Review Essay

Crime, fear of crime, environment, and mental health and wellbeing: Mapping review of theories and causal pathways

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ABSTRACT

This paper presents the findings from a review of the theoretical and empirical literature on the links between crime and fear of crime, the social and built environment, and health and wellbeing. A pragmatic approach was employed, with iterative stages of searching and synthesis. This produced a holistic causal framework of pathways to guide future research. The framework emphasises that crime and fear of crime may have substantial impacts on wellbeing, but the pathways are often highly indirect, mediated by environmental factors, difficult to disentangle and not always in the expected direction. The built environment, for example, may affect health via its impacts on health behaviours; via its effects on crime and fear of crime; or via the social environment. The framework also helps to identify unexpected factors which may affect intervention success, such as the risk of adverse effects from crime prevention interventions as a result of raising awareness of crime.

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1. Background

Crime and the fear of crime have been identified as potential mediators between neighbourhood characteristics and mental health and wellbeing outcomes (Jenkins et al., 2008), as promising loci of interventions to improve wellbeing (Department of Health, 2010; Department of Health, 2011), and as important dimensions of wellbeing in their own right (Stiglitz et al., 2009). Similarly, theories of the determinants of mental health have focused on crime as a major explanatory factor: for example, the VicHealth framework in Australia includes 'freedom from discrimination and violence' as one of the three key determinants of mental health, along with social inclusion and economic participation (Herrman et al., 2005; Keleher and Armstrong, 2005). In addition, participatory research has identified crime and antisocial behaviour as an important influence on wellbeing (Burke et al., 2009; O'Campo et al., 2009).

Thus, crime and fear of crime are widely recognised as potentially important influences on mental health and wellbeing. They also exemplify the kinds of complex environmental factors which may only be partially illuminated by quantitative observational studies alone (Cooper et al., 2008). Synthesising and understanding the complex links between physical environmental mechanisms, social norms and imagery, and simultaneously incorporating the impact of distal factors which cannot be captured in a linear concept of causality, demands a flexible approach which can integrate heterogeneous types of evidence (Cummins et al., 2007). Investigating such links also demands the integration of research from a range of disciplines, not only those directly related to health and wellbeing.

The primary aim of this paper is to present a holistic framework tracing the theoretical links between crime, fear of crime, the environment and health and wellbeing. The framework presented here was developed as part of a broader evidence synthesis project, which will include systematic reviews of the effectiveness of interventions in the built environment to improve health and wellbeing through addressing crime or the fear of crime, and of qualitative evidence relating to fear of crime and the

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built environment. Within this context, the framework is designed to facilitate an understanding of the contexts within which policy-makers and practitioners might seek to improve health and wellbeing by addressing crime and fear of crime.

A secondary aim is to use the framework as a methodological case study, to illustrate one possible way of constructing theory in the context of undertaking evidence synthesis of the effectiveness of complex social interventions. The value of theory-led approaches, particularly those that generate causal pathway frameworks, is now widely acknowledged (Anderson et al., 2011; Craig et al., 2008). However, in relatively few cases have such frameworks been set out in detail, supported by a discussion of underlying theories and empirical evidence. Previous research has emphasised a 'logic model' approach which is limited to elucidating the internal pathways of interventions, and does not lend itself either to a broader contextualisation of interventions, or to a critical engagement with the theories they embody. The approach set out below represents an attempt to remedy some of these limitations. Thus, this paper may also be seen in the context of the ongoing debate about the role of theory in informing systematic reviews, particularly reviews of complex interventions.

2. Methods

We employed a pragmatic approach, with iterative stages of searching and synthesis, influenced by realist review (Pawson et al., 2004), critical interpretive synthesis (Dixon-Woods et al., 2004, 2006) and the causal mapping method of Baxter et al. (2010). The aim was to generate a framework incorporating relevant theories and evidence on pathways to guide the broader project.

The construction of the framework took place in three phases within the overall iterative process. The initial phase attempted to catalogue the main theories linking the central concepts of crime, fear and crime and health and wellbeing, and develop a meta-theoretical framework to integrate them. Many of these theories were found to draw upon broader concepts (the physical and social environment, and policy-level factors) which were then included in the framework in their own right. This then induced a second phase in which the theoretical links between these further concepts and the original foci of interest were explored. Finally, where the theoretical literature was not directly based on empirical findings, we carried out further targeted searches to locate empirical evidence on the associations posited by the theories.

Search sources included targeted database searches and suggestions from subject experts within the review team and the Advisory Group; there was also a strong emphasis on 'pearl growing' methods such as citation chasing. The selection of studies prioritised those which helped to shape the emerging meta-theoretical constructs, and was initially pursued to the point of theoretical saturation with respect to the framework. Where the theories were conflicting or underdetermined, further searches were undertaken to identify empirical studies reporting data and associations between variables relevant to the theory, with a view to at least an indicative judgement of the theoretical claims. Thus, the main foci in terms of data were theoretical literature and quantitative observational studies of associations between variables, although we also utilised qualitative evidence, outcome evaluations, policy papers and a range of other types of evidence.

3. Results

Fig. 1 provides a graphical overview of the model derived from our review, showing the six key conceptual areas identified and the potential links between them.
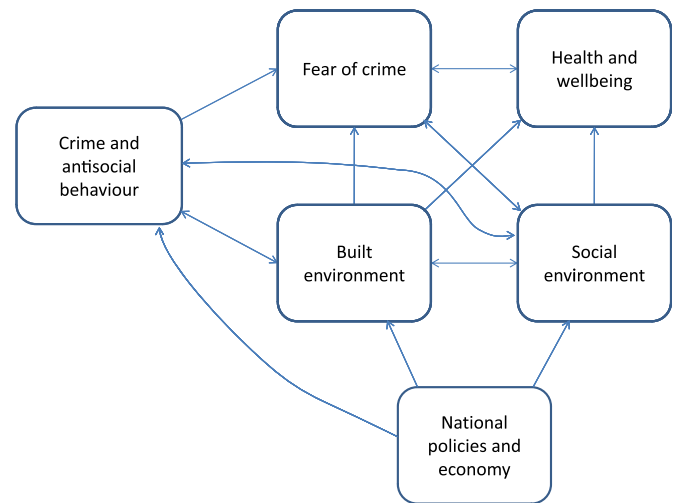

Fig. 1. Overview theoretical model

Fig. 2 presents the more detailed model, in which the six main areas are disaggregated into sub-concepts (with some areas of overlap) and the links set out in more depth. The main areas are shown as large hollow boxes, the sub-concepts as smaller shaded boxes, and the links as arrows.

The main concepts and sub-concepts are as follows.

- 'Crime and disorder' includes all types of crime and antisocial behaviour;
- 'Fear of crime' includes two main dimensions: the perceived likelihood of victimisation (the cognitive dimension) and the emotional response to the possibility of crime (the affective dimension);
- 'Health and wellbeing' is an inclusive concept including physical and mental health outcomes, health behaviours, and social wellbeing;
- 'Built environment' includes all factors relating to the physical environment insofar as they are shaped by human activity;
- 'Social environment' has been conceptualised on the basis of a previous review of theories (McNeill et al., 2006), and includes social inequalities and interpersonal networks, as well as the distribution of social factors in space ('neighbourhood and community factors'), which overlaps with the built environment; and
- 'National policies and economic factors' includes all broader policy or economic factors which may have an impact on crime or fear.

Due to limited space and resources, not all of the potential links identified in Fig. 1 have been dealt with in detail in the review. In particular, we have excluded the social, political and economic causes of crime from our scope (i.e. the links going from the social environment and national policy to crime). In addition, we have not considered the policy-level determinants of other factors in any detail; national policy is included in the framework mainly as a reminder that all the factors are shaped directly or indirectly by macro-level determinants. These limitations of scope should be borne in mind in interpreting the framework.

In the following sections we discuss the links between these concepts and their sub-concepts.

3.1. Crime, health and wellbeing

Crime may influence health in a range of ways (Hirschfield, 2004). A distinction can be made between direct and indirect
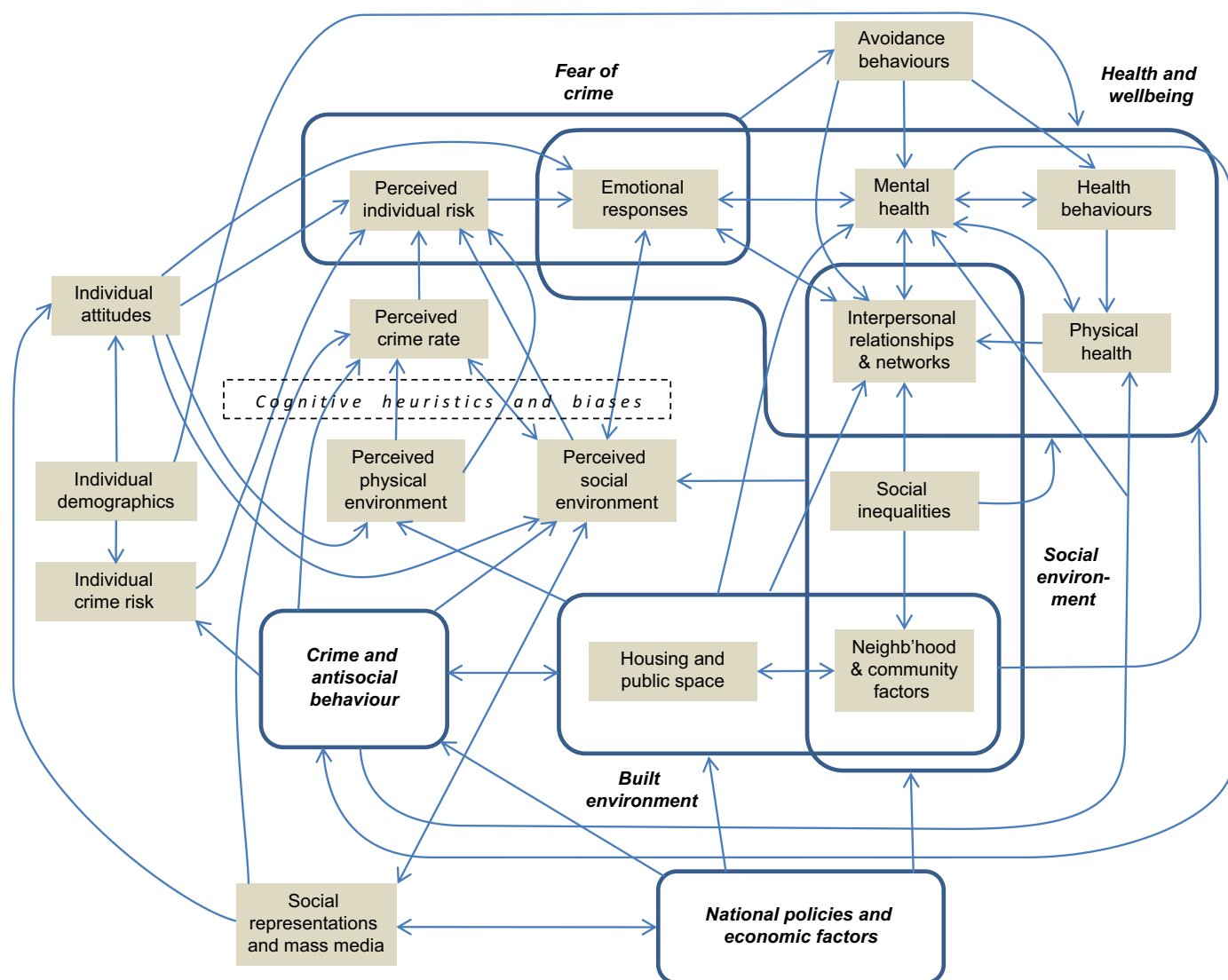
Fig. 2. Detailed theoretical model

impacts (McManus and Mullett, 2001). Direct impacts include both physical injuries and psychological trauma as a result of being victimised. Most direct impacts arise from violent crimes against the person (although non-violent crimes such as burglary may also have direct psychological impacts on victims). These direct impacts are represented in the framework by the link from crime to physical and mental health. Indirect impacts include a wide range of negative effects which crime can have on wellbeing at an ecological level, apart from its direct effects on victims. Most of these effects are likely to operate mainly at neighbourhood level, and are represented in the framework as several distinct pathways linking crime and wellbeing via physical and social environments, the perceived environment, and fear of crime.

The direct impacts of personal victimisation, particularly of serious and violent crime, on individual victims' health have been the focus of most studies of crime and health (McCabe and Wine, 1997; McManus and Mullett, 2001; Robinson and Keithley, 2000). A substantial body of literature documents these direct physical and mental health impacts on victims, which are often substantial and long-lasting, and unequally distributed across the population (see for example Norris and Kaniasty, 1994; Russo and Roccato, 2010). 'Domestic' crimes, including child abuse and intimate partner violence, may have particularly serious health impacts

(Campbell, 2002; Coker et al., 2002; Fanslow and Robinson, 2004). The significance of these direct impacts at a population level is unclear. Violent crimes occur relatively rarely—approximately 40 incidents per 1000 people per year in England and Wales (Home Office, 2012)—so the impact of their direct effects on the health of the general population is likely to be limited. However, due to the unequal distribution of crime, the impact on certain groups may be greater.

The indirect impacts of neighbourhood crime on health and wellbeing are more complex in nature. Area-level violent crime has been found to be associated with a range of negative health status outcomes, including all-cause mortality (Wilkinson et al., 1998), coronary heart disease (Sundquist et al., 2006), and preterm birth and low birth weight (Messer et al., 2006), as well as with health behaviours such as lower physical activity (Gómez et al., 2004; McDonald, 2008). Exposure to violence in the areas in which people live is also known to be associated with poorer physical and psychological health, particularly for children and young people (Boynton-Jarrett et al., 2008; Fowler et al., 2009). However, although these associations are well-established, the causal pathways involved remain open to debate. One mechanism which has been of interest to sociological researchers is the diffuse effect of structural inequality and disadvantage in conjunction with

repeated victimisation or the threat of victimisation. Such 'latent' structural violence may particularly affect women, people from ethnic minorities and people of lower socio-economic status, and has been encapsulated in the concept of 'spirit injury' (Walklate, 2007; Spalek, 2008).

Health itself may also have an impact on crime: people with health problems, particularly serious mental health problems, may be at greater risk of being the victims of crime (Choe et al., 2008; Maniglio, 2009; Teplin et al., 2005). This is represented in the model by the pathway from mental health to crime.

Finally, health behaviours are also included as a dimension of wellbeing in the model, and may themselves be linked to crime. Alcohol consumption is of particular interest here. At an individual level, problem drinking is known to be associated with violent offending (Shepherd, 2007); at an area level, alcohol outlet density is associated with alcohol consumption and related harms, including injuries and violence (Campbell et al., 2009; Popova et al., 2009). However, as in the example above, the direction of the causal relationships underlying these associations are not entirely clear.

3.2. Fear of crime and health and wellbeing

The framework includes four potential pathways connecting fear of crime to health and wellbeing outcomes.

(1) The anxieties induced or expressed by fear of crime may have an impact on mental health, and indeed may be considered a wellbeing outcome in themselves.
(2) Poorer health, particularly mental health, may exacerbate fear of crime.
(3) Fear of crime may lead to avoidance behaviours such as limiting one's movement outside the home, which may have a negative impact on (a) social interaction and (b) physical activity.
(4) Fear of crime may have an impact on social wellbeing at an ecological level.

Pathways 1 and 2 are difficult to disentangle empirically, as they link the same types of outcomes in opposite directions. The link itself is fairly well-established: several studies have found that affective measures of fear of crime are associated with poorer mental and physical health, although effect sizes are generally modest (Beatty et al., 2005; Chandola, 2001; Green et al., 2002; Roberts et al., 2010; Ross, 1993; Ross and Mirowsky, 2001; Stafford et al., 2007). There is also some evidence of an association between cognitive measures (perceived crime or risk of crime) and poorer health outcomes (Kitchen and Williams, 2010; White et al., 1987), although the findings here are less consistent, and other studies find no association (Bowling et al., 2006; Johnson et al., 2009).

However, while pathway 1 is likely to account for at least some of this association, pathway 2 may also have some effect, in that poor health, particularly mental health, may increase perceived vulnerability and hence fear of crime (Whitley and Prince, 2005). People in poor health have been found to be much more likely to report that fear of crime has a high impact on their quality of life: 20% for those with 'bad' or 'very bad' health, compared to 5% for the general population (Allen, 2006). Whereas much fear of crime, as measured by standard instruments, appears to be benign and 'functional' (Jackson and Gray, 2010), people with mental health problems are disproportionately likely to experience fear which has a substantial impact on wellbeing (Whitley and Prince, 2005). This has implications for the planning of interventions: if pathway 2 rather than pathway 1 explains much of the observed association between fear of crime and

health, then reducing crime and the fear of crime may have limited potential to improve health and wellbeing. This said, longitudinal data suggests that pathway 1 does have a significant impact independently of pathway 2 (Stafford et al., 2007). Rather than simply coexisting with pathway 1, pathway 2 may interact with it, in a vicious circle or 'feedback loop' between fear of crime and ill-health (Jackson and Stafford, 2009).

Pathway 3 links fear of crime to wellbeing via the avoidance behaviours adopted to lessen the perceived risk of victimisation. Many of these are everyday precautions which are likely to have little impact on wellbeing (e.g. locking doors). However, others may limit individuals' activities to a considerable extent, as they reorganise their lifestyles to avoid areas or activities perceived as involving exposure to risk. For women particularly, extensive constraints on behaviour resulting from fear may become internalised and normalised as an attitude of constant vigilance, with pervasive and potentially serious consequences for wellbeing (Campbell, 2005; Condon et al., 2005; Pain, 1997, 2000; Stanko, 1997).

These avoidance behaviours may be linked to health and wellbeing outcomes in two ways. First (pathway 3a), avoidance behaviours may limit interpersonal interaction, leading to poorer mental health (Stafford et al., 2007). Again, there may be a feedback loop here whereby limiting social interaction also increases fear in its turn (Liska et al., 1988). Second (pathway 3b), they may limit outdoor physical activity, hence leading to poorer physical health. This pathway has received considerable attention in the theoretical literature (Loukaitou-Sideris and Eck, 2007), although the empirical findings are mixed (Carver et al., 2008; Foster and Giles-Corti, 2008).

Pathway 4 hypothesises that fear of crime leads to decreased trust and cohesion within communities and to individual withdrawal, with a series of feedback loops at ecological and policy levels leading to progressive decline in social and physical environments, which then impact negatively on wellbeing (Skogan, 1986; Vanderveen, 2006). This can be seen as an extended loop which goes from fear of crime to interpersonal relationships, and from there (as part of the social environment) directly and/or via the built environment to the perceived environment and back to fear of crime. However, while this pathway has received considerable theoretical attention, many of the posited links are difficult to substantiate empirically.

Of the seven studies of associations between fear of crime and health cited above, two attempt to quantify the relative importance of these pathways. Ross (1993) investigates psychological distress (pathway 1) and physical activity (pathway 3b), and Stafford et al. (2007) physical activity (pathway 3b) and social interaction (pathway 3a), as potential mediators. Both find that a substantial amount of the association is explained by these pathways, but not all. This may indicate that broader, more diffuse connections, such as those hypothesised in pathway 4, play a role in the health and wellbeing impacts of fear of crime.

3.3. Crime and fear of crime

The link between crime and fear of crime is more complex than it may initially seem. This is partly because the concept of fear of crime is beset by issues of definition and measurement. It has been widely argued that standard measures of fear of crime tend to reflect general anxiety or unease, or broader perceptions of the social and physical environment, rather than anything specifically to do with crime (Farrall et al., 1997; Garofalo and Laub, 1978; Taylor and Jamieson, 1998). Empirical studies have generally found little relation between objectively measured probability of victimisation, or even actual experience of victimisation, and individuals'

fear or estimates of their own risk (Farrall et al., 2007; Hale, 1996).

Thus, there does not appear to be a reliable direct link between crime and fear of crime (the so-called 'risk–fear paradox' (Farrall et al., 2007)). Two implications may be drawn from this. The first is that fear of crime may be driven less by crime itself than by factors such as the physical environment or interpersonal relationships; these theories are examined in the following sections. The second, going back to the classic work of Tversky and Kahneman (1974), is that the link between crime and fear may be influenced by various biases and pragmatic procedures for estimating risk ('cognitive heuristics') which lead to inaccurate assessments of risk. For example, the 'anchoring and adjustment' heuristic involves using a single piece of information as an 'anchor' for estimates of risk and 'adjust' other information to fit. This may help to explain the finding that most people think crime is much worse at a national level than in their local area: media coverage of serious violent crime forms the anchor for estimates of risk, and people's direct experience of less serious, more high-volume crimes is adjusted accordingly (Moon et al., 2009). Such heuristics may also explain the potential for intensive policing interventions to increase fear by raising awareness of crime (Hinkle and Weisburd, 2008). They may act on a social as well as an individual level through the 'social amplification of risk' (Jackson, 2006; Pidgeon and Kasperson, 2003); the mass media may be particularly important here, although individual media consumption does not appear to be strongly associated with fear of crime (Chadee and Ditton, 2005; Ditton et al., 2004).

More broadly, the distinction between 'rational' and 'irrational' or 'symbolic' fear which underlies much work on the crime–fear relation (Elchardus et al., 2008) has been criticised as inadequate for understanding the place of fear in individuals' lives (Jackson, 2009; Lupton and Tulloch, 1999; Sparks, 1992). In particular, the concept of 'spirit injury' mentioned above indicates the inadequacy of labelling as 'irrational' any fear driven by factors other than the incidence of crime. For example, women's fear of rape appears to be substantially influenced by the experience of day-to-day sexual harassment, threats, and relatively minor sexual crimes such as indecent exposure (Valentine, 1989). It is thus considerably more grounded in reality than the simplistic juxtaposition with 'objective' risk of rape would suggest.

3.4. Built environment and health and wellbeing

The main theoretical frameworks linking factors in the built environment to health and wellbeing invoke some form of environmental stress theory, which sees wellbeing as determined by the balance between environmental stressors, such as noise, traffic, poor housing, or overcrowding, and countervailing protective factors, such as social integration (Halpern, 1995; Northridge et al., 2003). Such theories are well-supported by empirical studies of associations between these stressors and mental health outcomes (Evans, 2003; Halpern, 1995).

Crime and the threat of crime can readily be integrated into this type of theory as part of the complex of environmental stressors (Ellaway and Macintyre, 1998). The environmental stress concept is thus a useful framework for thinking about crime and fear of crime as mediators between environmental determinants and health outcomes. In addition, it supports the idea that the cumulative effect of everyday stress and anxiety can have a substantial effect on wellbeing—analogous to Arline Geronimus' 'weathering hypothesis' (Geronimus, 1992; Geronimus et al., 2006)—which helps to fill out the broader picture of the impacts of crime beyond its direct physical effects on victims.

The framework represents the potential influences of the built environment on health in terms of three main pathways. The built environment may affect health via its impacts on health behaviours (Humpel et al., 2002; Saelens and Handy, 2008); via its effects on crime or fear of crime; or via the social environment.

3.5. Built environment and crime

A range of features of the built environment have been hypothesised to have an impact on crime rates. The majority of the literature on these impacts focuses on identifying features of the built environment that provide opportunities for criminal acts, which may then be adjusted to reduce or prevent crime (Robinson, 1999). Some of these theories have adopted a distinction between 'crime science', which emphasises situational opportunities for crime, and (traditional) criminology, which focuses more on the social, economic and political determinants of crime.

Several strategies in the built environment have been shown by high-quality systematic reviews to be effective in reducing crime, including improved street lighting (Welsh and Farrington, 2008b) and, in a limited range of contexts, closed-circuit television (Welsh and Farrington, 2008a). Environmental design approaches are effective in reducing robberies in retail settings (Casteel and Peek-Asa, 2000), although there is little robust data on such approaches in residential or community settings (Eck, 1998).

The most influential theoretical paradigm has been Crime Prevention Through Environmental Design or CPTED. CPTED emphasises three key concepts as mediators between the physical environment and crime and other negative outcomes: ownership or territoriality; surveillance; and access control (Cozens et al., 2001; Robinson, 1999). CPTED theorists recommend specific design practices to increase these mediators, for example, clearly demarcating public from private space, and removing visible signs of neglect (litter, graffiti, etc.), to promote territoriality (Taylor, 2002); improving visibility to increase surveillance; and limiting points of entry to control access.

CPTED has been widely influential among policy-makers, particularly in the USA and the UK, and has been incorporated into initiatives such as Secured by Design, which recommends the integration of crime prevention into the planning process (Armitage, 2004). However, CPTED has been criticised for focusing on local-level initiatives which may merely displace crime to other areas (Cozens et al., 2005); for focusing on public outdoor spaces to the neglect of private or domestic spaces (Davies, 2008); and for encouraging a 'bunker mentality,' leading to reduced social cohesion as communities withdraw behind the barriers of 'defensible space' (Cozens et al., 2005).

In addition, there is limited empirical support for many of CPTED's more distinctive claims about territoriality and surveillance (although the potential for interventions in the built environment to reduce crime is well established in general). Much of the empirical literature on built-environment factors and crime (reviewed in Schneider and Kitchen, 2007) consists of cross-sectional observational studies with inadequate controlling for confounders, and systematic reviews are lacking, so the reliability of this literature is limited. However, more recent and methodologically sophisticated research, particularly using the 'space syntax' approach to model social interactions in space, has reported some promising results which may validate some of the predictions of the theory (Hillier and Sahbaz, 2007; Friedrich et al., 2009).

3.6. Built environment, social environment, national policy and fear of crime

The built and social environment may have an impact on crime rates, and the latter on fear of crime. In this sense, the environment

may have an impact on fear indirectly, by providing information about crime rates, which individuals then build into their risk perceptions. However, as we have seen, fear of crime may also express broader dissatisfactions with the environment. Hence, the environment may impact on fear of crime directly, independently of its effects on crime, by inducing feelings of threat, anxiety or alienation which are expressed as fear.

Two main theoretical approaches to the impacts of the environment on fear of crime can be found in the literature (Crank et al., 2003; European Crime Prevention Network, 2004; Franklin et al., 2008; Kanan and Pruitt, 2002; Vanderveen, 2006). 'Incivilities theory' or 'social disorder theory' emphasises the role of sub-criminal but antisocial activities in the local environment, and of evidence of neglect and decay, in the genesis of fear of crime. The concept of 'incivilities' here includes both problems in the built environment, such as vandalism and abandoned properties, and problems in the social environment, such as people dealing or using drugs. (The term 'broken windows', introduced by Wilson and Kelling (1982), has often been used as an umbrella term for such approaches, although it has taken on other connotations in its convergence with 'zero tolerance' policing (Harcourt and Ludwig, 2006).) 'Social integration theory' emphasises the role of local-level social networks as determinants of fear. To these two we can add CPTED theory, whose hypotheses about the influence of the environment on crime have often been extended to claims about the influence of the environment on fear of crime.

Incivilities theories appear to be fairly well-supported by observational data, which show a consistent association between perceived social and physical incivilities and perceived risk or fear of crime (Box et al., 1988; LaGrange et al., 1992; Lewis and Maxfield, 1980; Perkins and Taylor, 1996; Robinson et al., 2003; Scarborough et al., 2010; Wyant, 2008). Some findings indicate that incivilities are more strongly associated with the cognitive dimension of fear (perceived risk) than the affective dimension (LaGrange et al., 1992; Rountree and Land, 1996), and more strongly with fear of property crime than with fear of personal crime (LaGrange et al., 1992).

However, other research indicates that an individual's perception of social and physical disorder is a better predictor of their fear than objectively assessed measures of these problems (Taylor, 1995; Taylor and Hale, 1986). This finding has suggested to some researchers that the observed association between disorder and fear may result less from individuals' using disorder as an indicator of risk than from the social meanings of environmental conditions (Curtis, 2010), such that their relation is more an 'expressive' link than a cause–effect relationship (Hope and Hough, 1988).

Social integration theory is less well-supported; indeed, even the predictions to be drawn from it are ambiguous. Some researchers suggest that fear of crime may be mitigated by social support, while others argue that higher social interaction may increase fear of crime by increasing communication about crime (Skogan, 1986). The empirical literature does not suggest a relationship in either direction (although such a relationship may be obscured by the heterogeneity of the outcome measures used). Some studies find an association between stronger social interaction or cohesion and lower fear of crime (Gibson et al., 2002; Riger et al., 1981; Scarborough et al., 2010). However, many studies find no consistent association (Clarke and Lewis, 1982; Green et al., 2002; Kanan and Pruitt, 2002; Roman and Chalfin, 2008; Ross and Jang, 2000; Sacco, 1993; Shields et al., 2003).

CPTED-type theories of the determinants of fear are also not fully confirmed by the data. For example, CPTED theory predicts that larger building size will be associated with lower 'territoriality,' and hence with higher fear, but the empirical findings are mixed (Newman and Franck, 1982; Normoyle and Foley, 1988).

Finally, although few data were located on policy-level determinants of fear of crime, one study finds that more generous social welfare policies are associated with higher levels of perceived safety (Hummelsheim et al., 2011).

4. Conclusions

This review illustrates the multiple and complex nature of the theoretical links between crime, fear of crime, the environment and health and wellbeing. It is well-established that crime has substantial direct health and wellbeing impacts on individual victims. Indirect area-level links between crime and health, for example through the effects of chronically high crime rates on social relationships, are less well established. Crime may be influenced by the physical environment, although limited robust evidence is available. Fear of crime appears to have a modest adverse effect on wellbeing, and on health behaviours such as physical activity. Fear of crime may be substantially influenced by physical environmental factors, such as neglected and run-down environments; its relation to the social environment is less clear. The concept of fear of crime is unclear, and the validity of many commonly used quantitative measures is widely questioned; it appears to be only loosely related to crime.

Although substantial bodies of theory and evidence exist in many of the subfields included in the framework, this paper reports what we think is the first attempt to produce a synthesis of the diverse literatures to provide an overarching representation of the theoretical pathways between the environment, crime, fear of crime, and health and wellbeing. Our review also indicates several areas in which systematic reviews would be of value, particularly the association between fear of crime and health outcomes; and built-environment correlates of crime and fear of crime. However, any such work would need to take into account the methodological challenges of synthesising evidence on the fear of crime, particularly the questionable reliability of many standard measures.

The review has certain limitations, resulting both from the methodology adopted and from the nature of the underlying evidence. The review did not employ formal systematic review methods, and the methods employed were open to bias in terms of both the selection and interpretation of the underlying data. A wide range of material was used to construct the framework, from broad, abstract theory to quantitative studies of specific associations, and different areas vary widely in terms of the nature of the evidence supporting them. Within fear of crime research in particular, we can distinguish between a more positivist tradition which is reliant on quantitative evidence, and a more critical tradition, based primarily on qualitative research and incorporating insights from critical and feminist sociology; these have long been distinct paradigms, and only relatively recently have researchers tried to draw them together (e.g. Farrall et al., 2009). In several cases, especially with respect to the purported 'risk–fear paradox', these paradigms may not only generate conflicting findings and narratives, but disagree fundamentally on the very nature of the phenomena to be examined.

As noted above, this review could not encompass all relevant factors. In particular, the framework does not cover the social, economic and political determinants of crime. In addition, a number of areas are covered only in summary terms, and would benefit from more detailed investigation, for example, the interactions between different dimensions of wellbeing, and the psychological mechanisms underlying judgements about and affective reactions to the environment.

Another recurring issue is the difficulty of establishing the directionality of causal relationships from theories and observational data alone. In particular, further work on the relation between fear of crime and mental health along the lines of Stafford et al. (2007) would be valuable. Finally, while the graphical representation of the model is a useful tool to communicate the findings, it should not be taken too literally; in particular, the impression that the various concepts are discrete and well-defined, and the links between them homogenous, may be misleading.

We can tentatively propose the following more distal causal pathways linking crime and the fear of crime, and their environmental cues, to health and wellbeing. First, crime and fear of crime may have a substantial impact on wellbeing for certain groups within the population, such as people with mental health problems. Second, fear of crime is linked to health outcomes at an ecological level as part of a wider complex of environmental stressors. Third, fear of crime measures may express broader dissatisfaction with the environment.

However, in a number of areas there is less evidence for causal linkages. Generally, there appears to be limited reason to think that crime or the fear of crime, taken in isolation, are major determinants of health or wellbeing outcomes (or mediators of environmental determinants) for the general population at an ecological level. In particular, it is hard to establish pathways from crime to health outcomes, for several reasons: pathways via fear of crime are subject to considerable uncertainty; direct health impacts on victims of crime, while often serious for individuals, appear to be of limited importance at population level, due to the relatively low incidence of serious violent crime; and the strong correlation of both types of outcome with material disadvantage makes it difficult to test hypotheses about specific independent pathways between crime and health.

The potential implications for interventions are, therefore, also mixed. The framework suggests that interventions in the physical environment which reduce the fear of crime may have some beneficial impacts on health and wellbeing at a population level. Several different wellbeing dimensions might show positive impacts of such interventions, including mental health, health behaviours, and social relationships. The potential for environmental interventions which focus on crime prevention to improve wellbeing is less clear, and there is some possibility of negative effects if interventions increase awareness of crime, and hence fear. The framework suggests that interventions which integrate crime reduction into a broader set of objectives, and address other environmental determinants of wellbeing, are more likely to positively influence wellbeing outcomes. However, a robust systematic review of empirical data is required to confirm this hypothesis.

More generally, the potential challenges which the framework identifies for interventions in the physical environment indicate that other factors may be more promising loci of intervention. In particular, addressing determinants of crime in the social environment or at the policy level may be a more effective way to improve wellbeing. However, this lies beyond the scope of the present review.

On a methodological level, the work described in this paper indicates the feasibility and value of undertaking a wide-ranging exercise in meta-theory construction, based on a disparate body of theories and evidence, in order to inform evidence syntheses of complex social interventions. As has been claimed for 'logic model' approaches in general, the framework promotes an understanding of the internal mechanisms of interventions. However, the approach outlined here goes beyond this to provide an outline of the broader context within which interventions take place, and hence helps to identify unexpected factors which may affect intervention success. For example, it illustrates the risk of adverse effects from crime prevention interventions as a result of raising awareness of crime. Finally, it provides a conceptual vocabulary which can translate between divergent constructs, and hence may assist in producing a coherent synthesis of evidence on a wide range of interventions.

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