that heavy pedestrian and vehicular traffic flows were associated with higher victimization rates. In high-density environments the recognition of 'strangers' and potential offenders by residents is also more problematic. Furthermore, a range of anti-social behaviours have been reported in high-density environments including prisons (Paulus, 1988), college dormitories (Baum & Valins, 1977), nightclubs (Macintyre & Homel, 1997) and naval ships (Dean *et al.*, 1978).

Harries (2006) recently studied reported crime and population densities in Baltimore County, Maryland, USA. He analysed over 100,000 property crimes and crimes against the person and concluded; 'by and large, the available evidence increasingly tends to suggest that most types of crime tend to increase in levels of occurrence with increasing population density'. Harries (2006) observes, however, that this relationship is moderated by socioeconomic status such that an affluent high-rise apartment block may have high density, but will also have a high level of guardianship, thereby reducing crime. In terms of the crime-density relationship, Harries (2006) argues that smaller geographic scales are more appropriate for making generalizations.

Schneider and Kitchen (2007, p. 121) also report on a study that compared a dense permeable housing estate with a lower-density estate dominated by cul-de-sacs. They reported that burglaries, auto crime, arson and public disorder were significantly higher for the higher-density permeable development. They are cautious to note that there are many additional factors, other than density and street layout, which may help to explain these patterns.

Clearly, there is compelling criminological evidence that the three policy objectives of promoting permeability, mixed-use developments and high densities are not necessarily always socially beneficial.

Conversely, there is some research associated with the Space Syntax methodology of Hillier and colleagues (see, for example, Hillier & Shu, 2000; Hillier & Sahbaz, 2005; Lopez & Van Nes, 2007), which consistently contradicts the findings discussed in the three sub-sections above. Research by Hillier and Shu (2000) indicates that incidents of burglary are 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. Crucially, pedestrian levels are also estimated, rather than actually measured—suggesting that a connected street may not necessarily represent a well-used street.

Furthermore, Schneider and Kitchen (2007, p. 44) suggest that the Space Syntax perspective is 'a floating challenge to orthodoxy which has struggled to garner much independent support'. Armitage *et al.* (2010, p. 5) observe the divergent findings of Space Syntax studies and argue that it is can be explained by key differences in methodology. They argue 'although Space Syntax allows for greater sample sizes the methodology relies on the remote and automated assessment of street layouts and movement patterns which may not reflect the true nature of street layouts and how they are used'. Armitage *et al.* (2010, p. 5) also note that studies manually assessing the area (or based on offenders comments on vulnerability whilst on-site) 'have all concluded that increased connectivity and through movement leads to increases in crime'.

In recent years however, researchers have begun to distinguish between crime *rates* and crime *risk* (for example, Andersen, 2007; Hillier & Sahbaz, 2005; Andersen & Jenion, 2010). Populations are dynamic, and therefore the number of people in any given area will vary temporally. This means that crime rates based on static resident populations will be potentially inaccurate. The ambient population is an alternative measure of population risk (Andersen & Jenion, 2010) whereby global estimates for population movements and concentrations at different times of the day are used to highlight the utility of studying ambient populations and in re-evaluating crime risks. Indeed, crime rates in the inner city, and particularly in entertainment districts, may not accurately reflect crime risks if they are expressed in relation to the census data for the local resident population. In many environmental settings and at certain times, the population that is actually present will significantly exceed the number of residents—and potentially over-estimate crime risk. Indeed, Chainey and Desyllas (2008, p. 71) have suggested that 'If the residential population is used as a denominator for local level street crime analysis it may only misinform and mislead'. Bringing the debate back to the environmental setting, Andersen (2007, p. 2441) observes: 'given that residential populations are not a good indicator of where people actually are throughout the day, it must be the characteristics of these places that attract specific criminal activities to them'.

Research into pedestrian modelling (for example, Chainey & Desyllas, 2008; Andersen & Jenion, 2010) potentially promises more insights towards developing more realistic measures for street crime by estimating the number of pedestrians in an environmental setting. Observational research and pedestrian surveys (for example, Cozens & Greive, 2009) will also benefit this area of research, which is clearly attempting to synergize routine activities theory and Designing Out

Crime/CPTED ideas into a more holistic and dynamic model. Along with the theories and evidence from environmental criminology, these insights contribute towards developing a more critical understanding of local crime risks.

‘Eyes on the Street’: A Critical Overview

The concept of ‘eyes on the street’ strongly underpins safety assumptions within planning that are associated with permeability, mixed uses and high densities.

Jane Jacobs (1961) was highly critical of post-war urban planning and particularly the separation and zoning of urban land uses in America. Instead, she promoted more diverse and mixed land uses. Following her observations in Boston and New York, she recommended clear delineation between public and private space and defining the function of any space to promote a sense of ownership of that space by residents. She observed that vibrant streets with a diverse mix of land-uses provided more ‘eyes on the street’ (surveillance) and this could potentially reduce opportunities for crime. In design terms, residents potentially have enhanced opportunities to ‘self-police’ the streets in certain housing layouts, which are configured to face each other. Jacobs’ ideas have significantly influenced CPTED thinking and planning policy and practice since the 1960s.

Jacobs commented:

there must be eyes on the street, eyes belonging to those we might call the natural proprietors of the street . . . the sidewalk must have users on it fairly continuously, both to add to the number of effective eyes on the street and to induce a sufficient number of people in buildings along the street to watch the sidewalks. (1961, p. 35)

Crucially, Jacobs’ (1961) observations have influenced much of New Urbanist thinking and current planning policy in Australia, the UK and America. However, she focused on inner-city areas of large American cities in the 1950s and the seminal concepts of mixed and diverse land-uses and ‘eyes on the street’ were *not* observed in suburban areas, where much of New Urbanist developments are located. Significantly, *The Death and Life of Great American Cities* (Jacobs, 1961) did not contain any meaningful or systematic crime data as evidence for her assertions, which were all largely anecdotal.

This concept of self-policing may (or may not) work effectively in large vibrant cities, but it is certainly likely to be weakened in less densely populated suburbs with reduced levels of pedestrian and vehicular movement. Jacobs (1961) acknowledged that different densities were appropriate for different settings. Significantly, she noted, ‘we ought to look at densities in much the same way as we look at calories and vitamins. Right amounts are right amounts because of how they perform. And what is right differs in specific instances’ (Jacobs, 1961, p. 209).

Given the increase in the number of women in the workplace since Jacobs’ observations, and the rise of the ‘dormitory suburb’, there will also be fewer potential residents in buildings to watch the street. 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. Although increased numbers of pedestrians may provide additional ‘eyes on the street’ and potentially discourage some offences, this may also actually encourage and provide other targets for crime (e.g. pick-pocketing). Sorensen (2003, p. 34) observes, ‘pedestrian traffic thus seems to increase risk (from the standpoint of target selection) and decrease risk (from the standpoint of natural surveillance) depending on whether that traffic is through traffic or local traffic’.

Furthermore, as Newman (2003) and others have observed, the presence of ‘eyes on the street’ does not guarantee intervention. Indeed, studies, which have investigated bystander apathy, have found that as the number of bystanders increases, the likelihood for intervention decreases (Darley & Latane, 1968; Morgan, 1978). The study of bystander behaviour is important to understanding crime and has recently been applied to the field of interpersonal violence (Barnyard, 2008; Hart & Miethe, 2008).

Crucially, few planners would be aware of the criminological evidence associated with permeability, high densities and mixed-use developments. Furthermore, it is suggested that still fewer are familiar with a passage in Jacobs’ book that reads: ‘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’ (1961, p. 26).

Planning policy in the UK, USA and Australia (and particularly New Urbanism) is both ignoring Jacobs’ warning and overlooking the criminological evidence (Cozens, 2008c). Her anthropological approach is explicitly cautious about generalizing from one place to another. Significantly, before his death in 2004, Oscar Newman (2003) commented on New Urbanism, stating ‘the residential environments they are creating are very vulnerable to criminal behavior, unless, of course, these environments are exclusively occupied by high income groups’.

Crucially, if safety from crime is such a fundamental dimension to a healthy city, one might question why such a dearth of knowledge exists within planning, on the patterns of crime, which are an integral part of the mosaic of our cities. Indeed, Felson (2006) suggests that within the ecosystem that is the city different crimes have discrete settings, niches and habitats. He argues ‘the *web of crime* is a complex living system that links legal and illegal activities within the larger ecosystem’ (Felson, 2006, p. 61). It is therefore suggested that understanding crime patterns and the ecology of crime is more meaningful when opportunity theories and evidence from environmental criminology are considered.

Conclusions

Some authors (for example, Yiftachel & Huxley, 2000; Yiftachel, 2001) have called for more critical analysis in urban and regional planning, and have argued that planning theory and research frequently adopts a narrow analytical scope that often fails to critically analyse the key assumptions inherent in the discipline and practice of planning. Moreover, if, as Dempsey (2008) asserts, most of the assumptions underpinning ideas about what constitutes a quality built environment are not supported by evidence, then planning is potentially in a serious quandary.

Increasingly, research evidence from the field of environmental criminology (for example, Brantingham & Brantingham, 1993, 1998, 2008; Kinney *et al.*, 2008) unequivocally indicates that permeable street configurations, mixed-used developments and high population densities are associated with higher levels of recorded crime. ‘Activity nodes’ attract large numbers of people and can act as ‘crime generators’, while special activity nodes can become ‘crime attractors’ (Kinney *et al.*, 2008). These draw on the opportunity theories discussed above, and particularly routine activities theories, and following empirical investigation of land uses and crime rates, indicate that the pulse of human activity (including crime) is influenced by the land-use structure of the city and its governance. Crime is a function of the city such that ‘the concentration of crimes depends on the normal activity patterns within the city and the location of major attractor nodes’ (Kinney *et al.*, 2008, p. 64). The detailed mosaic of the city, with its patterns of activities and land uses as they relate to crime are therefore crucial to understanding how the city functions successfully or fails to perform in different places at different times and as a totality.

Moreover, this paper has argued that crucial knowledge about crime patterns and land uses in the city are not commonly known to most planners. Indeed it is argued that this knowledge can contribute towards creating a new dialogue for creating safer, more sustainable cities and to underpin more evidence-based decision-making.

It has also been argued ‘crime is rarely identified as a serious problem that we have to *know* more about in order to be able to know what to do’ (Wikstrom, 2007, p. 60). Indeed, if research and development is the core technology for successful crime prevention (Reiss, 1992), then those who are responsible for planning, designing, building and maintaining our cities need to be made aware of such research—particularly if it derives from a different academic discipline.

Dempsey (2008) claims that many of the key features associated with quality environments are assumed to be socially beneficial but are not supported by empirical evidence. These features include high residential densities, mixed land uses, accessibility, connectedness and permeability, legibility, attractiveness, inclusiveness, maintenance, safety and character. This paper has focused on the safety from crime issues and the evidence suggests that the three features of permeability, mixed land uses and high densities are not always benign and socially beneficial. This finding raises the possibility that assumptions relating to the other ‘quality’ features of the built environment could potentially be founded upon incomplete knowledge.

Brantingham and Brantingham (1998, p. 53) claim that ‘proactive crime prevention calls for the active movement of environmental criminologists into the development of more directed models for use in urban planning and then into a knowledge transfer role’. This paper has attempted to disseminate such knowledge and foster dialogue across the disciplines of planning and criminology. However, the challenge is to think about how to transform this knowledge into urban planning and design practice.

Although the criminological evidence suggests that permeability, mixed uses and high densities can potentially provide increased opportunities for crime, this does *not* imply that those involved should stop building such communities

(Cozens, 2008c, 2011). Rather, it suggests that planners should know what trade-offs they are making. For Schneider and Kitchen (2007, p. 53) argue:

if people are not informed of the possible consequences of their residential choices, at the very least they should not be actively misled by over-enthusiastic designers into believing that, like the snake oil of bygone days, New Urbanism (or any other broadly based design ideology) will prevent crime and heal society's ills.

In consideration of routine activities theory (Cohen & Felson, 1979) and ambient populations (Andersen, 2007), a more critical understanding of crime risks associated with the built environment will arguably emerge in the future. More importantly perhaps, if planners are to effectively perform any kind of crime-prevention function there is an urgent need for more data sharing, and particularly more detailed and timely crime data. Although it is largely accepted that the police no longer have the sole responsibility for crime prevention, the availability of appropriate crime data is often restricted and elusive for many agencies outside the police. For jurisdictions where police are not routinely involved in the development approval process, this situation is potentially significant. If crime prevention is now a multi-agency responsibility, crime data should arguably be more transparent, accessible and useable by those responsible for planning the design, management and use of the built environment in an increasingly urbanized world (Cozens, 2011).

Returning to the issue of sustainability discussed earlier, many new developments will have some risk of significant adverse impact(s) on local ecosystems and the environment, which planners strive to mitigate against, largely through the process of environmental impact assessment. This mitigation is commonly underpinned by evidence-based knowledge of the probable impacts associated with ecological sustainability and the precautionary principle. Similarly, if planners become more knowledgeable about the theories and evidence from environmental criminology (particularly at the local level), they will be able to make more informed decisions regarding the design, management and use of urban space. This highlights the crucial importance of conducting crime risk assessments and crime impact assessments that potentially facilitate a more targeted and critical approach to reducing crime and the fear of crime. This paper has attempted to provide a new perspective for safer cities, whereby Designing Out Crime is considered as a process rather than as an outcome (Cozens, 2011). Finally, in an increasingly urbanized world, planners need to think more critically about crime and the built form, and insights from environmental criminology can assist in this process.

Note

1. Such planning policies are often referred to as New Urbanism in the USA and Australia.

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