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**The Geography of Crime; Contextualising 'Place' and 'Space' in
the Geography of Crime and encouraging inclusiveness**

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A Thesis submitted to the University of Huddersfield in partial fulfilment of
the requirements for the degree of Doctor of Philosophy.

October 2018

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Abstract

The Geography of Crime has narrow empirical spatial analysis and pattern exploration outlooks with minimal developmental history. This thesis responds to the question of whether the contemporary Geography of Crime ethos is broad enough to facilitate high value geographical perspective knowledge generation. Two disparate topics, spatial 'near repeat' (NR) offending and Crime Prevention Through Environmental Design (CPTED) are critically examined and synthesised, interacting with a further topic of the integrity of Police Recorded Crime (PRC) data. Detailed NR analysis covers an early urban preventative initiative and robust identification of NR patterns in individual offending, requiring new analytical frameworks and methodologies and an original contribution to the analysis of NR. That study, unique in nature and subject, reveals sustained but individualistic NR behaviour by serial offenders and suggests crime Pattern Theory linkage. CPTED papers probe development over time and generate a robust evidence based action framework, positively linking academic and practitioner fields. PRC data integrity is questioned through a development timeline and use of Freedom of Information Act (FOIA) submissions gathering time separated PRC data. Results establish questionable police records management practices that negatively influences PRC data integrity. Research use of the FOIA, being an original contribution to knowledge, is also able to provide research methodology guidelines in its use for social scientists. Work follows opposing ontologies but critical examination exposes in-depth linkage to conceptual geographic concepts of 'place' and 'space', the geography outlook emphasised as the entwining position of the authors study of crime. It brings to the fore how mixed themes can engage in the generation of new knowledge but that the contemporary ethos of the Geography of Crime is at risk of being too narrow in what appears to have become a predominantly locational quantitative approach and as such can lead to attenuated cross-disciplinary inclusivity and knowledge generation.

Acknowledgements

It feels ironic to be writing acknowledgements for this text when I find myself reading many such sections in student dissertations and the like during the year. Almost all acknowledge parents and I now realise that it is (thankfully) inevitable. I must acknowledge both my parents for supporting me through life, especially with regard to all education/academic routes I have taken, as much now as 50 years ago.

Likewise, my wife Geraldine deserves my ever present thanks and gratitude for the never ending support she provides. It will never be forgotten.

Finally, I must thank my supervisors Rachel and Leanne for always being available and responsive to my texts and emails. They provided much needed direction and motivation, which at times can be difficult to self-generate. I am grateful to all.

Derek Johnson

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“An ounce of prevention is worth a pound of cure”

Benjamin Franklin, 1735

1.Introduction

In 1735, long before reaching heights that would lead to recognition as a Founding Father of the United States Benjamin Franklin penned the above quotation (Franklin, 1735), ultimately creating the iconic ‘Prevention is better than cure’ phrase so well known today.

Taken in the context of firefighting (Franklins’ original concern) or other singular matter the term prevention and its quantification becomes clear; an action that leads to fewer deaths/injuries by fire and is therefore quantifiable by the number of fire related deaths/injuries. If taken in the context of crime, we are presented with a far more complex and very different picture yet one for which the quantifiability of crime prevention has often become singular and stereotypical; prevention of crime leads to (is quantified by) a (singular) reduction in criminal events. The prevention sought is often of a particular type of crime but crime and its outcomes are far from being singular in nature. The issue of crime prevention initially presents two aspects to consider, the ‘quantifying’ of crime (counting, records management, data transparency) and variables to measure (crime count or rate, victimisation, economic impact, fear of crime, community cohesion etc.). It is these complexities and their spatial nature that this thesis considers.

Conceptually the approach taken in this thesis draws upon two academic themes extant in the sample of work drawn upon: spatial analysis of crime and Crime Prevention Through Environmental Design (CPTED). Both are areas of public and academic interest and in turn often make use of crime data records when examined, spatial analysis as the core component and

CPTED when being evaluated or assessed in some form. The value/integrity of the crime data records held by U.K. police forces (and therefore so often used in academic enquiry) is examined as a third core topic impacting upon the two themes. Table 1 summarises the six peer reviewed and published works drawn upon.

The first two publications discuss spatial analysis of crime events. Beginning with a case study of localised analysis leading to a crime prevention model the journey begins on a sure crime prevention footing. Extending to a wider macro scale the second publication furthers theoretical and practical knowledge on spatial behaviour of offenders interacting with the spaces and places in which they operate. This second paper significantly advances the contemporary knowledge base on the phenomenon of spatial behaviour that has become labelled 'near repeat'. Up to this point in time analysis work in this area was predominantly and almost exclusively centred on areal analysis of spatial crime data to identify if such patterns of behaviour were apparent in a town, city or similar. Paper two steps in to that arena and pulls the scale of enquiry down by examining the individual behavioural patterns of individual serial offenders. It shifts the focus of enquiry from the aggregated areal, and as such environmental outcome to the individual offender through the spatial lens. Identifying near repeat behaviour at the individual level, and the strength of that behaviour to the point where it becomes effectively long lasting and habitual makes a significant contribution to an otherwise environmental study agenda. In addition, the paper notes the topic of Police Recorded Crime data (PRC) integrity and details how this was mitigated within the data set through triangulation, going beyond the more generic manner of declaring a data caveat.

Publications three and four investigate a long established and core place based crime prevention method. CPTED promotes synchronising design of the built environment with key principles generated through a theory driven framework that considers potential impact upon crime.

Principles are aimed at crime prevention, so seeking high prevention value design of the place and spaces within it. Publication three critically reviews extant CPTED schema and promulgates a revised framework for academic and practitioner reflection. CPTED is built upon crime theories that are predominantly 'place/space' oriented and success is reliant on impacting the spatial behaviour of users and offenders in a particular environment.

The final two publications focus upon crime data, its availability, impact and integrity, all core problems for an empirical approach to evaluation using crime data. Publication five seeks to quantify at the macro scale of England crime committed by inter European Union (EU) migrants in 2011. The identity and integrity of police recording of crime data is identified as problematic and in the context of the research leading to the published analysis raises questions on how well policy development is informed in the justice arena. This topic of crime data integrity, particularly PRC data, takes the foreground in publication six, with a full exploration of data availability, accuracy and questionable records management techniques within English police forces. Whilst following the topic of PRC data integrity the paper extolls the virtues (and otherwise) of the Freedom of Information Act 2000 and its use as a suitable data collection methodology within predominantly the social sciences. It makes a significant contribution to the PRC data integrity issue by adding to the somewhat overused argument of poor conversion from report to recording by in depth examination of records management outcomes. It reports that whilst the reporting vs recording feature is an established issue the correct and systematic maintenance of that final data record must also be called in to question; the issue of integrity is not called to a halt solely by ensuring correct reporting vs recording processes are in place. As a result of the work undertaken and analysis of outcomes across English police forces the publication is able to state, with strong justification, that "Uncertainty, therefore, exists throughout the process of producing, recording and ultimately disclosing administrative data." (P6, p261), a statement that highlights the all-encompassing records management processes as

being problematic to PRC data. It also adds significantly to the knowledge base on the academic research use of the Freedom of Information Act 2000. Only one prior piece of work (in the form of an informative bulletin from University College London) was found that provided a framework and action list assisting researchers in the use of the Act as a valuable resource. **P6** concludes by providing an updated version of that activity framework.

Table 1. Peer reviewed publications

Topic	Reference*	Published text	Product
Near Repeat phenomenon - Offenders spatial selection process of crime location.	P1.	Johnson, D. (2008). The near-repeat burglary phenomenon, in Chainey, S. and Thompson, L. (Eds) <i>Crime mapping case studies: Practice and Research</i> . Chichester. John Wiley & Sons	Reporting on an early reduction initiative where near repeat patterns were utilised to drive a prevention initiative.
	P2	Johnson, D. (2013). "The space/time behaviour of dwelling burglars: Finding near repeat patterns in serial offender data." <i>Applied Geography</i> v41 pp139-146	Near repeat analysis of behavioural patterns of individual serial offenders. Such behaviour found to be apparent across sample of serial offenders identified.
Crime Prevention Through Environmental Design.	P3	Gibson, V. and Johnson, D. (2013). "CPTED, but not as we know it: Investigating the conflict of frameworks and terminology in crime prevention through environmental design." <i>Security Journal</i> , v41, pp139-146.	Identifies significant diversity in the academic configuration of CPTED and the generation of a framework to enable multi-agency work and cross collaboration.
	P4	Johnson, D., Gibson, V., McCabe, M. (2013) "Designing in Crime Prevention, Designing out Ambiguity: Practice issues with the CPTED knowledge framework available to professionals in the field and its potentially ambiguous nature." <i>Crime Prevention and Community Safety</i> v16 pp147-168	Examines terminology and descriptive language used by both academia and professional practice in the CPTED field. Significant and potentially damaging diversity was apparent and is discussed in full.
Crime data – lack of, failings, poor quality, difficulties in using.	P5	Johnson, D. (2014). "E.U. Migrant Criminal Activity: Exploring Spatial Diversity and Volume of Criminal Activity Attributed to Inter EU Migrants in England". <i>Applied Geography</i> v50 pp 48-62	Analysis of the volume of crime committed in the U.K. by inter-E.U. migrants in 2011 by drawing on police recorded crime and exploring spatial patterns apparent.
	P6	Johnson, D. and Hampson, T. (2015) "Utilising the UK Freedom of Information Act 2000 for crime record data: Indications of the strength of records management in day to day Police business." <i>Journal of Records Management</i> 25(3) pp248-268	An examination of the use of the FOI requests which led to paper 5 in this series of publications. For this research FOI requests across a 3 year timespan are reported and responses analysed.

*This reference will be used throughout the thesis to cite the published texts.

Crime prevention has historically sought reductions in the recorded levels of crime. However, this thesis questions the integrity of police records management of crime and therefore its use as suitable secondary data. It will state that greater acknowledgement of data uncertainty is required. It will move from unreported/unrecorded crime being the object of discussion to records management practice and the issue of recording change within records. Data integrity is a matter for each of the published texts and it is argued that perhaps it is time for police recorded data to be reassessed as a constructive data source for measuring or assessing crime prevention.

Individually the published works maintain crime prevention as an inherent theme but each can be overshadowed at times with the problematic topic of PRC data integrity and value. Throughout all, the matter of the Geography of Crime as an academic (sub) discipline is an overarching theme, emphasising a call for the geography discipline to play a greater and more diverse part in the academic crime agenda.

Researcher positionality is a topic much discussed in the social sciences arena (Williams, 2014; Dean *et al.*, 2017) but remains important to all research fields. It operates within the philosophy that we cannot see the whole given that we individually develop our observations. Summing up his positionality, Williams (2014 p75) concludes with an intuitive description of the feature stating “In other words, our human-situated interaction with the world –whether by history, culture, geography, experience, or embodiment– conditions how we can understand it.”.

The authors’ positionality holds a position of significance in this thesis, being one discussing seemingly disparate research papers and themes with inherent mixed research philosophies. It is important to set context, in this case the context of research philosophies expressed which do not follow a strong empirical and positivist structure throughout. Positionality seeks to express the contextual setting and expression of philosophy development.

Work presented spans nine years in academia (2008 – present) following a substantial career change in terms of the wider working environment and fundamental philosophies. As a sworn UK police officer (1978-2008), working life primarily revolved around a factual realism approach (Saunders, Lewis and Thornhill, 2003), certainly in part best described by ‘what you see is what you get’ – you get the story based on the evidential information presented. With regard to research development there are clear overlaps between the direct realism approach to research philosophies and the predominantly evidence gathering work of crime detection in the latter half of the 20th century. This was a period overseeing growing reliance on forensic science experienced from two viewpoints; as a pro-active crime investigator and as a more ‘evidence detached’ intelligence officer. Two contrasting roles balanced the formal regulatory perspective and confrontational interaction with offenders. An intelligence role included handling offenders as valuable information resources, relying on a non-confrontational, perhaps supportive but trustworthy relationship to garner information on the criminal activity of others.

The last few years in service saw a move from operational policing to strategic and tactical analytical work. Effectively a completely new concept to UK policing introduced via the National Intelligence Models business approach to policing (Ratcliffe, 2016) it never the less did not stray from the empiricist path set before it. Having been generating crime records for many years the analytical role was embroiled in the management and analysis of recorded crime. Used to produce empirical outputs justifying resource use, it led to critically questioning that empirical standard and the integrity of underlying data. Strategic and tactical work led to being instrumental and operationally involved in the development of a Night Time Economy (NTE) operational team to tackle alcohol related violence in Bournemouth, the largest and most problematic NTE along the south coast for 50 miles in any direction. Bournemouth faced an unusual position when its NTE of the early 2000’s is considered. The south coast town has a tourism history reaching back to its beginnings in the 1800’s whereas close cities to the east

(Southampton, Portsmouth) have industrial and Royal Navy backgrounds and to the west the nearest city/larger town is almost 100 miles distant. That geography created a town with a heavy entertainment focus at all times which unusually over took nearby cities in intensity and attractiveness. Problems of NTE violence and related crime were much 'bigger' than the town itself.

Beginning in 2005, the team development coincided with political and social concern on the alcohol related violence issue. Within that work the crime prevention facet of policing was hardened. It created a very firm situational crime prevention (Clarke, 1983) and problem solving (Clarke and Eck, 2014) approach, in particular, the preventative internal design of venues and dissemination of such features to the wider geographic environment, so moving in to areas of local authority control. Collectively 30 years of experience therefore garnered an empirical realism approach counterbalanced with elements of constructionism seen primarily through interaction with victims, non-confrontational engagement with offenders, NTE business leaders and local government policy involvement.

With regular reference to the six published texts, this thesis follows the three subjects of spatial behavioural analysis, CPTED and PRC data as delineated sub-sections with the crime record data topic following on from exploration of the two themes of near repeats and CPTED. The document seeks to set the argument that the sub-discipline of the Geography of Crime risks being too narrow in what appears to have become a predominantly quantitative (spatial) approach to the examination of crime as a Human Geography issue. Such an approach impacts upon cross-disciplinary inclusivity and side-lines the Human Geography of criminal activity and behaviour as an approach with limited ability to inform the knowledge base. Fundamental attributes of Human Geography are fully accepted as the creation, understanding, activities, delineation, engagement (and more) in the concepts of 'place' and 'space' (Tuan, 1979; Johnston *et al.*, 2005;

Cresswell, 2008; Agnew and Livingstone, 2011; Potter *et al.*, 2012) but the spatial approach to the study of crime has tended to attend far more to a locational 'place' than 'space'. Cresswell (2008) presents a short paper in which he presents a short timeline of the geography philosophy on 'place', pointing out that as late as the 1970's 'place' was really only explored through the (then) characteristic quantitative approaches of spatial science. Slowly the philosophy evolved to now consider 'place' from more experiential viewpoints but he emphasises that "Ideas such as 'experience' were not in the vocabulary of human geographers in the early 1970s who had been constructing the discipline as a 'spatial science'." (Cresswell, 2008 p135). Of note are his illustrative examples of the contemporary societal relevance of 'place', particularly the notion of architectural/urban development which clearly links with the CPTED agenda. Jorgensen and Stedman (2001) suggest methods of measuring the human 'sense of place' and put forward that the concept is not tied to only the physical attributes of a setting but fundamentally resides in human interpretations of it. Ryden (1993) discusses the place concept at length and adds that "A place, in this sense, is much more than a point in space. To be sure, a place is necessarily anchored to a specific location which can be identified by a particular set of cartographic coordinates, but it takes in as well the landscape found at that location and the meanings which people assign to that landscape through the process of living in it" (Ryden, 1993 p38). Such descriptions of 'place' linking the physical to the conceptual suitably lend themselves to the near repeat phenomenon as well as CPTED.

Tuan significantly progressed the humanistic engagement with the geography philosophy and is one of the most often cited Human Geography philosophical writers. In two philosophical works (1977, 1979) he explores the 'place' and 'space' concepts and moves them on from the spatial science pathway, but highlights both concepts as "defining the nature of Geography" (Tuan, 1979 p387). His complex discussion on 'space' features time as an important aspect in the development of the human 'space' concept from an early age, indicating that time and 'space'

become inseparable in many respects and that one can engage human behaviour in the other. Time as a core feature of the near repeat phenomenon therefore further merges with the Human Geography concept of 'space'.

Given clear and direct linkage between the spatial elements of crime and the Human Geography philosophy rendering 'place' and 'space' to be so much more than reliant on spatial coordinates this thesis responds to the question of whether the academic Human Geography discipline, and therefore the sub discipline of the Geography of Crime, is suitably engaged in crime studies. It will bring to the fore how the two themes of near repeats and CPTED intertwine with 'place' and 'space' and can therefore engage geographers in the generation of new knowledge by the Geography of Crime being an overarching theme throughout. The thesis achieves this through the collation of published academic texts in otherwise apparently diverse areas of study which have had limited geography input. This contextual document will clarify the research motives of the two themes of spatial analysis and CPTED, their within theme and PRC topic linkage and their engagement with a called for inclusive Geography of Crime. Inclusivity of issues and factors is fundamental to the study of geography and that core methodological geography concept has been so described and traced through history (Hartshorne, 1958). The thesis is finalised through a short conclusion.

2. Near Repeat Phenomenon

In its current form the Geography of Crime is neatly summarised by Le Beau and Leitner who draw upon and extend Herbert and Evans' interpretations (Herbert and Evans, 1989; LeBeau and Leitner, 2011). The 1989 book of Herbert and Evans is reputed as the first text book specifically on 'The Geography of Crime' and attempts to set an early context for its academic agenda. One earlier work dating to 1941 can be found as a published article (Cohen, 1941) but is very American centred and at that early point in the philosophical development of both criminology and geography it unsurprisingly has a central concern on empirical Physical Geography (particularly seasonal variations) rather than Human Geography. Setting the introduction to the book entitled "*Crime and Place: an introduction*" (my italics) Herbert discusses the potential impact of the geography disciplines perspective on the study of crime but makes scarce mention of 'space'. He emphasises the point that there is no attempt to suggest that the study of crime should be restricted to a single discipline, a point this thesis adheres to, but then articulates that the Geography of Crime may "belong" to criminologists who could benefit from the perspectives of geographers (Herbert, 1989). The book follows a predominantly empirical path utilising 'place' as a locational tool but its attempt to derive a conceptual Geography of Crime is unclear. One review of the book a year after publication succinctly makes the point "A "geography of crime," then, is not a certain outcome of this work, nor is it clearly articulated in this book." (Kennedy, 1990 p431)

Le Beau and Leitner's (2011) contribution is situated within a focus on spatial methodologies for studying crime and concludes with a shared positive trajectory between Geography, Environmental Criminology, Spatial Criminology and Crime Science. With its spatial analysis and empirical focus little is made of key geographical concepts of 'place' and 'space', indeed the term 'place' in a non-spatial geographical context does not appear within the text. Le Beau contributes

half of the journals special issue introduction by describing the history of the Geography of Crime and its academic development over the last 4 or 5 decades. That description tends toward a United States of America (USA) focus but describes an academic rift between the disciplines of geography and criminology where critical claims about geographers researching crime in the second half of the 20th century led to many being (self) displaced into criminology departments/schools of US universities (including himself). He claims that this led to sub-disciplines such as Environmental Criminology and Spatial Criminology pulling geographers away from their original disciplines and hence a down sliding of the Geography of Crime. Le Beau continues this timeline. He moves to the contemporary and how the spatial analysis of crime renders important information for academia and criminal justice agencies, but he maintains an upward trend only through collaborating with non-geography disciplines. Throughout his text the central paradigm is that the Geography of Crime delivers valuable empirical spatial research outcomes where 'place' becomes the locational tool.

Most recently, a special issue on "The Geography of Crime and Crime Control" of the Applied Geography journal is fronted by an introduction that appears to set further confusion (Vandeviver and Bernasco, 2017). It begins by establishing the sub-discipline of Geography of Crime as one of interest to the academic, but particularly scientific, community and grounded in an ecological approach with basis surrounding Social Disorganisation Theory (Shaw and McKay, 1972). Quickly the introduction turns to spatial (location based) empirical analysis of crime and the development of spatial patterns. The authors discuss the future research agenda of the sub-discipline. Tackling issues such as technology and cybercrime the impetus of location data (geo-referenced) is repeatedly called upon, and so the central paradigm, whilst weak in description, clearly resembles that of Le Beau.

The first two publications in this thesis (**P1, P2**) follow that spatial analysis of crime theme situated in the Geography of Crime by exploring the spatial behavioural patterns of dwelling burglary offenders. Specifically, they examine a feature known as the 'near repeat' phenomenon of offending location choices. However, the papers extend beyond spatial analysis to identify the 'place' of crime and potentially throw light on the 'space' of crime as envisaged by the offender, and so begin the journey of extending the Geography of Crime paradigm beyond empirical spatial (locational) examination.

The near repeat phenomenon concerns crime (dwelling burglary in this case) clustering in both space and time, time being a factor used to understand and delineate levels of risk. It identifies a selection process whereby, after an initial offence of dwelling burglary, the offender returns after a short time to offend again at a nearby dwelling (short distance and time – 'near repeat' offence) as opposed to a pattern where the initial offence location is repeatedly attacked (a 'repeat' burglary).

A much summarised historiography of the 'near repeat phenomenon' spans over 3 decades of spatial crime analysis, coinciding with the development and availability of desktop computing and Geographic Information Systems (GIS). Whilst study of the spatial relevance of crime (importance and relevance of 'place') probably begins with Guerry of the early 1800s (Friendly, 2007), Fletcher in 1861 (Cook and Wainer, 2012), Booth over the turn of the 19th century (Orford *et al.*, 2002) and others, the academic 'place' related study perhaps begins in Chicago in the 1920s and onwards, most notably with Shaw and McKay (Chamard, 2006). It was the introduction of accessible computer assets, GIS and its burgeoning availability that drove forward the spatial analysis of crime, offenders and victims, and that only began in the 1980s (Weisburd and Lum, 2005; Chainey and Ratcliffe, 2013). As late as 1995 Rengert introduces a

text on computer mapping of crime for policing purposes but acknowledges “The development of computer techniques of spatial analysis useful to Police is in its infancy.” (Rengert, 1995 pxiii).

Whilst academic research from the 1970s onwards had derived place oriented theories (Cohen and Felson, 1979; Brantingham and Brantingham, 1981; P. L. Brantingham and Brantingham, 1993), localised aspects became apparent in work undertaken into the factor strongly associated with burglary, namely repeated offences at the same locations. From the 1980s repeat victimisation became a significant topic of research, exemplified by the highly acknowledged Kirkholt Burglary Prevention Project of the mid 1980s with one focus being reduction of multiple victimisation (Forrester, Chatterton and Pease, 1988; Forrester *et al.*, 1990; Tilley, 1993; Farrell, 1995; Laycock, 2001: and others). The Kirkholt Project derived from the politically changing view of crime prevention that by 1984 was openly stated to be a responsibility that could only be accomplished through partnership working. This change in prevention policy, and indeed philosophical belief set also saw the parallel development of a crime situation approach to prevention and the development of new methods (Gilling, 2017). Kirkholt in Rochdale was an area of high crime and high levels of residential burglary that presented great challenges. This response to high crime levels through the Kirkholt project was multi-faceted during a period when the concept of crime prevention as a profession in itself was under rapid development and tended toward a situational approach to the crime itself. Routine Activity Theory (RAT) had been developed by 1979 (Cohen and Felson, 1979) and soon became a cornerstone of much crime prevention thought. The theory, still applicable and in regular use today, has a beauty in its simplicity and intuitiveness which is so succinctly and immediately stated in the abstract of the Cohen and Felson publication “Most criminal acts require convergence in space and time of likely offenders, suitable targets and the absence of capable guardians against crime.” (Cohen and Felson, 1979 p588). A theory that considers the situation or environmental context of the criminal act. It does not consider the characteristic of the offender(s) and so may be interpreted

(in geography terms) as being 'locationally' spatial. However, it does require a 'place' where spatial convergence happens alongside time so that a criminal act can take place in the 'space' of that 'place'. Once time is added, the movement from 'place' to 'space' within that 'place' can materialise; only with that spatial and temporal convergence do we have activity within a 'place' and therefore use of the 'space'. Derived by Cohen and Felson whilst considering the question of why crime was apparently rising in a time when social conditions had significantly improved it evolved from the recognition that those changing conditions led to changing behavioural patterns. Creation of crime opportunity was hypothesised to be an effective by-product. For example greater employment and increased accessibility to external entertainment venues led to more unguarded homes. RAT was an important development, easing the transition of crime prevention focus from the offender to the crime situation (Weisburd, Telep and Braga, 2010) and much of the work of the Kirkholt project dealing with repeat victimisation. It is an explanatory theory, offering an explanation of why a crime may take place in a given location at a given time but suggesting that it is a causal theory is tenuous. It can be argued that the cause of the crime was the presence of victim, offender and lack of guardian in one place and time but the context provided has no insight to the individuals involved.

As the topic of repeat victimisation developed, so the significant pool of literature on this subject began to directly involve a temporal aspect. Pease (1998) identified multiple victimisations as the best single predictor of victimisation, repeated offences at the same location tending to happen at short time intervals. He also drew on contemporary research of the time to establish that considerable evidence existed indicating the perpetrators of these repeat offences are the same. Other work confirmed the small time window of reduction opportunity with regard to repeat victimisation, elevated risk of victimisation for properties subject to a burglary and how that risk deteriorated over time and distance (Polvi *et al.*, 1991; Bridgeman and Sampson, 1994;

Anderson, Chenery and Pease, 1995; Johnson, Bowers and Hirschfield, 1997; Robinson, 1998; Shaw and Pease, 2000).

GIS availability through rapidly improving and cost falling technology, played a part as the ability to map crime and conduct spatial statistical analysis flourished. In 2000 spatial and temporal patterns of repeat burglary in an Australian suburb were explored (Townesley, Homel and Chaseling, 2000). Utilising police recorded data, they explore rates of victimisation and multi-victimisation and include spatial statistical 'hot spot' routines within the research. Their work was primarily concerned with understanding repeat victimisation, often comparing empirical results with the academic knowledge base on the topic (primarily UK based). In those comparisons, they note that the Australian repeat victimisation rate appeared lower than that from Kirkholt and seek to explain the discrepancy. Putting forward a number of explanatory options, which include data integrity issues, they make reference to the work of Morgan (2001), concluded but unpublished at that time. Morgan makes a solitary reference to 'near repeats' in a final paragraph of his work capturing prevention advantages in targeting repeat victimisation. He reported very high concentrations of burglaries during one month in one area of his study but notes that "An examination of these burglaries indicated two repeat burglaries, but also several "near-repeats" -burglaries of dwellings located close to an initial victim that were targeted later in the month." (Morgan, 2001 p112).

Townesley, Homel and Chaseling (2000) credit Morgan (2001) with naming the phenomenon and make two suggestions: that such near repeat behaviour may be a factor in suppressing repeat victimisation rates and that some form of 'contagion' process was operative. They also put forward that the phenomenon was worthy of further research and discussion as a construct to expand knowledge on the relationship between repeat victimisation and hot spots of crime.

The issue of time related risk becomes integrated into the literature through this suggestion that an initial burglary may serve as the precursor of further burglaries at nearby premises – a ‘near repeat’. The ‘near repeat’ hypothesis and disease analogy becomes articulated whereby burglary crime had been found to cluster in both space and time. In such circumstances it was promulgated that the risk of burglary victimisation can be likened to that of a contagious disease, those premises nearest to the initial burglary event being at heightened risk of future attack, such risk decaying both over distance and time (Townshley, Homel and Chaseling, 2000; Bowers, Johnson and Pease, 2004).

Picking up the theme in 2003, Townshley, Homel and Chaseling further examined crime data in Australia to establish if the near repeat phenomenon was apparent. That paper detailed a statistical method known as Knox analysis to analyse police recorded burglary data. Knox analysis was primarily drawn from epidemiology whereby a non-cumulative table is built of the volume of burglary offences within certain time (t) and distance (d) bands. Each cell in the table (e.g. 200m vs zero to seven days, 200m vs eight to 14 days, 200m vs 15-21 days etc.) reports the number of burglaries within t and d parameters and effectively examines data points in bands of time and space to establish the existence of clustering. To establish which cells experienced a greater frequency of events than could be expected by chance adjusted residuals (r) are calculated for each cell. The 2003 results established the existence of space-time clusters with parameters of 200 metres and 2 months, translating to higher risk of victimisation for dwellings within 200 metres of an attacked premise for a 2-month period. Following that methodology Johnson and Bowers (2004a) examined similar data from Liverpool (2004a, 2004b) and found parameters of 300-400 metres and one to two months. In their work, emphasis is placed upon operationalising findings for crime prevention purposes and predictive hot spot mapping.

Contagion parameters describe windows of opportunity during which crime reduction work is most beneficial. For successful operationalisation of such findings authorities with responsibility for crime reduction benefit greatly from the identification of workable parameters. Establishing near repeat activity allows targeting of crime prevention work such as delivery of advice to households within the now established high-risk geographies but within particular time windows of opportunity. From a policing perspective, knowing where and when risk is highest allows for informed crime prevention resourcing, targeting the highest risk area with quick and impactful reduction messages. Such practice has the additional effect of prevention impact on other, usually nearby or literally neighbouring areas to where the benefits are diffused (Clarke and Weisburd, 1994). **P1** stems from the earliest recognition of the near repeat phenomenon as a reduction tool by an English police force. Taking place in 2005 the reduction initiative in Dorset identified the existence of near repeat offences in crime data with workable time and distance parameters, thus enabling a specific reduction strategy to be implemented. Within an urban area experiencing near-repeat behaviour, a buffer of 200 metres was applied to each new victim address, and neighbourhood policing teams were tasked with delivering hard hitting face-to-face advice to neighbouring residents within the buffer. Priority areas of delivery such as housing in the same street and the like were made. The initiative initially disseminated to a handful of other English police forces but at that time Knox/near repeat analysis was computationally problematic for the public services sector and few forces had analytical staff with sufficiently high skill levels.

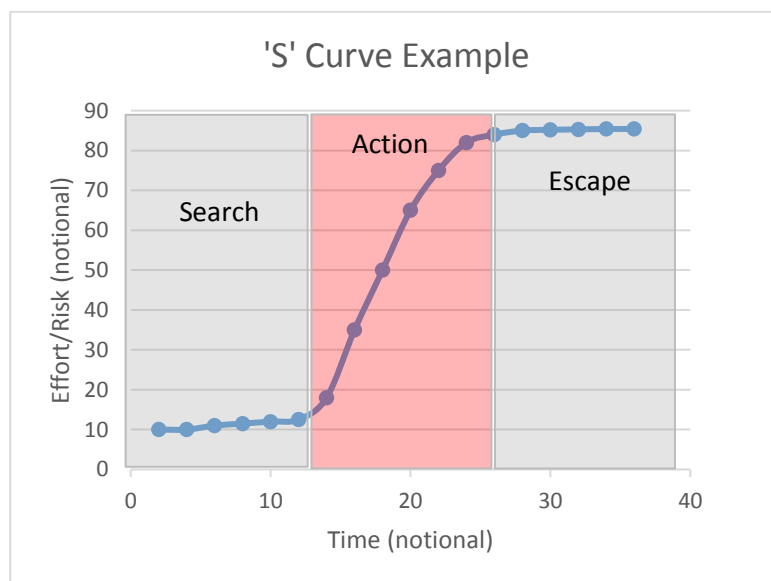
The Dorset Police initiative was evaluated after 10 months and an approximate 5% reduction in burglary crime was noted, however, this was not a statistically significant reduction. Instead, significance is implied the statement “The results of that analysis were perhaps the most telling feature of the intervention strategy. It was concluded that since the intervention was put into

place the 'near repeat' phenomena was no longer apparent but it was confirmed that it had been manifest in the area prior to the intervention." (P1 p8)

Acknowledging the statistical significance factor generally sought through empirical investigations, the text picks up the fundamental point that such a reduction strategy is based upon research identifying a particular aspect of human behaviour, namely how the offender relates to the 'space' around them and therefore operates in that 'place'. Given this position, it is put forward as a positive result that "action (the reduction strategy) had been taken that led to a change in the spatial behaviour of offenders." (P1, p8)

Graphically results could be represented through the standard 'S' curve exemplified in figure 1 whereby actions are differentiated in to three stages, site searching (foraging), action (offence commission) and escape from the scene. Each sectioned activity will require a nominally higher level of effort and/or risk. If taken as the benchmark position a successful preventative intervention would halt the curve development from Search to Action phases.

Fig. 1. 'S' Curve example



Fielding and Jones published a text explaining the use of the near repeat method to inform crime prevention in Greater Manchester during 2010 (Fielding and Jones, 2012). Their work followed the initiative described in **P1** of identifying high-risk areas for prevention advice, but was enhanced in delivery method. They make a claim to a “new approach to identifying predictive risk”. Their initiative is called upon in teaching material at Leeds University as the “Trafford Method” of near repeat modelling where it is described as “the first area where it was successfully implemented by practitioners.” (Evans, 2018) .

P1 bridged the gap between academia and professional practice. It detailed how the academic knowledge generated on the near repeat phenomenon had been picked up, developed and operationalised, categorising the key factors involved. In addition to reporting on the analysis of crime and the near repeat feature, the text creates a model of crime prevention practice. A critical but constructive approach is apparent, reporting on the analytical factors indicating crime (burglary) reduction but equally clarifying that those reductions were not statistically significant. It deals with the potential criticism that delivering ‘hard hitting prevention advice’ would impact the fear of crime factor amongst residents, reporting that a postal survey found “...overwhelming support for information to be passed concerning local crime, and very little evidence indeed of any resulting increase in the fear of burglary crime.” (**P1** p132).

The reasons are, as yet, unknown. Johnson and Bowers (2004b) propose that Optimal Foraging Theory (OFT) drawn from Behavioural Ecology may explain such behaviour. OFT is a well-established, but at times contentious theory (Emlen, 1966; MacArthur and Pianka, 1966) mainly evident in the disciplines of ecology, evolutionary ecology and archaeology. Much reference to OFT has been made within the ‘near repeat’ publications as potentially explaining the behaviour seen but, as Sorg *et al* (Sorg *et al.*, 2017) state, its use has been limited. The main concept taken on board within the ‘near repeat’ topic is the foraging behaviour of animals within areas

(‘patches’) defined through learning as suitable/likely to produce sustenance. If transferred to offender behaviour linkage is easily communicated. Generally unexplored in the crime literature (but alluded to by Townsley Homel and Chaseling in 2003) OFT behaviour is deemed dependent on the effort required to produce success but that the forager will move to a new “patch” because the original “patch” may become exhausted through over attention, or in the case of ecology terminology an area experiencing “resource depression”. To date the potentially explanatory concept utilised for near repeat explanation is that of foraging (searching), achieving success and then foraging again in the same “patch”. Learning within the environment provides knowledge of successful locations to the forager. Not yet significantly explored are the concepts of movement to/between other “patches” which in terms of the geography discipline would be firmly linked with behaviour in space and place. Such work would result in exploring the impact or importance of ‘place’ in the offender decision making by asking if offenders move from a near repeat ‘patch’ to another ‘patch’ before returning to the original ‘patch’, or is the original ‘patch’ repeatedly used until exhaustion.

In 2010, Johnson provides a discerning explanation of the foraging concept (Johnson, 2010). That publication provides a considerable section on the near repeat phenomenon. He moves the topic forward by summarising the few published papers (at that time) concerning the phenomenon being found in crimes detected by the police. Bernasco (2008) examined burglary in The Hague over an eight year period. By linking all potential pairs of burglaries and seeking common offenders across a space-time categorisation, he finds (as one example quoted by Johnson in 2010) that 89% of detected offences occurring within seven days and 100 metres are found to have a common offender. However, Bernasco used PRC data of detected offences. He acknowledges that detection rates within the whole data set of detected and undetected crimes only amounted to 6.21%. A pair of offences with a common (detected) offender being only 0.0034%. Patterns found by Bernasco suggest, within the considerable data limits imposed, that

same offender involvement with near repeat offences may be common. Similar results are found in subsequent research papers, all adding weight to the foraging theory put forward but none examining the individuality of behaviour by offenders and drawing upon their relationships between the space and place in which they operate (Johnson, Summers and Pease, 2009; Summers, Johnson and Rengert, 2013).

In 2014 Johnson researches offender movement between offence locations focusing upon the concepts of foraging behaviour (Johnson, 2014), so providing explanation of the three foraging concepts considered as explanatory. Analytical results are unable to clarify a suitable explanatory foraging concept and so fails to take the OFT route of explanation further.

Following the OFT route as an explanatory concept without further exploration of the overall behavioural patterns of individual offenders and critical review of extant theory can be problematic. Often put forward as an explanatory factor of (particularly) opportunistic crime, which can include residential burglary, is the Rational Choice Perspective (RCP). This was first put forward in 1986 (Cornish and Clarke, 1986) in relation to crime, but derived from much earlier work in economics. It is of note that considerable emphasis is given by the authors to the point that this is to be seen as a “conceptual tool rather than a conventional criminological theory.” (Cornish and Clarke, 2011) but that the title ‘Rational Choice Theory’ has persisted in academic texts referring to it. RCP has nothing to say about the nature of the actual offender, the victim or the environment but puts forward a framework to consider the decision-making routines that offenders may go through on selecting crime targets or ultimately deciding whether to offend. As such it does not seek to explain criminality. It offers a perspective on decision making in the environment of crime opportunity, and was developed in a significantly changing background of criminological thought and crime prevention philosophies where opportunity was coming to the foreground of thinking.

The perspective makes assumptions that criminality is purposive, it is rational behaviour and that the decision to offend is crime-specific. It is further broken down into two parts, crime involvement – deciding to become involved in criminality - and crime events – choosing to commit a particular crime. It professes that the perspective of the offender is to commit a crime because it is of benefit (acquisitive property crime being intuitive in this regard). Offenders will rationally consider the perceived risks of committing a particular crime in a particular environment that the opportunity and the offender are in and its potential success or otherwise. It is a complex perspective that has been met with criticism, not least the aspect of ‘rationality’ in the decision-making. It is however a perspective that has survived criticism when alongside situational crime prevention (Clarke, 1980) which considers the crime environment and has been seen as so applicable to volume acquisitive crime (Felson, Clarke and Webb, 1998; Parnaby, 2006; Hayward, 2007; Cornish and Clarke, 2011). Its relevance to this discussion concerning OFT and near repeat offending is that the perspective would suggest that the choice of committing a second (and future) offence close to a previous offence is a rational decision based on the experience of past success in that environment. It is a rational decision to behave in a criminal manner in the ‘space’ of that criminally advantageous ‘place’. Not, therefore, so far removed from OFT demands which are that the offender operates in a ‘patch’ that has positive outcomes and that this is learnt through experience. Human Geography strongly indicates that the ‘place’ or ‘space’ in question is likely to be very personal, it will have been generated as a criminally advantageous ‘place’ through the personal knowledge and experiential setting of the offender, and so the environment in question goes beyond (but is inclusive of) the physical. A simple rational choice due to learnt positive advantage therefore tends toward a simplistic response to the explanation of near repeat offending. The extension of RCP to “bounded rationality” (Cornish and Clarke, 1986), where the offender makes decisions governed by the (often limited) information that has been gleaned by them presents explanation. Knowledge and its assessment

are likely to be dependent upon many factors such as social and economic status. Mehlkop and Graeff (2010) use the example of tax fraud (assuming high financial penalty) where someone from high income social classes will have a very different view on the potential penalty and its impact than one from a low income social class. The financial and social status influences the rational choice. Rationality is 'bounded' by factors and information pertinent to the individual. Near repeat offending appears as the deliberate, and therefore assessed, return to a 'place' to offend in its 'space' and spatial analysis determining near repeat offending would suggest that the Rational Choice Perspective can play a part. However, it lacks a causality element and is a tool or framework for matters to be considered, not going beyond the concept that the offenders decision to return close to a previous offence is governed by their bounded rational choice. Considered alongside the findings of **P2** would suggest that all the serial offenders in that research think alike. They all commit near repeats and it is a re-occurring behaviour. That may be lessons learnt from experience but without taking other factors in to account such as the personal importance of 'place' it would not be reasonable to claim that all serial offenders make the same 'rational' decision to offend.

In their early work identifying near repeat patterns Townsley, Homel and Chaseling (2000) refer to how their work considers the (social) environmental factors linking the data examined and that further research in this area may be beneficial. This concept brings to the stable potential explanatory theories evolved from Environmental Criminology, yet little, if any, work has been published seeking explanation other than OFT. Within the field of Environmental Criminology the early work of Brantingham and Brantingham brought forward Crime Pattern Theory (CPT) (1981; 1993; 1993). As a theory of spatial behaviour of offenders CPT has stood the test of time, particularly linked with RAT, and is now routine text book material (Eck and Weisburd, 1990; P. J. Brantingham and Brantingham, 1993; Felson, Clarke and Webb, 1998; Smith and Clarke, 2012; Brantingham, Brantingham and Andresen, 2016). In short, the theory says that offenders will

criminally behave and operate within places and spaces of which they are in some way familiar, probably, but not necessarily exclusively, through their routine non-criminal activities. It lifts the importance of 'place' in the study of criminal behaviour, especially as it converges with the other very place based theory of Routine Activity. CPT promulgates that offenders will tend to offend in nodes, those areas that they attend and become familiar with during their non-criminal activity such as surroundings of the workplace or place of entertainment. Categorisation of nodes in the Brantingham texts (and subsequent text books) to suggestions such as workplace and entertainment locations is perhaps simplistic and it is suggested here that perhaps 'receiver of goods' and 'drug supplier' locations provide an often more intuitive picture, especially in relation to volume opportunistic crime.

CPT and its use is therefore highly relevant to the examination of crime hot spots if offenders are operating in places that have become their 'nodes' of activity, as CPT suggests will happen. Such place selection in its simplest consideration tends to point towards places which will attract criminal behaviour and where that behaviour will spatially cluster and potentially become dense in volume. Townsley, Homel and Chaseling begin their work on near repeat offending (2000) in a paper that sets out to examine repeat offending and stability of hot spots of such activity. Within their discussion the point of linkage between near repeats and hot spots is made and seeks to promote further research in that area.

CPT would appear to have received little attention as an explanatory theory with regard to near repeat offending patterns. OFT and CPT do not immediately appear to collaborate, OFT suggesting that offending will concentrate in time and space and then move on to concentrate in that way at another place, creating detachment between places. OFT offers no insight to place selection beyond criminal value.

CPT considers routine activities creating an offenders 'awareness spaces', those familiar places within which criminality may follow should opportunities arise or be observed, and so offers potential insight above and beyond OFT. Within its theoretical framework CPT describes site selection as relying on an offender finding somewhere where they feel "...comfortable or 'sure of what will happen'" and that the search for a suitable target is "positioned in time and space in a 'good' crime site situation." (P. L. Brantingham and Brantingham, 1993 p5). This direct reference to the importance of time and place in Brantingham's development of CPT brings to the fore the importance of 'place' in offender decision making and the core philosophy of Human Geography in the study of crime. CPT puts forward potential hot spot creation as an outcome, as does OFT. **P1** and **P2** offer information that is an insight to the potential that CPT may be the explanatory factor. **P1** reports success through a change in offender behaviour in an areal setting with no reference to individual offenders. If considered as a CPT 'node' of a number of offenders then changing the nature of that 'node' through a prevention initiative reduced its attractiveness and demoted it from 'criminal node' categorisation. **P2** does not look into the number of 'nodes' within the serial offending pattern but the x/y plot example of one offender certainly shows at least two (**P2** p143). It also comments that "With almost all offenders committing, at some point, future nearest neighbour offences that were actually consecutive in time..." (**P2** p145), indicating that near repeats were not restricted to continued behaviour at one 'patch'. Both papers therefore contribute to the knowledge base and provide unique insight.

Explanations of why/how offenders choose to commit repeat offences may throw light on near repeat offending. As stated in **P2** (p141) much literature has been published and strongly suggests common offenders (Polvi *et al.*, 1991; Wright and Decker, 1994; Ashton *et al.*, 1998; K. Pease, 1998; Kleemans, 2001; Hearnden and Magill, 2004). Such studies have tended to rely on victim/crime scene data or interview accounts with offenders. Ashton *et al.* (1998) interviewed

186 offenders determining that 31% admitted burglaries at premises where they had previously offended and similar results are reported elsewhere (Wright and Decker, 1994).

Reasons given to Ashton *et al.* (1998) for repeat offending were:

- Ease and profitability of previous attack,
- Ease of attack through environmental knowledge gained from previous attack,
- Returning to steal items left at time of previous attack,
- Restocking of premises following previous attack.

Hearnden and Magill (2004) interviewed 82 offenders and found that almost two thirds had committed repeat offences. Predominantly offenders said they returned because they knew goods were available at that location, due to witnessing new deliveries, knowledge of goods left behind during the previous offence or being told that new goods had been acquired. Additionally offenders perception of likely 'yield' was the key consideration when decision making.

One of the most used explanations is perhaps that of the 'Boost' and 'Flag' accounts of repeat offending (Pease, 1998; Bowers and Johnson, 2004; Johnson, 2008; Johnson, Summers and Pease, 2009; Youstin *et al.*, 2011), which has now also been pulled in to explaining near repeat activity (Chainey and da Silva, 2016). These two accounts are not necessarily incompatible (Farrell, Phillips and Pease, 1995; Youstin *et al.*, 2011). One caveat is that neither account has been put forward having gleaned offender insight, they are explanations of a spatial pattern.

The 'Boost' account puts forward an event dependent hypothesis that one event (offence) will increase the probability of a future event. Youstin *et al.* (2011 p1047) sum the account up by stating that "According to this hypothesis, a change can occur either in the individual or place or in the perceptions of those around the individual or place, increasing the likelihood for

revictimization.” If the matter under consideration is repeat victimisation at a place (e.g. burglary) rather than of an individual (e.g. harassment) then particularly pertinent is the concept of individual perceptions changing, or in Human Geography terms that ‘place’ has advanced in its interpretation. The initial offence has boosted the offenders ‘place’ from being potentially criminogenic to being actually criminogenic (assuming a successful crime event). The ‘Flag’ account also considers and relies upon ‘place’ and environmental background but this time does not rely on change. In the ‘Flag’ account a location maintains its criminal attractiveness after the first offence and so is flagged up as being suitable for offending at.

Following OFT as an explanatory theory of near repeat behaviour appears to have almost become the default position adopted, even though it is probably an untestable concept in terms of human criminal activity. If extended beyond the empirical location based examination of crime events the Geography of Crime could offer greater insight to the near repeat phenomenon by taking a critical and conceptual look at the ‘place’ and ‘space’ features that are inherent. **P1** and **P2** begin this process but maintain the empirical approach. By drawing out the inference that a resulting change in offending behaviour is a significant result, rather than the generic statistical significance routine, **P1** brings individualistic human behaviour in the ‘space’ of ‘place’ to the fore.

Whilst the near repeat phenomenon has flourished as a topic of study, this has predominantly taken place through crime science and criminology disciplines, perhaps a reflection of Le Beau and Leitners’ 2011 discussion on the format of the Geography of Crime. Studies have developed further analytical models and perhaps the most common now being used is via the publicly available ‘Near Repeat Calculator’ software developed by Ratcliffe (2006) and disseminated freely by Temple University.

Knox analysis and Ratcliffes' calculator provide global figures for the near repeat phenomenon. They take collective area data (spatial coordinates and time of commission) and establish if the phenomenon is manifest, so providing global time and distance parameters for the relevant areal unit. The proposal continues that knowledge of time and distance risk parameters provide crime reduction 'windows of opportunity' and that near repeat analysis becomes predictive in nature, predictability being the ultimate goal of policing resource provision.

As with Johnson and Bernasco mentioned above such areal analysis does not consider behavioural offending patterns of individuals. **P2** of this submission seeks to identify the extent of near repeat behaviour by researching individual offenders. Developing a methodology independent of Knox analysis, the research identifies that such behavioural activity was apparent within the sample of offenders examined in a south coast county of England. It identifies how the spatial behavioural pattern of known individuals can be revealed and reflects temporally consistent behaviour in space and place. Discussion again concerns crime prevention but the analysis and results now provide empirical indicators of the manner in which individual serial dwelling burglars interact with space and place on a personal basis. Of note is that **P2** identifies offences in a series of burglaries that take place at extreme distances from others, outlier offences, and calls upon CPT as explanation of that behaviour (**P2** p145). Evaluation of interventions based on the near repeat phenomenon can now move on from seeking statistical significance in crime recording reduction to measuring behavioural change through the space/place interaction of offenders. Using recorded crime data from the police service again calls data integrity into account. The paper reports on the activity of 14 individuals who had each committed at least two series of offences each containing ten or more offences committed over varying periods without interruption. The first series ended by being arrested and dealt with at court, usually by imprisonment, so providing formal interruption and a time gap before series two began and also concluded by arrest. These were extracted by filtering a four-year database

of all burglary. Detected offences of burglary amounted to 21.29% of the data set and the 14 individuals committed 5.87% of those, figures quite high compared to the data used by Bernasco (2008). Use of an apparently small sample must be accompanied by an explanatory caveat but within the sample of 14 offenders the record of an individual's criminal activity is considered reasonably robust. Whilst undertaking the research access was available to the entire crime related data sets (crime, arrests, incidents, convictions) for the county in question as well as the full (national) criminal history of the individuals, therefore allowing unrestricted searches to establish the sample. Fully explained within the paper (**P2**, p 144) access to the various data sets permitted strong triangulation. Each of the offenders had been formally prosecuted for a sample of the burglaries committed but asked the court to take a number of others in to consideration (TIC), indicating that full corroborated admissions had been made. Further to those offences dealt with at the court offenders were also subject to post-conviction interviews, whereby further admissions can be made with little risk of formal prosecution or change in sentence. Such interviews and associated investigative processes seeking corroboration provide an almost 'no risk' motivation for matters to be finalised. Post-conviction interviews also deal with any non-reporting/recording of burglary crime as admitting an unrecorded offence must be verified and ultimately recorded. It is fully acknowledged both here and in **P2** that the available sample can only be drawn from those offenders who were identified and prosecuted. **P2** devotes a substantial section to dealing with caveats that must be applied to the use of PRC data such as non-reporting, failing to record and incorrect classifications but is able to mitigate many through the triangulation that took place. Whilst this PRC topic is later discussed in this thesis **P2** provides an early example of the acknowledged problem and the power of triangulation to improve coherence.

Inclusion of 'time' crosses the bridge in Human Geography from 'place' to 'space' as discussed by Tuan (1977, 1979). The geography of the near repeat behavioural patterns moves from its

'place' focus to the sphere of 'space'. With knowledge of an individual's behaviour in this way it becomes about how that individual uses and interacts with the space of that 'place' given personal parameters of risk influencing behaviour. Jointly the two published papers sit within the arena of the Geography of Crime and empirical geographic study. On a topic of some import and relevance to contemporary issues, particularly the driven need for predictive policing in the atmosphere of public sector austerity, they contribute to knowledge yet raise prospects and reasoning for further study.

The 'near repeat' phenomenon remains of academic interest with more recent texts including exploring the phenomenon in Brazil (Chainey and da Silva, 2016), China (Ye *et al.*, 2015), and Austria (Glasner and Leitner, 2016). On insurgency in Iraq (Braithwaite and Johnson, 2015) and Maritime piracy (Townesley and Oliveira, 2015).

This ongoing research work has tended to be in the form of exploring countries, areas or crime types other than UK domestic burglary to see if the near repeat phenomena is apparent in the data, for instance is it just a manifestation seen in the Western industrialised countries of the world? Or just in burglary crime? Chainey and da Silva (2016) provide a general example model of much of this more recent work. They consider the residential environments of a Brazilian city and their distinct built environment and housing differences from most cities in the Western industrialised World. Acknowledging that near repeat analysis has found similarity in patterns in western industrialised cities they seek to establish if the built environment clash between those cities and Brazil renders similar results and therefore a transferable crime prevention concept. Theory explanation for near repeat offending is firmly rooted in OFT and whilst devoting a short section to explanatory theory nothing is offered beyond OFT, the Boost and the Flag accounts. Findings indicate that the volumes of repeat and near repeat offending in the Brazilian city are statistically significant but far lower than in western industrialised cities, the different built

environments in place being the suggested reason. Other work has sought to establish spatio-temporal clustering analysis to crime types external of domestic burglary, which tends to be otherwise over-used due to its usually strong geo-referencing integrity. Hence near repeat patterns have been established in Robbery (Glasner and Leitner, 2016), Insurgency (Braithwaite and Johnson, 2015), Maritime Piracy (Townesley and Oliveira, 2015), Auto theft (Youstin *et al.*, 2011) and Shootings (Ratcliffe and Rengert, 2008). Overall findings corroborate that the near repeat behavioural pattern is apparent globally and in different criminal practices that have a place based reliance, although that 'place' may be more general than a residential property.

In terms of societal impact, the 'near repeat' research knowledge follows two key themes of prevention and prediction, both areas explored within **P1** and **P2**. If focusing on prevention it is identifying near repeats that creates the possibility of targeted and empirically prioritised prevention practice falling within the realms of situational crime prevention. This situational approach (Clarke, 1980) seeks to deal with the crime issue in question as opposed to focusing on offenders or potential offenders and is used to manage crime (Hayward, 2007; Crawford, 2009). It introduced "discrete managerial and environmental change to reduce the opportunity for those crimes to occur" (Clarke, 1997 p2) often concentrating on 'crime hot spots' (Sherman, Gartin and Buerger, 1989). One implication of this approach is that it does not seek to solve (or deal with) the root cause of criminal behaviour.

The situational approach outcome seeks a behavioural change as the result of a place based situational change and is for relatively obvious reasons attractive to professionals, being potentially immediate in nature as simple changes such as locks and access restriction are often easy to facilitate. It is applicable at the micro scale of contemporary criminal activity issues and hence near repeat findings and the linked prevention methodology generate a 'good fit'. The situational approach takes account of the situation of the apparent environment, very often

seeking changes to that environment such as improved dwelling security. It identifies and considers the 'place' hoping to alleviate illegitimate behaviour in its 'space'. In 2003 Townsley, Homel and Chaselings's text which was so impactful on the future examination of the near repeat phenomenon considers in some detail the built environment of the research areas where burglary offences were taking place. The research had examined offending in five distinct suburbs located in south east Queensland, Australia. By calling on property age and volume of land development the suburbs are categorised depending upon the housing diversity present. Additionally, target vulnerability is calculated as a determinate of a suburbs socio-economic status. Of the five suburbs examined three are found to experience near repeat offending but it is the two with homogeneous housing which display "very strong evidence of near repeats" even though their levels of target vulnerability differed.

Problems exist within the concept of a near repeat phenomena as it has become known and still require further academic attention, particularly, it is suggested, within the Geography of Crime. Explanation of such human activity remains to be resolved as the OFT, put forward somewhat vigorously at times, lacks human activity definition and confirmation. Exploration of fully-fledged spatial crime theories such as CPT is lacking in engagement with the concept but this will only be possible if the individual behavioural patterns are explored, as they are in **P2**. Too few papers consider the Human Geography fundamental of the importance of 'place' to all individuals and how that can strongly influence place (site) selection along with the commonly explored built environment.

The particular study of residential burglary as a crime type, partly having an attractiveness to study due to the relatively solid 'geography' of a dwelling, has attracted a lot of attention over the years. Residential burglary is a volume crime with a low detection rate, even though it concentrates in terms of location and has few offenders committing large proportions of

offences (Hirschfield and Bowers, 2001). Whilst the legal definition does include entering unlawfully to commit violence or sexual offences, it is in the main a property crime leading to theft. Good coverage of the topic, from trends, characteristics (offences and offenders), motivations, impact, analysis, profiling and policing is provided in a number of crime related text books (Canter and Alison, 2000; Newburn, Williamson and Wright, 2007; Brookman *et al.*, 2010). Journey to the crime (home to crime scene) is an issue well researched over time (White, 1932; Baldwin, Bottoms and Walker, 1976; Canter and Larkin, 1993; Wiles and Costello, 2000; Groff and McEwen, 2006; Gottheil and Gabor, 2008). There are accepted general findings that offenders usually only travel short distances (up to approximately 2 miles) from home to offend.

Of one significant concern is the nature of results obtained from a Knox analysis type of investigation. Such analysis creates a matrix of cells whereby (typically) rows are delineated distance bands and columns similarly delineate time bands. Often referred to as spatial and temporal bandwidths interpretation takes the form of a cell with a statistically significant result indicating that space time clustering is taking place between 'x' and 'y' distance and 'a' and 'b' time from a previous offence. It is then stated, as in **P1**, that risk is high in this bandwidth. For example, risk increases by 'z' amount for premises within 400 metres and remains high for 14 days after which it will decay in a typical distance decay curve. However, the potential problem exists that this interpretation follows the ecological fallacy that risk is consistently at level 'z' for 14 days without fluctuation. It is reasonable to suggest that risk for the first few days may be very low but then becomes high. Such a scenario may be better reflective of activity at a CPT node rather than requiring OFT to be reflecting the behaviour of the human offender. The CPT node is one that has become attractive for criminal activity but is likely to be one of a number of active nodes at any one time; there is no assumption of continual return to achieve the required criminal result. That criminal result activity could be taking place at other nodes before the near repeat offence at the node under examination.

Townsley, Homel and Chaseling (2003) make the very well accepted point of considering the environment when studying crime. It is an influencing factor on human behaviour which is very clearly made and known in the marketing sector (Michon, Chebat and Turley, 2005) and elsewhere. For crime prevention the situational approach often factors in the environment and the CPTED concept is, from its very title, built environment focused. The 2003 work of Townsley, Homel and Chaseling indicates the relevance of the built environment to the issue of near repeat behaviour but appears to have had little impact on the development of prevention. The issue of housing diversity and offence location selection firmly establishes CPTED as a near repeat 'research partner', a concept to be co-researched for further knowledge insight.

3. Crime Prevention Through Environmental Design

CPTED is a further prevention technique requiring behavioural change. It is driven by seeking to create a physical environment that influences the interaction with space and place of victims, offenders and users. Whilst the concept of the built environment creating opportunities and impacting on decision making developed slowly over many decades the place and space element draws on the crime prevention development work of the last decades of the 20th century. Of the well-known applications perhaps the Westinghouse demonstrations of the early 1970's mark the beginning of practical application (Pesce, Kohn and Kaplan, 1978), although results were found to be less than favourable at that time. Underlying CPTED theories call on Routine Activity Theory (Cohen and Felson, 1979), Rational Choice theory (Cornish and Clarke, 2014) and the Broken Windows concept (Wilson and Kelling, 1982), all ingrained to some degree within the Situational Crime Prevention approach (Clarke, 1983).

The notion that a relationship exists between the environment and crime originated from the early inter war years work of the 'Chicago School' of sociology and particularly Park, Burgess, Shaw and Mckay. Their work is still read today and covered in all standard criminology text books (e.g. Bottoms and Wiles, 2002). Almost in parallel with the situational approach to crime prevention developing in the 1970's, studies in North America were bringing forward two environmental approaches displaying overlap, namely CPTED (Jeffery, 1971) and Territoriality/Defensible Space (Newman, 1972), although the terminology effectively becomes interchangeable as time goes on. Developed from two almost opposing backgrounds Jeffery was an academic of some standing and coined the phrase Crime Prevention Through Environmental Design with the publication of a book with that title in 1971. He discusses how the individualistic human environment will allow, or at times promote, criminal activity. Newman on the other hand, an architect of some standing, proposes that the issue of crime he witnessed many times

in his work on high rise re-development is the lack of territoriality; that a resident has no sense of ownership, responsibility or territorial ability outside the confines of the apartment occupied. Jeffery considered a wider view of the environment than the practitioner Newman: an 'environment' that encapsulated a person's life and activities and so included social as well as physical (built) factors. Whilst parallels clearly existed, it was Newman's approach and professional ability to 'put into practice' that initially won the day. As time passed and CPTED developed, the two approaches converge to a theory based practical appliance of built environment practice.

Both approaches move forward and become effectively synthesised in to the CPTED approach now widely recognised. It is again seeking place and space based behavioural change, aiming to reduce opportunity through considered design and impact upon the decision making of motivated offenders. It is an approach that has undergone extensive examination and regeneration over the 40 plus years of its existence, as briefly discussed in **P3**.

CPTED is a subject that has developed through significant research and change in its life and **P3** iterates a substantial evidence based study of that development. Detailing the research flow over the years and issues raised the text brings to the fore the ambiguous approaches which have developed over time and are apparent through the over use of mixed terminology and fundamental concepts, and in that context links closely with **P4**.

Unlike near repeats CPTED does not have a short specific historiography. CPTED as a concept began to emerge positively from the early 1960's onwards (Jacobs, 1960; Wood, 1961; Angel, 1968; Jeffery, 1971; Newman, 1972, 1996) but followed a sometimes tortuous route given the occasionally conflicting professions of academia (ideas) and practitioner ('doing') as independent sources of thought and action. It is a concept requiring a multi-agency community safety

approach and in this contextual setting should be holding a primary position given its unassailable multi agency collaborative need. However, where concepts have and are being misinterpreted and high-level terminology of objectives is inconsistent collective misalignments create difficulty in generating a solid business case for use. **P3** (p10) discusses textual analysis of extant CPTED frameworks where 58 different terms had been used to categorise the seven most recognised CPTED concepts.

Misinterpretation and conflicting terminology issues present fundamental ambiguity and have previously been iterated as problematic (Ekblom, 2011a, 2013) with some follow on refinement. Zahm notes in her examination of the transference of academic CPTED knowledge to planning professionals that "... this information has seldom been translated to a form for use by planners and designers." (Zahm, 2005 p285).

Others confirm that a lack of partner engagement can often be a direct consequence of confusions within guidance, frameworks and knowledge dissemination to professionals in the field (Kitchen, 2002; Armitage, 2004, 2006; Parnaby, 2006). Love (2002) opens philosophical debate in the field of design and design research. Whilst focusing on the inability to develop a cross-disciplinary body of theory and knowledge he identifies terminology definition as a fundamental barrier where they are "too broad, too narrow, inappropriate, ambiguous, multiple, inconsistent, and different in different areas of study or practice." (Love,2002 p353).

Examples of this nature are clear within CPTED and highlighted within **P3**. The need for a constructive practice framework for CPTED is established. Upon examination, the frameworks for research design and professional engagement must be seen as fundamental yet receiving little attention.

P3 and **P4** provide an overview of CPTED development during its early formative years. They then move on to define the focus of the papers as revolving around a growing and significant lack, or mixing of conceptual clarity (Ekblom, 2011b; Armitage and Monchuk, 2017).

P3 concentrates on two factors, the lack of a universal CPTED conceptual framework and inconsistent use of acceptable terminology. It is put forward that a holistic conceptual framework for CPTED is an absolute necessity but one that has fallen by the wayside in over 40 years of development. Ultimately a restructured, holistic and theory based framework is presented which clarifies aims and values and establishes clear illustration of the conceptual roles and components.

P3 puts forward a new CPTED framework as a proposed resolution to what has become a confused and very mixed picture of definition and transferability. The central new feature is a new framework for the understanding and approach to the major concepts that construct CPTED. Whilst historically there have been a number of concepts suggested with very mixed terminology there are fundamentally four (surveillance, positive reinforcement, access control and territoriality (**P4**)) but most often represented as seven differently named concepts as detailed in **P3** (p265) (Ekblom, 2011b; Cozens and Love, 2015). Construction of those concepts in to an overall CPTED framework has previously been linear in nature with all seen as working, or at least needed together to create an environment that reduces crime. Of the four concepts territoriality is perhaps the hardest to define and particularly difficult to evaluate. It cannot be simply counted or seen but is a personal, subjective and conceptual behaviour. Territoriality suggests that an individual will behave in certain ways whilst occupying the 'space' of a 'place' they find themselves in and that behaviour will depend upon the nature or environment of the 'place'. Human Geography links are very clearly apparent. Such a linear framework fails to define an overarching goal that is to be achieved, without which it remains unclear how each concept

may influence the prevention of crime in a collective manner. The proposed new framework removes territoriality from the linear process and situates it as an overarching goal. Repositioning clarifies the early signal work of CPTED developers that territoriality (behavioural change) is achieved through the introduction of the other concepts and should be seen as a collective result influencing the prevention/deterrence of crime. The proposed model allows territoriality to be considered as an entity, which can aid prevention rather than cause prevention. It becomes one that can be separately evaluated as an outcome of the three major concepts. Within England and Wales the Secured by Design (SBD) accreditation service is promoted as best practice and CPTED based, providing accreditation to the design of (predominantly) major developments by meeting standards aligned to a number of categories. There are no categories that directly and causally enable the generation of territoriality. Indeed, as it is such an individualistic behavioural matter it becomes difficult to imagine that a particular design feature can claim causality.

With an overarching goal of developing territorial behaviour with users/victims in the developed environment to achieve a vision of prevention, CPTED can now be considered as a hierarchical concept (Figure 21.).

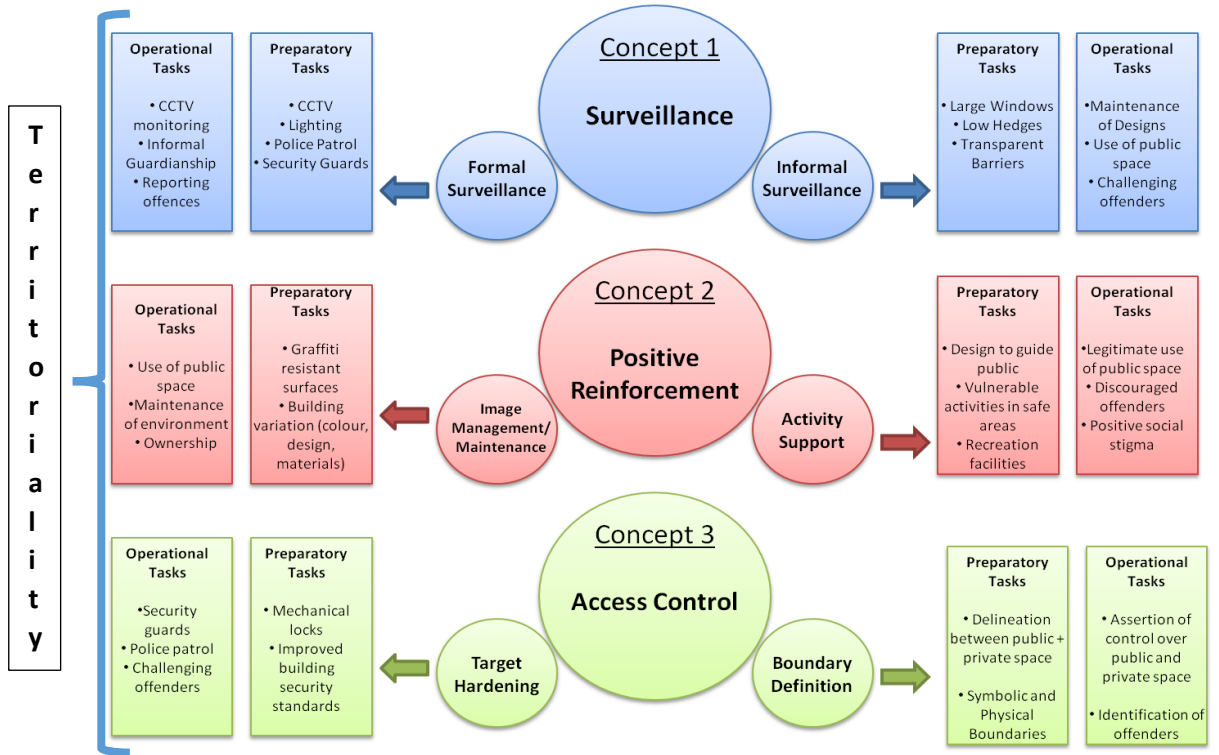


Figure 2. P3 Framework.

The previous linear structure limited assessment to exploring the vision of prevention but evaluation now has a behavioural handle to grasp and three levels of enquiry. P4 follows the CPTED topic by cementing the need for a reconstructed and evidence based new framework. By extending the research into CPTED generated professional frameworks similar disparities are identified that pose significant risk to the transferability of CPTED into the professional fields of design and construction of the built environment. P4 firmly corroborates the conclusions of P3, going beyond the boundaries of academic texts under examination and establishing a need, if not a requirement, for greater clarity and agreed terminology across the academic and professional fields.

The **P3** framework for development and user related activity also provides an improved approach to evaluation. Following the long held and supported theoretical footings behind CPTED prevention can be achieved via increased territorial behaviour and the social sciences are likely to be best placed to consider its measurement. The new CPTED framework directs that surveillance, access control and image management will influence the creation of improved territoriality and collectively contribute to the prevention of crime. Evaluation of each concept can now inform the development of territoriality and crime prevention, providing stronger understanding on the workings of CPTED as a preventative method.

The framework also demonstrates that prevention of crime through environmental design is very much a place based construct. It seeks to impact on human activity as users negotiate with the space created by that place. To date the Geography of Crime has had little to say about CPTED, other than perhaps spatial analysis with PRC data in order to evaluate. A typical Human Geography introduction text book (Johnston *et al.*, 2005) devotes a couple of pages to the Geography of Crime of which approximately 5% refers to the built environment impact and how that environment *may* impact on crime. CPTED itself is not mentioned. Geography has much to offer due to the core features of 'place' and behaviour within the 'space' of that 'place'. CPTED remains a concept seeking 'space' and 'place' behavioural change.

Under the proposed new framework territoriality as a behavioural issue is to be considered as a collective outcome of successful operation of the three main concepts, and prevention of crime as an overarching outcome of all factors. At the time of publication of the two texts territoriality was generally considered a concept of importance to the crime prevention drive of CPTED, being the core feature from Newman in 1972 and onwards. Interviews with a number of incarcerated offenders with regard to their selection of properties to target (Nee and Meenaghan, 2006; Nee, 2015; Armitage and Joyce, 2016; Armitage and Monchuk, 2017) moves to filling a significant

knowledge gap in the CPTED literature concerning evaluation and encapsulating offenders' modus operandi within CPTED. That research corroborates findings of a positive nature for a number of CPTED features but concludes that territoriality does not pose a significant deterrent upon offender choices. The authors also make the point that the academic knowledge base currently fails to express a common agreed framework and that a number of varieties exist. It is suggested here that such a finding does not pose a problem to the proposed framework model but instead adds a new angle which remains constructive and of value. The three main concepts are now the concepts that seek a direct impact on offending behaviour, jointly helping to develop territoriality within the legitimate user and overall crime prevention. The new framework does not put territoriality forward as a directly influencing prevention technique. Territoriality can be seen as promoting a safe and sustainable environment for users. If the user exercises their control over a space within that place (the development) then they will do so if they feel safe in that environment, in which case territoriality does play a role in the proposed framework even though its significance to offence selection is limited. Geographer's activity in this field could follow an interpretivism research philosophy, different to the traditional work of Geography of Crime as outlined by Le Beau and Leitner (2011). That interpretivism of a geographer has a place in understanding and evaluating the territoriality factor of the proposed framework.

However, if the Geography of Crime follows the positivist philosophy it is suggested that the near repeat phenomenon can be called upon in the CPTED evaluation arena. The work expressed in **P1** and **P2** and previously discussed indicates a serial offender will develop spatial 'patches' of offending behaviour where risk is low and success is valuable. Taking the example of a CPTED linked housing development area (SBD accredited) requiring evaluation the question can be asked 'Does this development experience near repeat offending patterns?' and if not then 'Are near repeat 'patches' to be found adjacent (or nearby) the development?'. If near repeats are experienced, then the indication would be that the offender favours that environment, considers

it low risk and a valuable foraging area ('patch'). If not then 'nearby' patches may indicate spatial avoidance, the term 'nearby' being somewhat subjective in the context of this submission text. **P1** of this thesis makes the claim that exclusion of near repeat behaviour as a result of reduction/prevention activity is a valuable outcome, but this has received little attention given the usual drive to count crime as the reduction/prevention measure. CPTED evaluations have been problematic during its history. In 2016 Armitage and Joyce focus on one particular factor as a rationale for their research method, namely that previous comprehensive evaluations have been reliant on police recorded crime data. They go no further but such a data source is well documented as problematic in terms of its completeness and integrity, a matter referred to in most of the published texts in table 1.

With the non-linear approach detailed in **P3** (fig. 1) and the emphasis change in territoriality a Geography of Crime with greater inclusivity of philosophical research approaches has a far greater part to play. Evaluation of CPTED initiatives has always been problematic with over reliance on PRC as *the* indicator of success, however, the new framework provides three issues to be evaluated and critically assessed. Those three features then feed in to a sought after change in the behaviour or perception of a 'place' and the 'space' within it, fundamentals that call on the geography discipline to engage with. Because of the seemingly narrowing philosophical approach of the Geography of Crime towards positivism, it is difficult to encourage exploration of a topic such as CPTED beyond evaluation. Papers 1 to 4 (incl) of this thesis cover two areas of crime enquiry that retain a prevention focus but present almost opposing methods of approach for the researcher. Near repeat analysis to date has followed an empirical and therefore positivist philosophical path. On the other hand CPTED follows the qualitative or mixed methodologies available but has not overtly fallen in to the Geography of Crime arena. This thesis expresses the need for the Geography of Crime to open its doors and readily encompass a wide range of research philosophies in order to capture the 'place' and 'space' syntax of crime.

4. Police Recorded Crime Data

The final section of this thesis follows the core topic of the measurement of crime and the ability to successfully measure prevention through reliance on the recording of crime events and the mechanisms involved.

Much has been written concerning the 'Dark Figure of Crime' (Biderman and Reiss, 1967; Skogan, 1977; Jansson, 2006); that amount of crime that is never reported and/or recorded by the police service or other relevant official body. It features routinely in media and government coverage of crime. Traditionally crime related activities ranging from prevention to detection and assorted policing functions have been measured by the recording of crime (in the U.K.) by the police service. Acknowledging the gap between PRC and actual crime (the Dark Figure) is formally undertaken by the Crime Survey for England and Wales (CSEW) which states "The crucial value of the survey is its ability to find out about crimes which do not get reported to, or recorded by, the police. The survey has previously shown that only 4 in 10 crimes are actually reported to the police, so conducting the survey is incredibly valuable in understanding all of the other crimes which go unreported." (Office of National Statistics, 2017). No longer does the CSEW openly present numerical differences between CSEW crime estimates and those recorded by the police but it is accepted that offences involving burglary and auto crime are generally well represented in the PRC data, often influenced by an insurance claim that will demand reporting. In a property crime focus in 2014 it was reported that property crime (theft/damage) accounted for 70% of PRC and 81% of CSEW data.

The measurement issue explored here is the integrity and value of officially recorded crime as an issue independent of and without reference to the dark figure. **P5** is an empirical paper originating from an examination of the criminality of inter-EU migrants. **P5** maintains a focus

upon criminality whilst **P6** reports upon the records management of police forces in England and Wales, their ability to respond to the Freedom of Information Act 2000 and the integrity of recorded crime data supplied. **P1** and **P2** also reflect upon the integrity and use of PRC as the data source for the academic research undertaken, a common caveat to use of such data for research purposes. This chapter will critically consider PRC data and its ability to constructively inform empirical analysis. Whilst there is much historical debate and reporting on the official recording of crime the focus will be on post 2000 comment to retain a contemporary viewpoint and align with the time line of published texts submitted with this thesis.

Police forces in England and Wales are effectively autonomous, they work for the community in the area that they police, report to that community and are answerable to that community. Individual forces manage their own operational functions, albeit following the law, numerous national guidelines and directives. They are not state agencies but those various national directives are often sourced via Her Majesties Government (HMG) Home Office (HO), including detail regarding the recording of crime. Each police force is responsible for recording an incident of crime when it is reported or when they become otherwise aware of it. Reasons for recording are numerous and well understood. At the force level there are administrative, legal, procedural, managerial and operationally tactical functions that can only be met by maintaining an accurate record of the occurrence of crime and its investigative status. At national governance levels the reasons are again clear and all forces disseminate crime figures to central government. As a national policing function, it relies upon HMG HO to lay down common rules to dictate how an incident is to be categorised and recorded. Detail of this can be found in the various documents associated with the 'Home Office Counting Rules for Recording Crime' which are publicly available (Great Britain. Home Office, 2017).

Circumstance dictates that it will be very few, if any, independent academics who can research and critically examine the intricacies and management of police crime recording practice if only because of the logistical barriers of time, cost, unlimited and immediate secure access and intricate internal knowledge requirements it would invoke. Each police force should be following the same Government directives and recording rules but no common method for this activity is dictated. Each Force will have its own administrative and hierarchical structures and processes so leaving examination of a sample of Forces open too difficult to counter criticism with regard to being at all representative. We turn instead to HMG monitoring agencies such as HM Inspectorate of Constabulary¹ (HMIC) and similar bodies. From this and media attention we find that recording practice in police forces has often fallen under the spotlight (Burrows *et al.*, 2000; Povey, 2000; Simmons, 2000; Smith, 2006; Britton *et al.*, 2012).

Between January and May 2000 HMIC conducted a thematic inspection on PRC and the use of the Police National Computer system (Povey, 2000), the latter part not commented upon in this document. The motivations for HMIC to critically examine PRC were many and varied and some explanation is provided within Povey's 2000 document (p27), not least the statement that such activity had been criticised many times over the years. The report makes a number of recommendations, most concerning management and some towards the HO, but overall it ultimately finds that poor recording practice was common. It does not dwell on figures but the executive summary comments that, of the records examined across 11 forces (of 43) the error rate differed between forces, the best being 15% and the worst 65%. In addition, three impactful bullet points are given:

¹ Now called HM Inspectorate of Constabulary and Fire and Rescue Service as of mid-2017. In this thesis the term HMIC will be used throughout to reflect the title and responsibilities in use during the relevant periods pre 2017.

- Force recording rates ranged between 55% and 82%
- Ten forces only recorded between 70% and 82% of all crime
- The average non-recording rate was 24%

A number of constructive changes followed, particularly the introduction of the National Crime Recording Standard (NCRS) which sought to create a common recording standard across all police forces. Integrated nationally into crime recording in 2003 the NCRS also created problems.

Whilst this thematic inspection is of a sample of police forces HMIC is statutorily empowered to effect change across England and Wales and so their reports receive acknowledgement. Their interventions also mean that issues (in this case PRC) can become the subject of routine Force inspections and so not time limited.

Since inception in 1981 and first wave of reporting in 1982 the British Crime Survey (now termed CSEW) results had always been compared with those of recorded crime and in 2003 the NCRS resulted in a big increase in PRC, hence conflicting with the crime survey findings. The British Crime Survey was a national social survey seeking a respondent's experience of crime over the preceding 12 months. The respondent sample has increased annually in size since inception and a robust selection process and overall methodology has developed. Ultimately, it only covers a limited number of crime types where experience is personal to the respondent and prior to 2003 was reported upon independently from the PRC. In 2003 the change from British Crime Survey to CSEW included the output document incorporating work on, and comparison with, PRC data. Impact of the NCRS was noticeable and required explanation via a companion to the CSEW report (Simmons, Legg and Hosking, 2003).

That explanation estimated that recorded crime overall had risen by 10% since the previous year with variations by crime type. Violence against the person saw the largest increase at 23% whilst domestic burglary rose by 3%, vehicle theft offences by 10% and damage by 9%. For dwelling burglary these figures estimate that in the year prior to NCRS 13,023 offences had been reported to but not recorded by police in England and Wales when they should have been. They further estimate that only 65% of burglaries were reported to the police but if a loss occurred then that rose to 87% (Simmons, Legg and Hosking, 2003), usually driven by insurance claims.

The introduction of the NCRS as a new management framework of recording crime therefore evidences that significant under recording of reported crime took place immediately leading up to 2002/03, but context is provided by the 2000 papers (Povey, 2000). A report of that nature from HMIC demands response and many forces had made changes as a result, some 2 years prior to Simmons, Legg and Hosking's' report of 2003.

The issue of PRC data integrity simmered over the years. In 2007 the Audit Commission reported on data quality, generally reflecting on NCRS compliance. They found that compliance and data management (and therefore data quality) was diverse across police forces. Some forces improved on previous assessments and some deteriorated, identifying a lack of continued focus on data quality (Audit Commission, 2007). By 2008 things are portrayed as 'looking rosy' for the future and Kershaw publishes a short piece with positive overtones on the development of a new data hub by the Home Office. He puts across that PRC data integrity had improved very significantly since 2000 and was no longer a barrier to constructive research and use, accepting that reports on the matter in 2000 had identified a very problematic situation (Kershaw, 2008).

Patrick (2011) suggests a flaw in the NCRS which allowed police forces to influence the recording of reported crimes and declare a 'false' reduction. He argues that the introduction of certain

investigative policies on false reporting of crime (usually insurance motivated) allowed for the reversion to pre NCRS philosophies of recording and hence apparent crime reductions. Prior to NCRS the police decision to record a crime was to make a judgement concerning whether a crime had been committed or not to an 'evidential standard', a standard generally aligned to that of Criminal Justice which was inherent in almost all police work. The officer (or staff) had to be satisfied that a crime had been committed because there was available evidence of its commission. As Patrick puts it "... 'evidential' standard usually resulted in the victim having to prove that a crime had occurred and in some cases endure rigorous cross-examination from the investigating officer" (2011 p50). NCRS changed this decision standard to encourage a victim-focused approach, asking instead that the officer (staff) should be satisfied because 'on the balance of probabilities' a crime had occurred and so should be recorded. Only if an investigation following the recording of a crime provided evidence that no criminal act occurred would the crime record be removed. Existing alongside the introduction of the NCRS was an apparent national, but poorly evidenced, trend of high false reporting of street-crime type offences, generally quantified by the theft of a mobile telephone. Motivation for false reporting was put forward as the generation of a crime record number which any insurance claim would demand. In response, a number of police forces introduced investigative policies that effectively reverted NCRS to an 'evidential standard' and therefore facilitated recording fewer offences.

By 2013 integrity is again under investigation, this time by the Public Administration Select Committee (PASC) of the House of Commons who make a damning report on the integrity of police recorded crime data (Great Britain. Public Administration Select Committee, 2014). They raise many concerns and recommendations for improvement. Interest in the topic stemmed from a number of sources such as a HMIC review of practice by Kent Police (Her Majesty's Inspectorate of Constabulary (HMIC), 2013). That found that overall 10% of reported crimes were not being recorded correctly and that only 81% of reported burglary crimes were correctly

rejected as not recordable (33% robbery, 75% violence and 73% rape). In addition, they received oral evidence from a police officer acting as a 'whistle-blower' who expressed concern to the committee regarding data manipulation falsely representing improvement. Within the final report PASC lists 11 agency reports expressing concerns about crime statistics since 2000. They spend some time on the topic of PRC originally being 'awarded' National Statistics status (quality mark for official statistics) in 2011 by the United Kingdom Statistics Authority (UKSA) but that this was rescinded in January 2014. The removal of that status is reported by UKSA who state that "The Authority notes:

- that there is accumulating evidence that suggests the underlying data on crimes recorded by the Police may not be reliable. This evidence includes HMIC assessments of data recording practices (para 3.15 of this report);
- ONS's own report, in January 2013, which raised concerns that the degree of compliance with the standards for Police crime recording may be falling (para 3.7);
- and high profile concerns raised at the Public Administration Select Committee and the Home Affairs Select Committee (para 3.7)." (UKSA, 2014 p2)

Collectively these reports tell a story of repeated significant PRC integrity failure and that such failure has been an ongoing matter for a number of decades. The general view is often that it is the result of target driven/performance management cultures but reasons aside, we are left with a data set in which trust is difficult to express or maintain, yet that data set is repeatedly used to conduct empirical analysis. Dutton (1991) considers data uncertainty in the field of spatial data and analysis. He makes the accepted point that all branches of science will fail to prosper without qualifying the uncertainty within its data to contextualise finding.

After the 2014 PASC report HMIC reviewed data standards of all forces (HMIC, 2014b). In a similar vein to the PASC report their paper made strong statements of integrity failure. They found an overall under-recording rate of 19% (800,000 crimes; 33% for violence and 26% for sexual offences) and ranges of recording accuracy across 6 crime categories of 86% to 92% for burglary falling to 63% to 71% for violence. On posing the question of the extent to which police recorded crime data can be trusted they conclude that “in too many respects Police recording of crime is at a level which is inexcusably poor” (Her Majesty’s Inspectorate of Constabulary (HMIC), 2014a, 2014b p19).

Data examined within these various HMIC reports and audits is at times difficult to consider constructively compared to an academic paper following research and analysis of data results. The primary audience is different and to some degree more ‘trusting’ of HMIC given that the HMIC are acting as absolute experts within rigidly defined remits of their superior authority (Parliament). However, there does appear to be integrity within the examination of the samples they explore given the depth of data exploration available to them. For each police force inspected HMIC officers/staff have the unfettered ability to examine virtually any material relevant to their enquiry. An example is their initial examination of Kent Police in 2013 (Her Majesty’s Inspectorate of Constabulary (HMIC), 2013). They examined 303 incidents reported to the police but that examination moved along the complete timeline of the record from original audio recordings of the reporting telephone call, every documentary record of the matter and every decision made in relation to it. Those decisions range from decisions to record (or not), investigative decisions right through to how the crime was finally recorded in terms of crime type and status at conclusion of the investigation. It would be fair to say that of the 303 reported incidents examined probably every aspect was investigated for action and justification of those actions. In order to triangulate findings HMIC also investigated the internal procedures and processes used to make, amend and conclude the record (who, how, when, what department)

and interviewed a number of willing victims to establish if the record made was a true reflection of the report made.

The sample of 303 incident reports is small, particularly against 140,000 incidents over a 6-month period, but HMIC confidently reported that the sample was such that they were able to extrapolate rates for the whole force. In this sense it is unlikely that such a small sample would be adequate for statistical examination but context in these audits has a significant part to play. They were auditing complete processes from telephone call to final filing of a report, processes which sometimes involve staff employed solely for such roles and following absolute procedures; almost a 'philosophy' within UK policing of setting procedures and making sure they are followed. The HMIC 2013 final report on Kent Police crime recording reports "The methodology that we have used for this inspection will be applied to our review of crime data integrity in all forces which will commence in 2013/14." (p14).

Whilst samples are small triangulation is very strong.

These reviews, enquiries and reports over almost 20 years now present a picture of PRC data that rarely seems to improve in quality or integrity. HMIC continues to audit crime recording practices through police forces in England and Wales and in 2018 have (to date) reported the following after auditing Humberside, Lincolnshire and the Metropolitan Police Forces this year:

- "Based on the findings of our examination of crime reports for the period 6 June 2017 to 6 December 2017, we estimate that the force fails to record over 14,200 reported crimes each year. This represents a recording rate of 85.7 percent (with a confidence interval of +/- 1.81 percent). The 14.3 percent of reported crimes that go unrecorded include crimes such as sexual offences, public order and violence offences. The recording rate for violent crime is of particular concern at only 79.4 percent (with a confidence

interval of +/- 3.28 percent).” (Her Majesty’s Inspectorate of Constabulary (HMIC), 2018a) (Humberside)

- “Nonetheless, based on the findings of our examination of crime reports for the period 1 July 2017 to 31 December 2017, we estimate that the force fails to record over 94,500 reported crimes each year. This represents a recording rate of 89.5 percent (with a confidence interval of +/- 1.64 percent). The 10.5 percent of reported crimes that went unrecorded are particularly affected by the under-recording of public order crime and low-level assaults where there is no injury to the victims.” (Her Majesty’s Inspectorate of Constabulary (HMIC), 2018c) (Metropolitan Police)
- “Based on the findings of our examination of crime reports for the period 1 June 2017 to 30 November 2017, we estimate that the force fails to record over 9,400 reported crimes each year. This represents a recording rate of 81.2 percent (with a confidence interval of +/- 1.93 percent). The 18.8 percent of reported crimes that went unrecorded included a large proportion of common assaults and malicious communication offences, and a small number of more serious crimes including sexual offences, grievous bodily harm and rape. Some of these crimes involved domestic abuse. The recording rate for violent crime is a particular cause of concern at only 72.7 percent (with a confidence interval of +/- 3.30 percent).”(Her Majesty’s Inspectorate of Constabulary (HMIC), 2018b) (Lincolnshire).

All but **P3 and P4** use or rely on PRC data and many of the documented texts supporting the near repeat phenomenon and CPTED equally draw upon that data subset. It is generally recognised that there is no alternative data source given that the CSEW is a representational social survey rather than a count of crime and the one unique factor to PRC is its granularity. In terms of the near repeat papers of this submission that granularity is total for **P2** as it deals with specific (singular) geographic locations and individual offenders. No aggregation of data takes place. An

assumption is made that the offending record is the total offending of the individual. The manner of that data collection is explained and expresses particular justification for such an assumption. **P1** aggregates data to establish if near repeats are apparent within the greater spatial area but for the outcome statement of none being apparent the spatial area is small so potential unreported/unrecorded crime is minimal. The reduction initiative is scaled to the individual offence. **P5** uses PRC data at the scale of police force area. Data availability and its management is a matter taken up in the paper but the analysis is generalised spatial analysis and attempts to portray a national picture having critically discussed the problematic data of migration. Brimicombe (2016) dwells upon the granularity and uniqueness of the data source. He acknowledges the problematic history and examples useful granular analysis that had been previously published but also throws a further issue in to the pot, that of records management. He briefly explains that each force will typically develop their own IT systems, resulting in the 43 police forces of the UK using diverse and multiple digital recording structures. Whilst touched on in a number of the reports discussed here the issue of how to manage the records of police recorded crime rather than collect its data has never featured in the integrity issue yet is a fundamental management function. Transforming a database into a valuable asset cannot be achieved unless the records within it are suitably managed.

P6 of this thesis adds to the integrity discussion. It explores how police forces in England and Wales respond to the Freedom of Information Act 2000 (FOIA) and the use of that legislation as a data collection method. In doing so the paper identifies integrity issues emanating from records management of PRC data; not the pure collection but ongoing management and interpretation of those records. Whilst acknowledging the necessary fluidity of such databases **P6** compares the results of FOIA requests and identifies a significant number of apparently extreme (sometimes unexplained) data changes over time and poor understanding of the data asset.

All empirical papers using PRC data will include a caveat concerning data uncertainty but none can be found which dwell upon the wider integrity issue within such caveats. It is suggested here that the questions “To what extent can Police recorded crime data be trusted as a viable data source for analysis? And how could that data uncertainty best be presented?” must now be asked by academia.

Data quality is naturally of concern to all but is a feature that the geography discipline has grappled with when examining spatial matters. Exploring how to deal with spatial uncertainty, the degree of error in spatial data, has been focused on cartographic (now GIS) work and its visual representation. Inaccurate spatial references (e.g. British National Grid reference points only provide accuracy to one metre) lead to spatial uncertainty, corroborating the position that spatial data will only ever be a generalisation of reality and therefore all spatial databases are generalisations.

It would be unreasonable to suggest that the totality of crime is measurable. Overall the CSEW and PRC make it very clear totality can only be estimated, a default position adopted by the CSEW (Flatley, 2016 p4).

Available crime data is therefore a generalisation of reality but that generalisation receives a limited amount of attention within data use caveats, particularly when compared to the level of critical examination social science data collection methodologies may receive.

Hunter and Goodchild (Hunter and Goodchild, 1996) draw on an intuitive tool from Zwart (1991) who, on the subject of impact evaluation suggests questioning the decision level targeted by the (spatial) work in question and evaluating the importance of uncertainty in the product created (Fig 3). The importance and subsequent explanation of data uncertainty can be categorised by decision level.

1.	2.	3.	4.
Not Referred to.	Referred to.	Supports values or decisions.	Changes values or decisions.

Figure 3. Decision level matrix

Geographers have considered typologies and frameworks for representing and visualising spatial uncertainty (Dutton, 1991; MacEachren, 1992; Drecki, 2005). Much of that work was relatively early in GIS development and now embedded; data uncertainty remains an issue to be presented in research outputs. Whilst not overtly geographic in nature (excluding spatial elements of PRC) Geographers have much to offer, the contention being that PRC data, its integrity and the generalisation of reality represented via crime data reflects problems explored in depth by the geography discipline.

5. Conclusion

Whilst the peer reviewed publications forming the backbone of this thesis are not drawn from overtly common areas of academic activity this thesis presents to the reader that the Geography of Crime can be seen throughout as an overarching theme. Collectively they add to a knowledge base otherwise narrowly delineated as one of spatial and empirical study. In doing so, this thesis offers insight for the potential expansion of that theme in to other areas of research activity in the wider crime agenda.

Geography of Crime has a part to play in the exploration of locational decision and the potential of spatial behavioural patterns beyond (but including) that of spatial analysis. The choice of location is activity within the 'space' of an individual's 'place' where the individual has personal perspectives of that place and space and personal boundaries as suggested in **P1** and **P2**. Changing those perspectives can lead to changing interpretations. Designing those 'places' and presenting them in the built environment has a part to play and generating knowledge to improve the partnership activity required for such design configurations, and so impact on 'place' and 'space' interpretations, is a Geography of Crime feature little explored but done so in **P3** and **P4**. Finally, the matter of data use is considered, which is not overtly geographical in nature. Data use is certainly a feature of the geography discipline but spans all disciplines and all activity if the broad interpretation of 'data' is considered. Therefore, it cannot be specifically drawn in to the field of the Geography of Crime. However, this thesis identifies and significantly extends through **P6** the very significant issue of data integrity in terms of PRC data, that source which is repeatedly drawn upon for empirical study of crime. **P5** considers the limited value of crime data in high-level policy development. The point is made that crime data provides a generalisation of reality in a manner similar to spatial geographic data and that Geographers have tackled that conceptual issue repeatedly over the decades. How to manage and portray

crime data uncertainty and generalise reality could, and this thesis argues should, be a matter for Geographers.

Only six published texts are utilised to present an argument for greater inclusivity of research methodologies in the Geography of Crime but each pair of texts generates valuable new knowledge of their particular topics in their own right. **P1** and **P2** discuss research undertaken on the issue of 'near repeats' but their impact develops from two aspects, firstly the way that **P1** is able to present success by indicating a change in spatial behaviour due to the initiative discussed. Whilst using PRC data, and therefore the problems associated with it, it removes the 'statistical significance' barrier of evaluating only through PRC. Secondly, **P2** explores the individual behaviour of serial offenders and very firmly establishes spatio-temporal clustering of offending as an individual trait. Researching at that micro level, to date a unique approach, opens up discussion on whether the 'near repeat' behaviour is a phenomenon (as it is so often termed) or just part of offending behaviour such as CPT. Is it a pattern to be bundled up independent of well established spatial behaviour? Or is it the way that offenders operate in their 'nodes' of activity? Together the two texts pull together the importance of 'place' in the activity of offenders but follow the empiricist approach, which has been bundled up as the Geography of Crime. The importance of time to near repeat patterns and examination at micro level builds a bridge from 'place' to 'space', two fundamentals of the Human Geography discipline.

The second pair of texts come from a very different perspective, that of CPTED and a methodology that does not immediately fit the Geography of Crime remit currently presented to academia. These two documents present a powerful argument for the need of CPTED to become refined and reduce the confusion that sometimes reigns over the academic-practitioner collaboration. To resolve that confusion a new CPTED framework is created and presented that can claim solid theoretical backing from the three main theory strands within CPTED yet retain

clarity of purpose. It is put forward that CPTED can be seen as a 'place' and 'space' oriented issue that Human Geography can (and should) become involved with. The framework creates new opportunities for evaluation by moving away from a linear, and therefore restrictive, approach. Opportunities for the Geography of Crime to better explore the 'place' and 'space' of crime.

Those first four documents look into the Geography of Crime in two areas of study that have had a limited engagement from the geography discipline. Through two different perspectives the two crime related themes covered coalesce in to one theme by the thesis drawing out that they are both intertwined with 'place' and 'space', as is the remit of Human Geography. Furthermore, the geography discipline is one that fully acknowledges and encourages through a fundamental concept inclusivity of thoughts. Moving the Geography of Crime on from empirical locational 'place' study is called for.

The final pair of texts cover a topic of great importance that is unavoidably and extricably linked with crime, that of the integrity of PRC data. It calls in to question how PRC data is used in the research field through two papers, one that used PRC as a data collection tool and identified problems with it and a second that explores a little research aspect, that of records management of PRC. Whilst this topic does not immediately fall into the Geography of Crime field, and so the theme of **P1** to **P4**, the topic itself is within the first four papers and cannot be overlooked. PRC has almost been exclusively used as the source of spatial data for near repeat analysis whilst CPTED (and crime prevention/reduction in general) seems forever to be measured by it. The question is posed whether PRC data can be legitimately used for knowledge generating research without significant triangulation, as provided in **P1** and **P2**.

This thesis presents a collective response to the commonly held positivist philosophy of the Geography of Crime, seeking inclusiveness from the broad spectrum of research philosophies

actively engaged with in the geography discipline. In particular, it makes the point that the geography discipline can further knowledge in the spatial selection processes of offenders and CPTED but that the empirical approach utilising PRC data is at the stage of requiring critical assessment, another feature within geographer's expertise.

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Appendix A

Contents

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15 The near-repeat burglary phenomenon

Derek Johnson

15.1 Introduction

Academic research in recent years has explored the spatial and temporal elements of residential burglary in the UK as well as in other countries (Bowers *et al.*, 2004; Johnson and Bowers, 2004). This research has concluded that burglaries cluster in both time and space. Where this is apparent, the risk of burglary is ‘communicable’ in a similar way to disease, that is it quickly spreads to other residential properties nearby but as time passes the risk of communication reduces.

This ‘near-repeat’ phenomena, as it has been dubbed, would appear to potentially contribute to supporting a proactive impact on crime reduction initiatives. It was on this basis that analysts in the Bournemouth Division of Dorset Police (on the south coast of England) saw opportunities for such strategies around residential burglary crime in 2005. This was at a time when the division was faced with tough burglary reduction targets and when it appeared to offer the ability of introducing a predictive capability towards directing reduction interventions.

15.2 Near-repeats in Bournemouth

Such potential predictiveness does, however, require a quick response. Research indicated that properties close to an initial residential burglary event were at their highest risk of attack within 48 hours of that initial event. Although risk remains high for a further five days before tailing off over 28 days, the challenge was to introduce a workable intervention that could respond almost immediately following a trigger event. If processes could be found to utilise this identification of high crime risk areas, the process of identifying near-repeats could empower us to map risk with

good integrity and begin to predict where offences were most likely to occur in the future. Both a time (two days, seven days and 28 days) and distance factor (400 m from initial event) had been determined, allowing us to focus towards specific areas that could receive the intervention after the initial event.

The second, and perhaps most important challenge, was to establish if the residents of Bournemouth were actually experiencing the phenomena. If this was the case then where in Bournemouth was it happening? Another factor learnt from the research was that near-repeats are not all encompassing, but appear to be restricted to certain areas of a conurbation.

The Jill Dando Institute of Crime Science undertook analysis of 12 months of burglary data for Bournemouth and established that, on a whole Basic Command Unit (BCU) scale, the near-repeat phenomenon was indeed present. The analysis also confirmed that the high risk features were over distances of 200 m and at time scales of two (highest risk), seven and then 28 days. Bearing in mind that the data analysed were for the entire BCU, the results were very promising. There was clear evidence that the near-repeat phenomena had been present in the town during 2004 but that, unlike the situation found elsewhere, the near-repeat distance was only 200 m (and not 400 m as shown in previous studies – Bowers *et al.*, 2004).

No quick and easy method was available to identify the particular housing areas suffering from near-repeats, although further research findings could be taken into account to reduce the problem of having to analyse data over the entire residential geography of Bournemouth. For instance it was known that there was a very definite negative correlation between repeat residential burglary offences and near-repeat offences; that is near-repeat offences did not tend to occur in areas that suffered from high numbers of repeat offences. Given this information it was perhaps unsurprising to also learn that near-repeats did not tend to be manifest in areas of high social deprivation either.

15.3 A methodology for analysis and action

To establish communities in which near-repeat offences were manifest local analysts had to extract residential burglary data for 12 months. This was then plotted within a geographical information system (GIS) and separated into new tables depicting offences that had occurred in fortnightly blocks over the year long period. Having plotted the first two weeks of crime, 200 m buffers were created around each crime location and the next two week block was plotted. This process was then repeated for each fortnightly block of data. By simply visualising the data in this way, but never having more than two fortnightly blocks of data visible at any time, it was possible to identify those burglary crimes from the second fortnightly period that lay

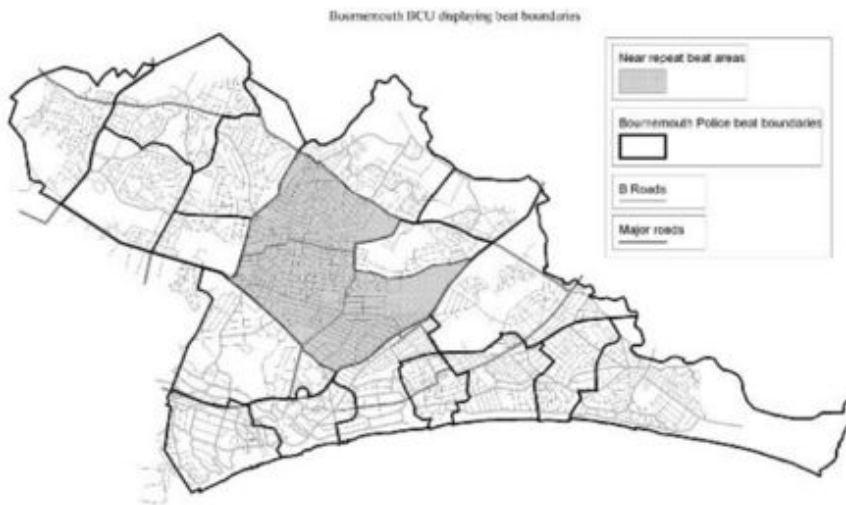


Figure 15.1 Police beat areas in a Basic Command Unit (BCU) of Bournemouth where the near-repeat burglary phenomenon appeared to exist.

within the 200 m buffers around the incidents from the first fortnight. By repeating this process for the whole year it was possible to establish three police beat areas where the phenomena had been operating almost throughout the beats. All three beat areas were contiguous and two, unusual for police beat areas, actually had boundaries that appeared to be useful for the purpose of near-repeat analysis, in that they followed significant roads in the area and therefore tended to delineate between different communities. These beat areas are shown as shaded in Figure 15.1.

It was decided to develop a strategy that would operate in just two of the three beat areas for a pilot period. There was some evidence of near-repeats in other areas of the town but these were within beat areas rather than encompassing them as a whole. Although police beat areas tend often to be drawn arbitrarily (and those in Bournemouth do not reflect other geographies such as local authority ward areas) they are defined by police officers, for police officers and are therefore understood by police practitioners. This was an important factor as it was clearly going to be these practitioners that would be delivering any reduction strategy.

Delivering 'hard hitting' crime prevention advice to properties within 200 m of a burglary event was seen as paramount in a bid to reduce burglary within the selected beat areas. An intervention strategy was therefore put into place that hinged on three key factors.

1. The ability of analysts to identify the locations of dwelling burglaries within the two chosen beat areas, and wherever possible within 24 hours of the initial event.

2. The ability of Police Community Support Officers (PCSOs) to respond to the analysts' recommendations on the same day as a high risk location was identified.
3. The delivery on a face to face basis of some hard hitting crime reduction advice to those addresses identified by analysis as being at high risk. This was to include householders being told about the near-repeat phenomena and it being made clear that police had reason to believe that their properties were at increased risk of attack.

15.4 Delivering a near-repeat intervention

The police crime reduction intervention began on 1 April 2005 and was preceded by a number of press releases. This was an intervention that the local media found particularly appealing and as a result were keen to follow over time. This was found to be advantageous as the main audience for the intervention were to be those that use and respond to the local media.

Analysts responded by identifying all burglaries in the selected police beat areas within 24 hours of reporting (wherever possible) and preparing detailed maps indicating the dwellings that were at the highest risk of imminently suffering a future burglary. This utilised a simple process of drawing a 200 m buffer around the location of the trigger event on a conurbation-level map. By then using further findings from the original research, such as houses on the same side of the road as the trigger event being at higher risk than those on the opposite side, actual buildings were highlighted on the analyst's map as first, second and third priority requirements.

These maps were passed to PCSOs who were priority tasked with visiting as many of the high risk addresses as possible within that day, and then similarly calling at the second and third priority addresses until all had been visited. An emphasis was placed on visiting the high priority addresses as soon as possible. At all times 'one on one' communication with householders was sought, but ultimately all identified addresses received a crime reduction information pack together with correspondence describing the initiative and the increased risk factor. By January 2006 over 3000 dwellings had been visited by PCSOs at various times, all receiving specific dwelling burglary crime reduction advice.

15.5 The impact

The two beat areas that received this focused attention experienced a dwelling burglary reduction of 37% and analysis was undertaken to further evaluate the success or otherwise of the action taken.

THE NEAR-REPEAT BURGLARY PHENOMENON

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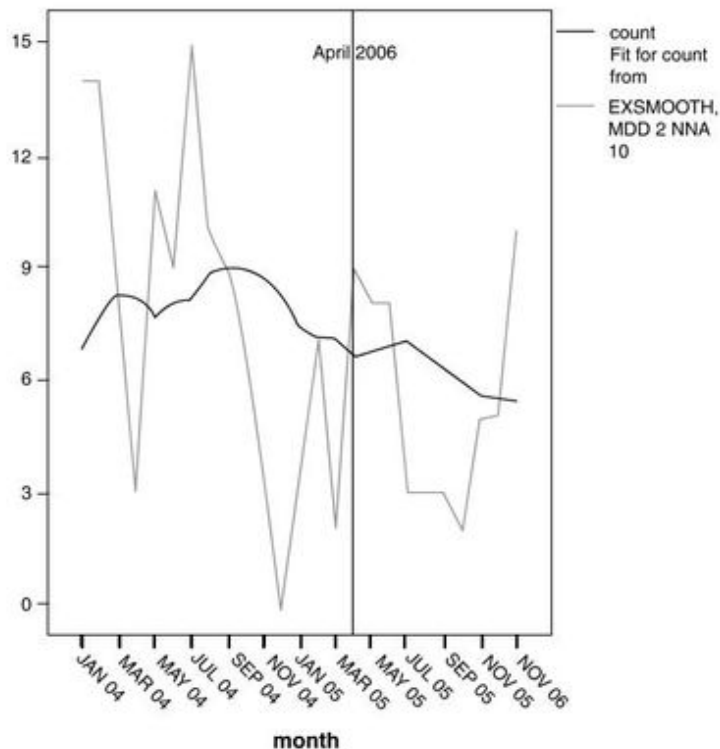
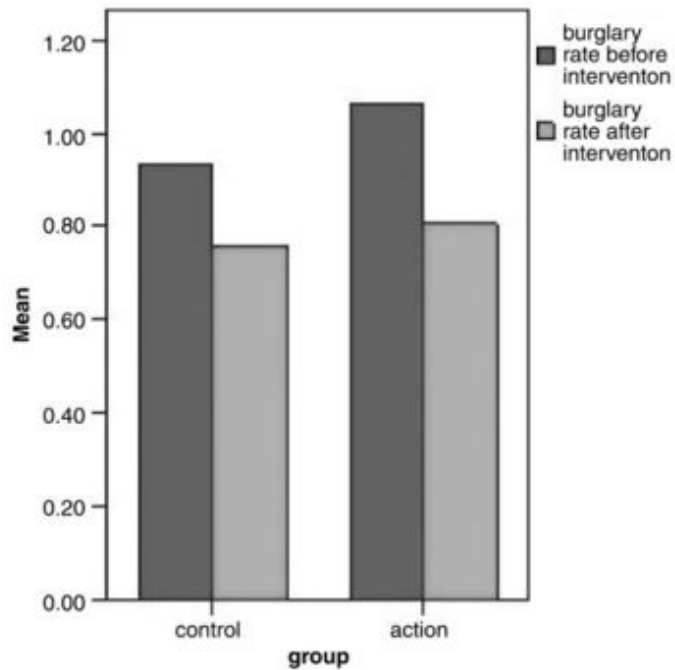


Figure 15.2 Changes in burglary dwelling offences in Bournemouth between January 2004 and January 2006

With a start date of the 1 April 2005, two 10 month periods of data ('before' and 'after') showed that dwelling burglary crime had reduced by 32.5% in the 2005–06 period. A time-series chart (Figure 15.2) indicated that burglary dwelling offences in the area had been reducing from about October–November 2004 in any case. This can be seen in the exponentially smoothed line in Figure 15.2. It was therefore necessary to establish if burglary crime had fallen at a greater rate than could have been expected from the ongoing downward trend.

In order to identify a further area of the division which displayed similar demographic qualities to the intervention areas, and could therefore be used as a control site, 2001 National Census data relating to premises of a similar type were sourced. This process identified twenty Census Output Areas displaying similar rates of ownership and had similar levels of burglary dwelling offences during the intervention period. Twenty census output areas were also found in an area to the south that displayed similar rates of occupier mortgage ownership and where the near-repeat phenomena was known to be apparent. This area had not been subject to intervention and was separated from the intervention area by about four miles.

Comparisons were then made between the two burglary crime rates. Figure 15.3a displays a bar chart of the mean values of dwelling burglary crime rates in the two areas both before and after the intervention began. From this we can see that burglary crime did fall in both areas and possibly more so in the 'action' area. The possibility of a seasonal factor was considered but did not appear to be apparent. Figure 15.3b shows certain descriptive statistics for both areas before (controlpre and actionpre) and after (controlpost and actionpost) the targeted interventions.



Descriptive Statistics

	Range	Minimum	Maximum	Mean	Std. Deviation
controlpre	1.17	.58	1.75	.9320	.39869
controlpost	1.56	.19	1.75	.7580	.50736
actionpre	1.57	.20	1.77	1.0620	.50920
actionpost	1.18	.39	1.57	.8060	.41979

Figure 15.3 Changes in burglary dwelling rates in the action area and the control area: (a) displayed as a bar chart and (b) as descriptive statistics.

The following points (shown as bold in Figure 15.3b) are of note from the descriptive statistics:

- The post-intervention range (maximum–minimum) in the control area was higher than the pre-intervention range, unlike the action area where the range reduced.
- The maximum value in the action area fell following the intervention, whereas in the control area the value did not alter.
- The mean burglary rate in both areas fell following the intervention although the fall in the action area was considerably greater than in the control area.
- The standard deviation in the control area increased after intervention.
- Although the action area experienced a reduction in burglary dwelling that equated to about 5% greater than the control area it could not be shown as statistically significant.

These descriptive statistics offer corroboration that burglary dwelling crime fell in both areas and that there were marked differences between the ‘before’ and ‘after’ values. This indicates that the decrease in dwelling burglary crime was different in both areas and that possibly the dynamics of those reductions were also different.

Dwelling burglary data for the action area over the same 20 month period was also examined on a spatio-temporal basis and it was the results of that analysis that were perhaps the most telling feature of the intervention strategy. It was concluded that since the intervention was put into place the ‘near-repeat’ phenomena was no longer apparent.

By mapping and treating residential burglaries in areas known to encourage a spatio-temporal link between such crimes as indicators of forthcoming risk, action had been taken that had led to a change in the spatial behaviour of offenders. This spatial change can also be visualised with the use of standard deviational ellipses of burglary crime (produced using the program CrimeStatIII (Levine, 2004)). Figure 15.4 displays a background map with the two shaded areas representing the beat areas subject to the intervention. Standard deviational ellipses relate to the residential burglary crime in those intervention areas before and after April 2005. Noticeable is the quite acute change in direction of the ellipse.

15.6 Conclusions

The use of the near-repeat phenomena in the Bournemouth BCU has been ongoing. In terms of residential burglary intervention, the strategy has been expanded into further beat areas where near-repeats were found to occur. A postal questionnaire to residents



Figure 15.4 Standard deviation ellipses of burglary dwelling crime in Bournemouth (a) before the crime reduction initiatives and (b) after the crime reduction initiatives.



(b)

Figure 15.4 (Continued)

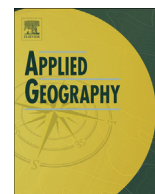
also identified overwhelming support for information to be passed concerning local crime, with very little evidence of any resulting increase in the fear of burglary crime.

Speed is, however, of the essence as the high risk window is small in temporal terms. It is therefore essential to develop both analytical and operational processes that can react both quickly and efficiently. Interestingly there was one short period during 2006 when the BCU was unable to provide the operational resources to react to the prospective mapping. Although anecdotal only, it was noted that in that period alone a number of near-repeat burglaries were recorded in the intervention areas. In order to reduce the time between identification of a trigger offence and communicating the risk to residents', mobile telephone text messaging technology is now being utilised. By using a web-based service and asking residents to register with their mobile phone numbers and postcodes a generic text message is sent to registered residents in high risk postcodes when a trigger burglary event is identified. Although these addresses are still visited, this does allow for speedier communication with residents, particularly those who may be working during the period when PCSOs are visiting.

Steps are now underway to identify areas in the BCU where the same spatio-temporal clustering can be found in thefts from motor vehicle crime. At this stage a number of beat areas have been identified that display evidence of such clustering. It is intended to use recorded theft from motor vehicle offences in such areas as trigger crimes in the same manner as described for burglary dwelling. However, unlike the burglary initiative, the existence of a trigger crime will be used to create enforcement opportunities, primarily by prioritising the deployment of 'trap' vehicles within the identified high risk zones. Again, the highest risk window is small at no more than three days and the distances from the initial event remain at about 200 m. It is hoped that such a strategy will lead to an enhanced predictive mapping capability that can influence the use of enforcement resources to best effect and shape tactical responses. Dorset Police is committed to continuing to develop an approach to mapping crime risk by utilising research in this area, and so developing prospective crime mapping to intelligently lead crime reduction and enforcement opportunities.

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The space/time behaviour of dwelling burglars: Finding near repeat patterns in serial offender data



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A B S T R A C T

Keywords:

Burglary
Clustering
Serial offending
Crime prevention
Repeat

Whilst analysis of crime for tactical and strategic reasons within the criminal justice arena has now become an established need, predictive analysis of crime remains, and probably always will be, a goal to be desired. Opening a window on this over the last 2 decades, prominent research from academia has focused on the phenomenon of repeat victimisation and more recently 'near repeat' victimisation, both firmly grounded in the geography of crime. Somewhat limited to the establishment of near repeat behavioural patterns in whole area data, these can be utilised for crime prevention responses on a local scale. Research reported here however, explores the phenomenon through the examination of serial offending by individual offenders to establish if such spatio-temporal patterns are apparent in the spatial behavioural patterns of the individual burglar, and if so how they may be defined and therefore utilised on a micro rather than macro scale. It is hypothesised that offenders' responsible for more than one series of offences will display consistency across their crime series within time and distance parameters for their closest offences in space. Results improve upon current knowledge concerning near repeat offending being the actions of common offenders. Testing of the extracted data indicates that offenders maintain personal boundaries of 'closeness' in time and space even when actions are separated by significant time spans, creating stylised behavioural signatures appertaining to their use of and movement through space when offending.

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Introduction

As spatial analysis and the availability of G.I.S. has blossomed so the relevance of its use, and indeed the concept of an empirical geography of crime, has become embedded within the Criminal Justice System of England & Wales. [Chainey & Ratcliffe \(2006\)](#) devote a number of pages succinctly explaining its use within a variety of functions of such agencies, whilst their book title and potential audience indicates the recognised importance of the subject to practitioners in the crime arena. Introducing an issue of the *Professional Geographer* devoted to spatial methodologies for studying crime [Le Beau and Leitner \(2011\)](#) set out a time line of developments in the geography of crime together with three claims. Whilst the first two refer to past developments his third considers the future:

"...the academic niche for the geography of crime will very likely be shared with the new fields of environmental criminology,

spatial criminology, and crime science." He concludes by asserting an upward trajectory for the geography of crime and in particular for the geographical and spatial analysis of crime due to its importance to society. In the same issue [Andresen \(2011\)](#) reports on empirical research studying crime rates using an alternative measure of the population at risk. Given results showing a marked difference when using these alternative measures he comments on the importance of policy makers remaining current with geographical data sets and geographical analysis in relation to crime to avoid bias in their work. Alternatively [Breetzke \(2012\)](#) considers an aspect of physical geography and how the surrounding terrain may affect risk of victimisation of burglary in South Africa. Rather less contemporary but remaining pertinent, Herbert in 1989 was of the view that the geographers interest in space and place had much to offer criminological research.

Whilst maintaining the theme of geographic analysis of the spatial patterns of crime and criminals this paper reports on the spatial analysis of burglary offences committed by individual offenders. By moving forward with recent research reported within the criminology and crime science literature as suggested by Le Beau, this research indicates a predictability to an individual's offending

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behaviour that changes little over time, suggesting that a geography of individual serial offenders can be defined on a micro scale.

Repeat victimisation

Predictive patterns of crime in the form of repeat victimisation was a phenomenon perhaps first identified by Johnson, Kerper, Hayes, and Killenger in a 1973 study 'The Recidivist Victim: A Descriptive Study'. This was furthered by Sparks in 1981 through identifying several key themes that can be linked to what he termed 'multiple victimisations'; describing views that can be adopted to explain why an individual may become a victim, but more importantly, a victim multiple times (Sparks, 1981, pp. 772–777). In 1993 Farrell and Pease (1993, pp. 6–7) evidenced repeat victimisation accounting for a significant amount of crime in England and Wales. They provided analysis of British Crime Surveys reporting that between seventy-one and eighty-one percent of victims surveyed had suffered two or more victimisations within the twelve months prior to the survey. As a result of these, and other academic explorations U.K. Police Forces began to develop crime reduction processes to counter repeat victimisation; first steps towards prediction of crime events and a suitable preventative reaction. By 1995 the U.K. Home Office were issuing Crime Detection & Prevention Series papers on the topic that were citing 10 or more previous linked papers and Police Forces had annual targets to reduce or at least maintain below target, the number of repeat victimisations in their force areas

Near repeat victimisation

Following hot on the trail of successful action to reduce repeat victimisation, studies began to emerge identifying patterns of crime clustering not only in space but also in time. Morgan (2001, p. 87) highlights research conducted in the early nineties by Polvi, Looman, Humphries, and Pease (1990) which showed that the risk of repeat victimisation was heightened over a short time period, but that for the first month, risk of repeat burglary victimisation was twelve times greater than expected. Subsequent research supported this suggesting that between the first and second month risk is temporarily heightened following a residential burglary, but that there are also limits on the spatial risk. Johnson & Bowers term this the spatio-temporal buffer (Bowers & Johnson, 2005; Johnson & Bowers, 2004).

Working in Australia Morgan (2001) conducted research into the repeat burglary phenomenon in Perth discovering the presence of what he termed 'near repeats', repeat victimisations closely occurring in both time and space to an initial victimisation but not actually at the same ('repeat') location. Shaw & Pease reported in 2000 on research of repeat offending in Scotland finding distinct spatial features. On 68% of occasions, if the first dwelling burglary was at a house with an even number, the next property to be burgled was also an even number. This pattern held for odd numbers. Thirty percent of dwelling burglaries on the same street occurred within 6 numbers either side of the first property attacked, the authors referring to this as the *penumbra of risk*.

In 2000, Townsley, Homel, and Chaseling, again in Australia, considered this further by analysing residential burglary crime for clusters of offences 'close' in space and time, near repeat offences in terms of being *near* to a previous crime event in both dimensions rather than true repeat victimisation of the same location.

This research suggested that, much like disease spreads between people who are classed as potential hosts (those who have the right characteristics to contract a disease) the process translated into dwelling burglary, finding that areas of largely

homogenous housing, were far more susceptible to near repeat victimisation than areas of heterogeneous housing.

Johnson, Bowers and Pease invoke Optimal Foraging Theory derived from behavioural ecology as a potential explanation for the behavioural pattern of near repeat offences. Searching for food animals endeavour to maximise resources acquired, simultaneously minimising chances of capture and effort expended. The analogy between animals and offenders is clear. In their search for food animals are likely to learn much about the environment they move through such as high yield locations, escape routes, hiding areas and safe places. If offenders act as optimal foragers it was anticipated that the same would be true; offenders would learn about likely yields, security measures, potential escape routes from their previous actions, using this information for future offending. Extending this they suggest that repeat location offences can then be considered a form of optimal foraging (Johnson, Bowers, & Pease, 2005).

Policing response

Academic research activity in this search for predictive analytical power has received significant impetus through work such as that described. Promulgating that the risk of burglary victimisation can be likened to that of a contagious disease, those premises nearest to the initial burglary event being at heightened risk of future attack and such risk decaying both over distance and time, is a useful analogy. Most important from a predictive sense is that parameters from both dimensions can be articulated (Bowers, Johnson, & Pease, 2004; Townsley et al., 2000 and others).

In 2005 Police in Bournemouth, a popular U.K. south coast town, undertook a burglary reduction initiative based on similar near-repeat analysis. Patterns of space/time clusters were evident in the towns recorded burglary data with two dimensional parameters of 200 m and 48 hours for highest risk. Rapid delivery of reduction advice to residents within 200 m of an initial burglary and 48 h of its report resulted in increased crime reduction, but perhaps more significant was an apparent change in offender spatial behaviour in the areas of intervention (Johnson, 2008). Such predictive analysis has now been adopted with significant fanfare by others, particularly Greater Manchester Police. However the proactive Policing response has taken a global approach of establishing near repeat patterns within area based data to intelligently lead the deployment of prevention and patrol resources, refining the original work of Johnson (2008) in Bournemouth.

Research objectives

Research reported here explores the phenomenon through the examination of individual offender data to establish if time and space patterns are apparent in the spatial behavioural patterns of the individual burglar. If so it is asked how such patterns may be defined and therefore utilised on a micro rather than meso or macro scale. Such work has the advantage of approaching data from a known situation, namely that a series of crimes were the actions of one individual and therefore display personalised behavioural patterning.

It is hypothesised that offenders' responsible for more than one series of offences will display consistency across their crime series within time and distance parameters for their closest offences in space. It is suggested that each offender will have personal definitions of 'closeness' in space and 'closeness' in time in a similar way that we each have our own activity spaces (Brantingham & Brantingham, 1990), although closeness in time may be driven by an individual's needs and are likely to be more fluid. In addition it was considered that if serial offenders were to display consistent near repeat offending this may create opportunities to develop

predictive analytics utilising these as stylised behavioural patterns akin to crime ‘signatures’.

Literature on repeat victimisation strongly suggests common offenders for repeat offences (Ashton, Brown, Senior, & Pease, 1998; Hearnden & Magill, 2004; Kleemans, 2001; Pease, 1998; Polvi, 1991; Wright & Decker, 1994) but such studies have tended to rely on victim/crime scene data or interview accounts with offenders. To date little published work on near-repeat burglaries has been undertaken using offender data. Examination of modus operandi facets of burglary has been undertaken on Liverpool data (Bowers & Johnson, 2004) suggesting common offenders are responsible for near repeat offences and the original burglary event, but was based on data with no reference to identified offenders. Bernasco (2008) points out that the theoretical claim that the original and subsequent near repeat offence (in terms of burglary particularly) are the work of the same perpetrator relies on limited evidence. He states that until his work of 2008 no such research had utilised offender data. Bernasco examines Police recorded detected offence data from the Hague and surrounding area over an 8 year period, providing empirical evidence that offences related in time and space are highly likely to indicate same offender activity. However he does not investigate the spatial point patterns of identified individual offenders.

Data for this research was drawn from the English south coast conurbation of Bournemouth and Poole, the first stage involving analysing police recorded burglary data to ascertain whether such near repeat patterns were apparent. Townsley et al. describe using a Knox test to build a non-cumulative table of the number of burglaries actually committed (observed) over various distances and time periods. Such a table allows comparison of the number of burglaries committed with those that may be expected by chance (Townsley et al., 2000). This method was used to establish the presence of near repeat patterns in the Bournemouth & Poole data.

It had been anticipated that it would be similarly effective for identifying such patterns in serial offender data, however, due to comparatively low volumes of offences within serial offending it was found incompatible and a new method was developed.

Material & methods

Police recorded residential burglary crime for the calendar years 2002–2006 inclusive for the coterminous Police divisions were obtained for analysis. Knowledge of the burglary reduction intervention in Bournemouth (Johnson, 2008) prompted the Bournemouth data to be split into two time periods, before and after the intervention start date. No such intervention had taken place in the Poole policing area.

Linked to recorded crime was data enabling the identification of all identified offenders for residential burglary within the extracted

committed. One offender was responsible for three separate periods of serial offending.

As with most recorded acquisitive crime exact dates and times burglaries occur are rarely known. Time and date fields within the data consisted of ‘from’ and ‘to’ dates and times; when the premises were last known to be in order (‘from’) and when the burglary was discovered (‘To’), so giving a time window when the offence could have occurred. Distributions indicated a prevalence of offences committed within a one day time window indicating that use of the ‘from date’ field in all three data sets as a time reference was valid. Three further data sets consisting of only those offences committed during such a 24 h window were then created so ensuring time accuracy.

The methodology of Townsley et al. (2000) was used in order to establish the presence or otherwise of near repeat offences. This utilises the Knox method whereby a non cumulative table can be built of the volume of burglary offences within certain time (t) and distance (d) bands. Each cell in the table reports the number of burglaries within t and d parameters such as in Table 1.

By utilising column and row totals the expected values (e) for each cell are also calculated as at formula f1.

$$e = (y_i \times y_j) / y_k \quad (1)$$

Limitations to this methodology are well known, being that time and distance parameters are set by the researcher and should therefore utilise some form of empirical measure. By considering relevant results from previous empirical research integrity can be built in to the Knox analysis through empirically informed categorisation. Time is dealt within previous research concerning repeat burglaries, suggesting a tendency for them to occur soon after previous events and generally within 2 months (Anderson, Chenery, & Pease, 1995; Bowers & Johnson, 2004; Pease, 1998; Polvi, 1991). Concerning Bournemouth the 2005 Dorset Police reduction intervention established high risk at much shorter intervals, certainly being apparent at 7 days from an initial event. Time bands of 7 days were therefore utilised extending over a period of 6 months. Anderson et al. found addresses two doors away from a burgled premise to be at slightly higher risk than those further away (Anderson et al., 1995). A 2002 study also found that houses on the same side of a street were at heightened risk (Everson, 2002). Actual distances are unknown but a few hundred metres can certainly be inferred. For this research a distance variable of 200 m was chosen extending to 2000 m overall.

CrimeStatIII software (Levine, 2004) provides Knox test functionality and reports x values as described in Table 1. To establish which cells in the 3 tables established experienced a greater frequency of events than could be expected by chance adjusted residuals (r) were then calculated for each cell as shown at formula f2.

$$r = x - e / \sqrt{e(1 - \text{row proportion of } x)(1 - \text{column proportion of } x)} \quad (2)$$

data set. Further filtering enabled extraction of those responsible for ten or more residential burglaries. Forty-four offenders formed this category but only 14 of those had committed two distinct series of crimes, each having been imprisoned following their first series of crimes for varying terms. Post release a further series had been

As described by Townsley et al. (2000) “The residual scores measure how many standard deviations the observed frequency is from the expected”. Values ≥ 2 reflect a 5% chance of a type I error. To limit this, minimum values of 3 could be utilised thus only 1% of cells will potentially display chance values. The built tables for the

Table 1
Time.

Distance	0 to d	d to $2d$	$2d$ to $3d$	Totals
0 to t	x			y_j – row total
t to $2t$		x_i		
$2t$ to $3t$			x_j	
Totals	y_i – column total			y_k – row and column total

d represents a distance parameter set by the user e.g. 200 m
 t represents a time parameter set by the user e.g. 7 days.
 x represents the number of burglaries between 0 to t time and 0 to t distance.
 x_i represents the number of burglaries between t and $2t$ time and d and $2d$ distance.
 x_j represents the number of burglaries between $2t$ and $3t$ time and $2d$ and $3d$ distance.

Bournemouth and Poole data contained 280 cells each and therefore residual values of 3 and above were deemed significant, limiting the number of cells displaying Type I error values to a maximum of 3.

Ultimately when used with offender data the Knox method becomes unstable with low values, high residual scores showing significance against observed values of only one burglary. Given such instability with low values of serial offending a second methodology was developed to identify near repeat patterns in serial offending and a number of requirements for the analysis were formulated, namely to identify within a series of burglary crimes:

- Those offences close in space,
- The time distribution relevant to spatially close offences,
- To quantify the ‘closeness’ of space relevant to the individual offender and,
- To quantify the ‘closeness’ of time relevant to the individual offenders spatially close offences.

Variables for time (t) and distance (d) now translated into defining what could be considered as ‘close’ given an individuals’ serial behaviour. Literature appertaining to near repeats overwhelmingly suggests small distances of a few hundred m, (Bowers et al., 2004; Johnson et al., 2005, 2007) particularly for Bournemouth (Johnson, 2008). Consequently an aim of establishing the minimum distances within an offenders’ spatial distribution of crimes was selected.

Straight line distances between crime events were utilised to populate a table of distances between all burglary events and those future to them in the series. For each row of data the minimum distance was extracted. Unlike nearest neighbour analysis which considers events past and future row minimum distances refer to each events future nearest neighbour. Future nearest neighbour distances therefore determine that for each event except the last in the series there is at least one other event that is ‘close’ to it. An assumption is made that events are ordered chronologically.

Table 2 examples the inter event distances for offender D series 2 in the sample. Fig. 1 displays the frequency histogram of inter

Table 2
Inter event distances offender D series 2.

Min. Distance	Event:	1	2	3	4	5	6	7	8	9	10	11
0.752	1		1.54	3.72	0.75	2.43	2.38	1.52	10.39	8.10	1.51	1.81
0.390	2			4.62	2.03	3.78	3.83	0.39	9.66	8.40	0.57	3.01
1.878	3				2.97	1.88	2.31	4.30	9.03	4.82	4.13	1.97
1.067	4					1.76	1.80	1.87	10.06	7.43	1.78	1.07
0.446	5						0.45	3.58	10.46	6.69	3.46	0.84
1.101	6							3.67	10.88	7.12	3.57	1.10
0.187	7								9.34	8.01	0.19	2.78
6.352	8									6.35	9.22	9.90
6.628	9										7.82	6.63
2.649	10											2.65

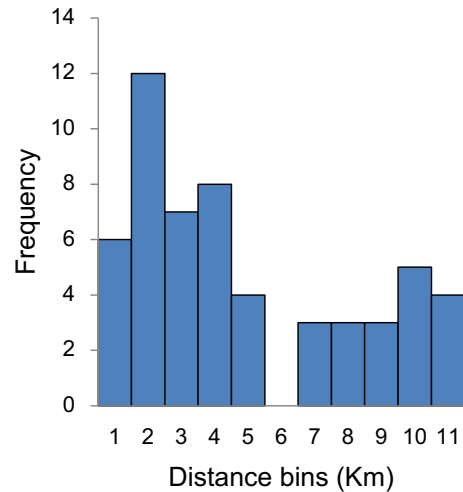


Fig. 1. Histogram of Inter-event distances.

event distances and Fig. 2 the corresponding histogram of the distribution of future nearest neighbour distances (column ‘Min. Distance’ from Table 2). Table 3 reports descriptive statistics corresponding to the future nearest neighbour distribution. All distances are in kilometres.

For this offender we can conclude that offences cluster at small distances \leq median and this can be visualised in Fig. 3, a simple plot of the grid references pertinent to this example.

Skew values for the distribution of future nearest neighbour distances were obtained by using the Pearson coefficient of skewness:

$$\text{skew} = 3 \times (\text{mean} - \text{median}) / \text{standard deviation}$$

Skewness is a dimensionless measure descriptive of the relevant distribution. Its descriptive nature is succinctly put by Tabachnick & Fidell (2001, p. 73–77) “If there is positive skewness, there is a pileup of cases to the left and the right tail is too long; with negative skewness, there is a pileup of cases to the right, and the left tail is too long.” Using the Pearson coefficient of skewness secures a guide of significance as values greater than +1 can be considered notably positively skewed whilst values less than –1 indicate notable negative skewness (Pearson, 1895; Rees, 2001, p. 43).

Skew values for the future nearest neighbour distance distribution describe that distributions tendency or otherwise to cluster towards small or larger distances. Within a skewed distribution median values are representative of the nature of the data sets distribution and central tendency, therefore if an offenders serial offending displayed a positively skewed distribution of future nearest neighbour distances (as with offender D series 2 in Table 2)

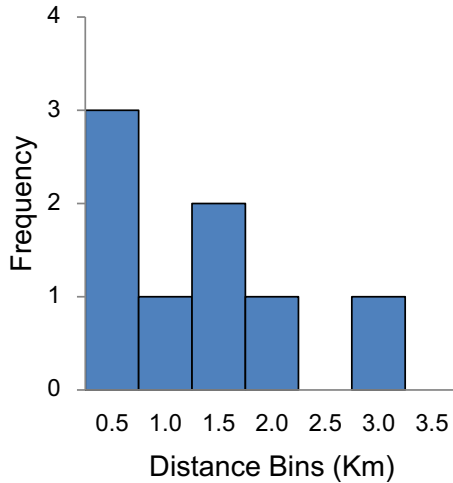


Fig. 2. Histogram of future nearest neighbour distances.

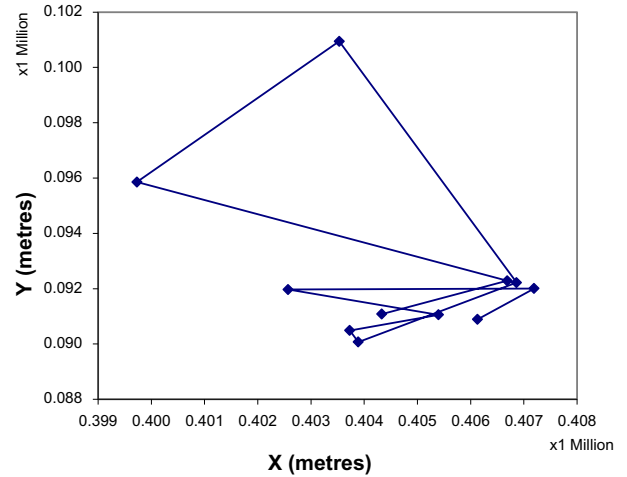


Fig. 3. x/y plot of offences.

it shows a tendency to commit offences close in space. These Median values provide a cut-off measure at which events with inter event distances \leq to this distance can be selected. Such events represent those that have taken place at close distances with respect to the overall spatial distribution, thus identifying offences within a burglary series that are 'close' in space. Time spans for these spatially clustered events were then calculated and by utilising the same methodology of selecting those with a time span \leq median time span a simple matrix was compiled of offences close in both time and space.

If an offenders' behaviour is such that, in chronological sequence, his/her closest future nearest neighbour offences always follow the immediately previous offence such a matrix would show populated cells across the diagonal. Such time/space patterning can be summarised by the simple proportion of populated cells in this diagonal where the total number of possible nearest time/space neighbours = n (No of offences in series) - 1. This proportion can be seen as an index score for time/space nearest neighbours.

Such a sequence can be imagined as a series of clustered events on a straight line, perhaps a single street, where chronologically events move along the street from left to right or vice-versa. Other configurations can be imagined but in every case events move along a time line and are further away from the event prior to the immediately preceding event. In this case the index score obtained would equal 1 and these closest nearest neighbours could be referred to as first order time/space neighbours. Second order time/space neighbours would relate to the next offence but one i.e. offence 3 to offence 1, offence 4 to offence 2 and so on. Again an index can be calculated. High index scores for k order space/time neighbours will indicate a repeating pattern of behaviour. The relevance of the k order neighbour is however dependent on the number of crimes in the series. Crime opportunities available = $n - k$ therefore the 8th order neighbours in a series of 11 events only represents three possible crime opportunities.

Within an offenders' data the future nearest neighbour distance data sets from their series of crimes were compared using a Fisher exact test on the median values. The data sets of the two series of

each offender were amalgamated and a combined median value calculated. A 2×2 table was constructed (Fig. 4).

Fisher's exact test calculates the exact probability that a table could be obtained that differs from the expected values as much as or more than the actual table of values by effectively generating all possible tables given the margins of the observed values. Unlike a chi-squared test the Fisher exact test can utilise small values (<5) hence its preferred use in this case. The null hypotheses (H_0) state that the medians of future nearest neighbour distances for each series of crimes with a common offender are the same. This same method was applied to the tables of time spans between events where the inter event distance \leq median future nearest neighbour distance. In all cases a double sided p -value was sought as direction was unknown. In each instance the alternative hypothesis states that the medians would be different as an individual offender maintains no personal concept of 'closeness' in terms of distance or time between offending locations.

Results

Area results

Knox analysis showed significant time–space clustering in the data from both towns. A marked difference between the two Bournemouth data sets was observed, the post intervention analysis showing a considerable decline in such clustering.

Poole data returned significant residual scores at 14 days up to 400 m. All residual values greater than three were sourced from observed values of actual burglaries that were at least 20 offences greater than their respective expected values. Bournemouth data provided a considerable contrast against that for Poole. Given that they reflect different time periods and that such crime had been noticeably falling comparisons are however jeopardous. High scores (>8) were reported at 200 m up to 21 days, similar to parameters set by the analysis undertaken for the Police reduction initiative (Johnson, 2008). Observed values for the first 14 days at 200 m were at least 100 offences greater than expected. For the period post April 2005 in Bournemouth risk remained high at

Table 3 Future nearest neighbour distribution.

	Q1	Std deviation	Mean	Median	Skew	Range
Min. Distance	0.523	2.406	2.145	1.084	1.323	6.441

	Series 1	Series 2
No of values > combined median		
No of values < combined median		

Fig. 4. Fisher exact test: 2×2 table.

200 m but for only 7 days. As this data reflects the reduction intervention it is interesting to note the considerable change.

Offender data analysis

Offenders with multiple series were required in order to facilitate comparison between series. All selected offenders were lone offenders; data did not reflect others being proceeded against for the same offences. Only one had committed more than two series of crimes (offender F, 3 series) leaving potential comparisons limited.

Table 4 reports time and distance parameters for each offender and respective series of crimes. These values were concluded by reference to the skew value obtained, the median or mean value as appropriate and frequency distributions. Unless the skew value indicated a distribution close to symmetrical the median value was concluded as the better descriptor.

‘Close offences’ provides the parameter for those offences determined as close in space and close in time for the individual series of offences being examined, whilst the ‘All offending’ value reports a similar statistic for the distribution of all crimes within the series. This table also reports the results from the Fisher’s exact test carried out on each pair of crime series. This test sought to establish if the ‘Close offences’ parameter in relation to one series was statistically the same or significantly different from the ‘Close offences’ parameter in a second series of offences.

Discussion

There are a number of caveats to consider when using Police recorded crime data, notably that not all crime is either reported or recorded. For the whole area research under reporting/recording of crime was not considered problematic due to the volume of data obtained, however exploring individual offending and relying on recorded data may create bias. There are two issues, the potential for the offender to have committed offences that went unreported (or reported but unrecorded) and/or the potential for the offender to have committed more offences than are known to have been his responsibility. In many ways these are limitations that are forced

upon researchers, there probably is no better available data to work with.

Regarding offences simply not reported to the police domestic burglary is one that routinely shows a high reporting/recording rate. The 2010/11 British Crime Survey (Chaplin, Flatley, & Smith, 2011) reported that “over eight in ten burglaries where something was stolen (82%) and over three-quarters of burglary with entry were reported (79%)”.

In this case detected offences were considered those offences where an offender had been brought to justice as opposed to being arrested for it without further action being taken. In all cases offenders were prosecuted for a sample of the offences in their series of offending and asked the court to then take the remaining offences into consideration (TIC). Whilst not foolproof personal knowledge of relevant investigative procedures and methods indicate to the author that the technique of detecting offences by way of confession and ‘TIC’ is reasonably robust. In the majority of cases offenders accept that they have little to lose once formally charged with a sample of substantive burglary offences and that it can help their case by showing a willingness to cooperate. During the period when this data was collected it was common practice for an offender to be driven around an area and be asked to point out premises attacked. If an indicated address had no associated recorded crime an enquiry would be made with the householder, recording a detected burglary offence rather than an undetected one obviously being more favourable.

For this research the results obtained indicate that data sets utilised were probably consistently accurate with regard to these non recording/non detecting issues. Consistent results such as those obtained would not be anticipated had there been non recording issues apparent in individual offender’s data sets.

Another important issue concerning offender data is that it only represents those offenders brought to justice. Whilst the offender data examined appears representative of the most prolific offenders it only concerns a proportion of total offending. In this case 21.29% of all burglary offences in the data set were marked as detected, whilst the offences committed by the selected prolific offenders amounted to 5.87% of all offences.

Table 4
Spatial offending patterns and series comparisons.

Offender	Series 1								Series 2								Fisher’s exact test between series		Comments
					Close offences		All offending						Close offences		All offending		p distance	p time	
	n	t	n _c	r	km	Days	km	Days	n	t	n _c	r	km	Days	km	Days			
A	39	155	38	0	0–0.4	0–28	2–4	0–5	12	14	14	0	0–0.6	0–12	1–3	1	0.320	0.000023**	
B	22	90	17	0	0–0.4	0–10	0–2	0–2	6	10	2	0	0–0.6	3–4	0–4	0–6	0.280	0.485	
C	14	114	8	0	0–0.6	0–28	0–1	0–3	15	46	11	0	0–0.8	0–5	0–3	0–5	0.449	0.369	
D	13	39	11	0	0–0.65	0–15	5–10	0–4	11	34	8	0	0–1	0–25	0–3	3–6	0.669	1.000	
E	9	79	7	0	0–0.4	0–30	0–1	0–10	10	53	7	0	0–1.1	5–10	1–2	0–5	0.153	0.286	
F	8	125	4	0	0–0.8	0–40	0–3	0–11	15	85	18	0	0–0.6	0–32	0–1.6	0–4	0.659	1.000	Test on series 1/2
Offender ‘F’ Series 3																			
F	11	51	11	1	0–0.6	0–23	0–2	0–6	–	–	–	–	–	–	–	–	0.637	1.000	Test on series 1/3
F	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.000	0.064	Test on series 2/3
G	18	124	15	8	0–1	0–1	0–5	0–1	11	34	6	0	0–0.6	0–5	0–5	0–1	0.310	0.361	
H	6	34	3	0	0–0.5	0–8	0.2–0.8	0–6	9	27	6	1	0–0.4	0–10	0–0.8	1–4	0.592	1.000	
J	15	313	25	0	0–0.7	0–25	0–2.5	1–3	17	40	15	0	0–0.4	0–15	0–1	0–1	1.000	0.000774**	
K	20	142	14	0	0–0.5	0–10	0–1.5	0–2	17	33	12	1	0–0.4	0–11	0–2	0–2	1.000	1.000	
L	11	44	7	2	0–0.2	0–1	0–1	0–1	10	95	5	1	0–0.2	0–15	0–1	0–10	1.000	0.00126**	
M	28	92	28	0	0–0.9	0–12	0–5	0–2	17	47	5	0	0–0.4	0	0–1	0–2	0.004**	0.048*	
N	7	98	4	1	0–0.8	0–10	0–2	0–10	9	21	5	1	0–1	0–2	0–2	0–5	1.000	1.000	
P	39	56	41	0	0–0.3	0	0–3	0	38	30	40	0	0–0.3	0	0–3	0	1.000	0.822	

Significance level * = $p < 0.05$, ** = $p < 0.01$.

n = volume of offences.

t = time span of series in days.

n_c = number of future nearest neighbours with inter event distance ≤ the median future nearest neighbour distance.

r = number of repeat offences in series.

All offenders selected, bar one, had committed the majority of their offending in either Bournemouth, Poole or both towns, but there were instances of some offenders travelling considerable distances (tens of kilometres) to commit one or two offences. It is suggested that the most likely scenario concerns visits by offenders' to associates, committing burglaries whilst 'en route'. Such activity would be representative of crime pattern theory (Brantingham & Brantingham, 1990) and entirely expected. In the context of this research such distant offending has the effect of literally skewing the results in that offenders with such patterns will potentially generate high skew values in relation to distance over their entire offending. Should the distant offence be a lone event in time, such as one offence preceded and followed by offences in Bournemouth, it will be recorded as one of the future nearest neighbour distances and could therefore significantly skew the future nearest neighbour distance distribution. Such activity was present in the data for 3 of the series of crimes examined (D1, J1, E1).

Within offender analysis there is a degree of dependency in the data. This concerns distances for future nearest neighbour events and those that occur at a distance \leq the median measure of that distribution, as one data set is a derivation of the other. However derived data sets are not formally compared nor tested against their origins but used only as tools to gather further descriptive information, namely time spans between close events in space. Similarly Fisher's exact test is conducted on data sets derived from different series of offender's crimes. The offender is a common factor but the crime series from which the two sets of data originate are temporally independent.

Offender data analysis sought to establish if near repeat patterns could be observed within a series of burglary crimes and therefore within individual offending behaviour, and a methodology was devised to achieve this. A second question asked was whether such 'near repeat' spatial and temporal patterns could be considered a 'signature' of the individual offender. Patterns in offender data generally reflected the parameters established by the area analysis. Of 29 series of offences 18 displayed spatially close offences taking place within 14 day time spans and a further three within 15 days. Distances did not reflect the area results quite so well with only 11 series reporting small distances \leq 400 m. This may be because the offender data only accounts for a relatively small proportion of the data used for the area analysis. It is plausible, given low detection rates, that offender data for burglary does not accurately represent all offenders.

Stylising offender space–time behaviour could advantageously provide investigative opportunities for undetected series' of offences. Results in this research suggest many maintain a spatial and temporal approach to offending, even when such acts are separated by significant time periods. Results show little differentiation in the 'closeness' of time or distance between offenders with regard to their minimum distances and time lags. Testing between inter event distances across different offenders' serial burglaries may be more informative. This would tend towards a fuller description of their spatial offending behaviour. As it is results suggest small scale spatial and temporal offending features are aspects that could add to undetected serial crime analysis of modus operandi features.

Index scores for space–time k order nearest neighbours also indicate a tendency for the majority to commit burglary offences at their individualised shortest distances in space and time. With almost all offenders committing, at some point, future nearest neighbour offences that were actually consecutive in time (1st order space/time nearest neighbours) the importance of the time element is highlighted within offender decision making, perhaps giving an indication of the needs of the offender at that particular time. Establishing the offenders' yield at an initial offence may be informative of offences which become a 'seed' offence to a near repeat.

Conclusion

Area analysis confirms near repeat residential burglaries in the two towns, suggesting such patterns should also be discernible in offender data. Fisher's exact tests between offender's series only led to the rejection of H_0 in five cases, 4 rejections being in respect to time only. For only one series was H_0 rejected for both time and distance, thus suggesting offenders particularly maintain distance 'mental maps' over significant periods with respect to 'close' offending.

This research adds to existing literature expressing the view that crime reduction work should follow quickly in the footsteps of offenders and take on a targeted 'small area approach' as well as focussing on an attacked premise (Farrell & Pease, 1993; Polvi et al., 1990, 1991; Townsley et al., 2000). Whilst future risk at burgled premises is significant there is now substantial evidence to suggest that current repeat victimisation policies focussing solely on an attacked home would benefit from an expanded approach. Offender analysis upholds this view and provides further evidence that serial offenders commit spatially and temporally clustered crime.

Merry considers the ability to link both past and present offences with common offender(s) to be the "essence of operational crime analysis" (Merry, 2000) and such work is a core activity of the operational crime analyst. Considerable literature exists concerning methods to link offences to common offenders, although it is perhaps most prevalent concerning sexual and serious violent offending rather than volume property crime. By far the most common approach used by Police analysts (barring evidence such as DNA or fingerprints) is examination of behavioural modus operandi features from crime scenes. However research indicates the preferred approach would utilise spatial information concerning crime locations as well (Ewart, Oatley, & Burn, 2005; Goodwill & Alison, 2006). This research provides further evidence of the importance of spatial consideration when searching for linked crime events but emphasises the need to consider space/time relationships in doing so.

Acknowledgments

The assistance of Dorset Police in the provision of data which made this work possible is acknowledged, together with the always constructive encouragement and proof reading of Dr M. Barke of Northumbria University Geography. The insightful and constructive comments of two anonymous reviewers are greatly appreciated.

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Original Article

CPTED, but not as we know it: Investigating the conflict of frameworks and terminology in crime prevention through environmental design

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Abstract In designing, the built environment crime prevention has become a major international concern in recent decades. A transferable framework to give practitioners and researchers guidance and clarity is essential for effective cross disciplinary collaboration. Preliminary investigation revealed the lack of a universally accepted Crime Prevention through Environmental Design (CPTED) framework that suggests significant transferability issues and inconsistency. Such terminology, framework and definition conflict was evaluated through an exhaustive literature sample presented in this research. A restructured framework is proposed that allows a better emphasis of the CPTED aims and values, with a clear, thorough, unambiguous illustration of the intended roles of its component parts. The framework is accompanied by a finalised list of definitions and terms useful for practice and research alike.

Security Journal (2016) **29**, 256–275. doi:10.1057/sj.2013.19; published online 13 May 2013

Keywords: framework; terminology; cross disciplinary; CPTED; crime prevention

Introduction

Crime Prevention through Environmental Design (CPTED) has become a familiar field in contemporary crime prevention, evidenced particularly in English speaking and Northern European countries; but more recently expanding South to Italy, France, Eastern Europe, Turkey and the Middle East, where crime prevention has traditionally adopted more offender and community orientated approaches (Ekblom, 2011b). Underlying theory is identified in decades of previous research, but the concept has evolved over time rather than originating from one coherent theory. There is a demonstrable paucity of studies that have attempted to develop a holistic CPTED framework for academic research and practice. Given that the CPTED concepts derive from over 40 years of consideration, this is perhaps surprising and a potential obstacle for both theoretical development and practical implication. Examples of the few date from Westinghouse 1977 demonstrations (see Bickman *et al*, 1978 and Kaplan *et al*'s, 1978 Westinghouse publications; Crowe, 2000 and Ekblom, 2013). CPTED displays a lack of structured development, which is evidenced in its first few decades of exploration

and operationalisation as the first published framework (Westinghouse) has limited acknowledgement in the frameworks and strategy designs known and used today.

For the purpose of this research, three key terms require definition and clarity at this stage. A *framework* can be seen as a general set of concepts organised to facilitate the understanding and operationalisation of a complex or overlapped approach. A framework should aim to organise the component parts in a suitable format so to aid the understanding of intricate relationships and drivers behind them. A *Concept* refers to a theory driven classification of common principles with a shared desired goal/aim. A *Principle* will be referred to as a fundamental proposition that serves as the foundation for a system or process within the concept.

Definitions of CPTED vary, but the most commonly cited is by Crowe (2000) of the US National Institute for Crime Prevention:

CPTED is the proper design and effective use of the built environment that can lead to a reduction in the fear and incidence of crime and an improvement in the quality of life ... The goal of CPTED is to reduce opportunities for crime that may be inherent in the design of structures or neighbourhoods. (p. 46)

More recently, the concept has been redefined by Ekblom (2013) of the Design Against Crime Research Centre:

CPTED is reducing the possibility, probability and harm from criminal and related events, and enhancing the quality of life through community safety, by the process of planning and design of the environment ... on a range of scales and places, to produce designs fit for purpose and contextually appropriate, whilst achieving a balance between the efficacy of avoiding crime problems before construction, and the adaptability of tackling them through subsequent management and maintenance. (p. 13)

While this article does not seek to consider such definitions in detail, it does set out to consider the framework that lies behind the concepts of CPTED.

CPTED theoretical development began slowly in the early 1900s but did not make a significant contribution to knowledge until the early 1970s (Figure 1). Its long history has opened doors to many schools of thought, making it subject to sweeping changes of emphasis and direction and in turn leaving it vulnerable to somewhat inappropriate adaptation that will be evidenced later in the article.

Changes in direction evidenced within the literature created a shift in focus to design and architecture rather than criminology (Ekblom, 2011b), potentially suggesting why the growth of multi-agency collaboration in the field of CPTED now operates in subtle conflict (see Piombini, 1987; Crowe and Zahm, 1994). In an analysis of 64 documents, this research identified significant terminological conflicts within the overarching CPTED philosophy, representing a variety of and often conflicting environmental designs and definitions. Designers need focus and guidance for clarification, articulation and prevention of uncertainty at the design and implementation stage. A degree of freedom provided through uncertainty must be granted, but of the liberating rather than the confusing kind. Lack of transferable frameworks can result in poor communication and obstacles at each stage of the development process making any short-term or lasting effects on crime prevention difficult to attain.

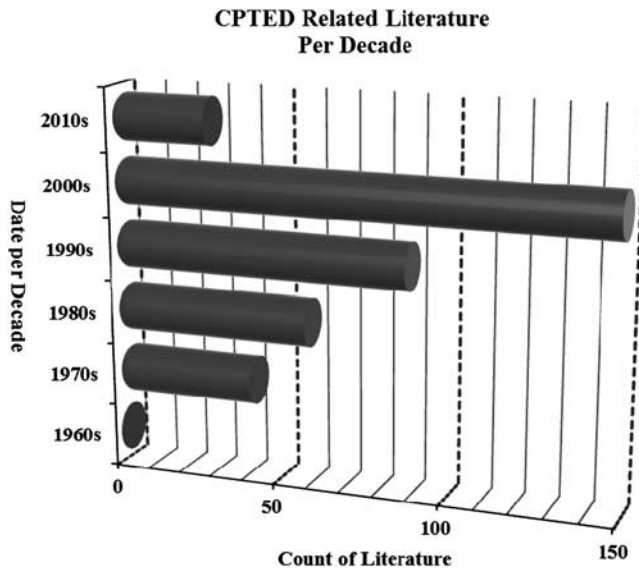


Figure 1: Total number of documents per decade shows CPTED is rapidly increasing in research interest.

The objective of this research therefore was to reconstruct CPTED components into a framework suitably describing the intended role of each and to facilitate easy definition and transferability throughout cross disciplinary research and practice.

The framework proposed is designed to serve as a supporting and guiding mechanism to the achievement of crime prevention through the design of the environment. As a theory dependant framework, it can be used as an intellectual structure while providing evidence of what works. It offers a precision tool for unfolding the interrelatedness of concepts in detail, while organising enough empirical evidence to do so. Of particular importance is its role in the development of a universal language to aid effective communication between agencies.

A potential remedy is offered here through the development of a deeper, improved and further integrated framework, useful for both practice and research. This article seeks to present constructive criticism of contemporary CPTED in a respectful and supportive manner. It will begin with a short literature review to illustrate the current problem, followed by a detailed description of the framework analysis undertaken, an explanation of the process of the framework’s construction and finally a discussion of the reconfigured framework needs and benefits.

Literature Review

Initial systematic debates on CPTED related strategies within the scholarly literature did not occur until the mid 1960s and early 1970s.

Wood (1961) from Chicago Housing brought about design changes to enhance the quality of life for residents, also developing a series of guidelines to assist the improvement of security conditions of such environments.



Urban Planner Jacobs (1961) sparked the earliest discussions of the relationships between urban decay and crime, creating widespread interest in how environmental conditions relate to crime.

Angel (1968) was among the first to note the active role citizens could take in the prevention of crime by their diagnosis of opportunities within the environment. The basic principles of CPTED are deeply rooted in his work with its distinct differences from other contemporary, situational approaches to crime prevention such as opportunity removal.

Newman (1972), creator of 'Defensible Space' and former Architect, assisted by the National Institute of Law Enforcement and Criminal Justice (now the US National Institute of Justice) offered prescriptive design solutions from his research on public housing estates in New York. He proposed designs that could allow and encourage residents to supervise and be seen by intruders as taking responsibility over their neighbourhood.

The first comprehensive articulation of CPTED, however, was presented through Jeffery's (1971) publication *Crime Prevention through Environmental Design*, written simultaneously and therefore without influence (Robinson, 1996).

Jeffery produced an updated version in 1977 and again in 1990, *Criminology: An Interdisciplinary Approach*. His basic assumption, as it stands today, is that:

The response of the individual organism to the physical environment is a product of the brain; the brain in turn is a product of genetics and the environment. The environment never influences behaviour directly, but only through the brain. Any model of crime prevention must include both the brain and the physical environment. (Jeffery and Zahm, 1993, p. 330)

It seems that Jeffery was preparing to develop a model for CPTED to modify both external and internal environments of the offender. Unfortunately, mainstream criminologists have ignored much of his seminal contribution to CPTED (Robinson, 1996).

Within 3 years of Newman's publication of *Defensible Space*, Westinghouse National Issues Centre Consortium working with the Law Enforcement Assistance Administration undertook research to demonstrate Newman's design solutions under Jeffery's term 'CPTED', but without the acknowledgement of his contribution. Results ensured most public housing designs were based on Newman's ideas, which remain globally influential today (Clarke, 1992, p. 6). Subsequently, research and practice has tended to adopt Newman's version of CPTED that has evolved significantly.

Although CPTED research was disseminating into practice, academic research and development on the concept still continued. In the late 1970s, the work of Gardner (1978) provided an informative and influential manual for practitioners in addition to a planning and decision making tool for those changing the future of towns and cities. In the early 1980s, Poyner (1983) outlined Surveillance, Movement Control, Activity Support and Motivational Reinforcement as four CPTED concepts. Coleman (1985) soon after addressed the interaction between social factors and the physical environment, her findings received a £50 million grant to test the ideas under direction of the Design Improvement Controlled Experiment project (see Coleman, 1992). Cozens *et al* (2005) later extended Poyner's concepts to include Defensible Space, Access Control, Territoriality, Target Hardening, Image, Surveillance and Activity Support. The question of how far Defensible Space and Territoriality should be presented as separate principles is an ongoing concern, as Defensible

Space refers to a physical creation and Territoriality describes a human response/emotion to that state (see Ekblom *et al*, 2013).

More recent efforts have witnessed a substantial impact by Saville and Cleveland (1997) in their development of Second Generation CPTED. Ekblom *et al* (2013, p. 94) suggest this wide range of social interventions somewhat dilutes the unique 'environmental design' aspects, removing it from its source domain. Crowe (2000) and Ekblom (2011b, 2013) have both advanced a much needed and respected refinement and redevelopment of the CPTED concept that will be discussed later.

It has been argued, however, that during this long process of theoretical and practical development, a number of limitations have been identified (See Moriarty, 1972; Hillier, 1973; Hackler *et al*, 1974; Roncek, 1975; Repetto, 1976; Pesce, 1977; Kaplan *et al*, 1977; Stanley, 1977; Titus, 1977; Bell and Young, 1978; Bickman *et al*, 1978; Gardner, 1978; Kohn and Hanes, 1978; Pesce *et al*, 1978; Rouse and Rubenstein, 1978; Wilson, 1978; Mayhew, 1979; Lavrakas and Lewis, 1980; Wallis and Ford, 1980; Booth, 1981; Kushmuck and Whitemore, 1981; Merry, 1981; Greenberg *et al*, 1982; Lavrakas and Kushmuck, 1986; Smith, 1986; Piombini, 1987; Atlas, 1990; Poyner, 1991; White, 1993; Cisneros, 1995; Phillips, 1996; Robinson, 1996; Craig, 1998; Tijerino, 1998; Schweitzer *et al*, 1999; Cozens, 2000; Cozens *et al*, 2004; Ekblom, 2011a,b). The widespread acknowledgement of limitations within CPTED is manifest among academics and practitioners alike. However, this article focuses on the apparent lack of a universal CPTED framework and the inconsistency of terminology in frameworks identified. Definitions serve multiple purposes, for thinking, communicating, planning, and coordination between research and practice, for gathering practice knowledge, theory and evidence. The multi-disciplinary nature of CPTED makes their importance vital to ensure that effective international research and practice is delivered. Without continual re-appraisal of definitions and frameworks, there are higher risks of isolating a field from its 'intellectual blood supply', which through its development, has debatably occurred in the field of CPTED (Ekblom, 2011a).

Clear unambiguous definitions and transferable terminology create improved foundations for the development of a unified body of knowledge (Love, 2003). Science-based research and practice has a controlled vocabulary, but it is uncommon to find such structure in practice oriented social research, particularly the practice of crime prevention. In a multi-disciplinary field such as CPTED, however, this structure is essential for common understanding between agencies. Practitioners can often assume meaning based on vernacular understanding; however, problems arise when practices work together from diverse professional disciplines with different interpretation and usage of terms (Love, 2003).

This suggests that if problems found in this research reflected reality in practice, serious difficulties could occur. Hypothetical examples could include conflict in understanding or miss-interpretation of CPTED concepts leading to overemphasis of certain design aspects. A lack of clarity in concept definitions may also cause CPTED designs to be implemented with a distorted judgement of their intended goals and therefore significant wasted efforts. The limitations of CPTEDs language barrier could seriously mislead practitioners, therefore inhibiting a healthy 'two way flow' between research and practice (Ekblom, 2013).

Ambiguous terms and concepts therefore restrict a universal use of CPTED designs. Guidance is needed for clarification of underlying values, articulation of tradeoffs and conflicts, and vigilance to creatively resolve such issues. Without efficient communication through a universal language, this guidance is restricted. The general laxity of CPTED



discourse reflects its history and development that has taken the form of a build up of ideas over time from diverse origins of schools of thought, disciplines and practices, which are yet to be fully synthesised. Ekblom (2011a) describes this accumulation of concepts as a 'layered, badly-stirred mixture rather than a well-prepared construction with reliably known properties' (p. 13). Recently however, some much needed improvement has been approached with careful attention by both Crowe and Ekblom, who have both considered the refinement and redevelopment of the CPTED concepts. Crowe made a significant contribution to the development of the concepts in his book *Crime Prevention through Environmental Design*. He introduced a widely cited definition of CPTED mentioned earlier, while recognising the importance of Image Management and Activity Support as two socially orientated CPTED concepts. The intertwined relationship of the concepts was also identified and Territoriality's importance in the framework was recognised.

Ekblom on the other hand advances the CPTED concept beyond the work of Crowe whose definition is suggested to be 'imprecise'. He stresses the need for a definition that decreases uncertainty of scope, changes in fashion and drifts of meaning. With regards to the principles, he identifies serious conflict in implementation, duplication, overlaps, gaps, the extensive focus on physical aspects and the neglect of significant wider social contexts to mention just a few. The scope and adaptability of CPTED was also suggested as a consideration for further framework refinement in that currently CPTED is not conducive to focused thinking. Ekblom therefore developed a specification for what an improved CPTED should look like. More recently, Ekblom *et al* (2013) have discussed the challenges to cross-cultural knowledge transfers in crime prevention with regards to the context of place, and CPTED's transferability to non-Western countries. It is therefore evident that CPTED is still an emerging concept and further refinement and redevelopment is still essential to remain practically sharp and empirically up to date.

Confusion over definitions became apparent from this study. Many academics refer to Crowe's definition of CPTED, yet his definition parallels that of the National Crime Prevention Institute. The US National Crime Prevention Council has also published a CPTED handbook containing the exact same definition, yet referenced as Jeffery's definition. These issues are particularly problematic for its use in academia as aspects of its early development may be ignored or missed and therefore misunderstood.

Another obvious problem is the use of vernacular terms used to adapt the CPTED framework but with no clear reason for such adaptation. Wallis and Ford, academics from a public policy and affairs background have provided an independent framework including 'Movement Control' as a main conceptual heading, their reason for use of such term is however, unexplained. 'Movement Control' is defined in their framework as *limiting the use of paths and corridors to specified users and using real and symbolic barriers to inform outsiders that a particular environment is restricted* (1980, p. 2). This definition parallels the aim of 'Access Control', yet the authors use alternative headings without explanation or reference for their choice of terminology. The nature of this adjustment could be particularly problematic in such a multi-disciplinary system. The multi-disciplinary nature of CPTED and the diversity of disciplines contributing to and refining CPTED makes it vulnerable to a shift in focus and subtle modification with conflicting priorities. Few studies exist in non-Western contexts (Ekblom *et al*, 2013); however, CPTED has featured extensively in policy and guidelines and throughout various academic disciplines. Unfortunately, there is a significant paucity of studies having evaluated the effects of conflicts, tensions and their

impact on CPTED discourse, and minimal international comparative research is evident. Armitage and Moncuck (2009) analysed tensions and synergies between security and sustainability to establish the extent to which Secured by Design and Sustainability guides need revision and reconciliation. There were no significant tensions between the two agendas explored but rather, poor design and poor processes, together with significant lack of communication and consultation between key partners. Problems in the way of framework adaptation may lead to subtle changes with a bias towards some design aspects rather than others, or change in focus causing conflicting designs and a deficit of crime prevention concentration. Such terminological confusion may exacerbate the well-known struggles witnessed throughout multi-agency and cross-disciplinary collaboration (see Crawford, 1998; Rosenbaum, 2002; Tilley, 2005; Atkinson *et al*, 2007; Dykes *et al*, 2009) between academic disciplines, between agencies and between research and practice alike.

Poulson (2013) discussed conflicting agendas and priorities in the urban planning and design field with regards to crime prevention, establishing a disconnection between disciplines. His interrelated reasons for this clarify a general belief that design and crime are incongruent, an overall lack of education and training concerning crime, the lack of tools and practical guidance for clarification and articulation, and an overall misconception that the crime prevention goal is unworthy, conflicting and mutually exclusive from all other planning goals. He identifies an acceptance for its value as a societal issue, yet few consider it an important or fundamental component of the planning process. In reality, however, without consideration, the likelihood of attaining planning goals may be somewhat hindered.

In the United Kingdom, there has been a formalised attempt to encourage the planning system to address its contribution to crime prevention. This constitutes a strong national policy drive encouraging local level working relationships between police and planners, supported by Section 17 of the Crime & Disorder Act 1998, which made local authorities statutorily responsible for ensuring the consideration of crime prevention among their varied duties. Morton and Kitchen (2005) analysed the police Architectural Liaison Officer (ALO)–planner relationship that evidenced:

1. a lack of interest by planners;
2. conflicting priorities (ALOs favoured Surveillance and Structure and planners favoured Access and Movement and Physical Protection);
3. the need for ALOs to engage more effectively with the planning process;
4. a difference in view about consultation arrangements and regulatory of meetings.

The need for a holistic, transferable framework therefore becomes essential to diminish such confusion to clearly define design intentions in order for planners and designers alike to have shared expectations and goals, and to prevent practitioners being discouraged by unrealistic interpretations that design alone prevents crime.

Methodology

Textual analysis identified disparity in terms used within CPTED frameworks. It should not, however, be taken to imply that the frameworks discussed are incorrect or valueless; this research merely highlights the inconsistency of language and of framework versions and suggests reconsideration.



A systematic literature analysis of CPTED frameworks was therefore carried out and analysis of the inherent conflicting practice and research confirmed that an effective and integrated practice framework is still needed for CPTED. The main part of this study uses directed content analysis (DCA) from which frameworks were extracted and analysed in depth. DCA is a methodology within the social sciences used for studying the content of literature in relation to themes, words, authorship, authenticity or meaning. Content analysis provides a summarising, quantitative analysis of text that relies on a scientific method with attention to objectivity, reliability, validity and generalisability. When DCA is used, the researcher begins the analysis with a theory or relevant research findings as guidance for the identification of themes or content; this is often incomplete. The ultimate goal is to validate or extend conceptually the framework or theory itself (Hsieh and Shannon, 2005).

The study utilised 64 papers representative of an exhaustive search for material to provide integrity for the DCA. A systematic sampling frame was adopted that covered a multi-disciplinary array of electronic databases, relevant journal archives, broad Internet based searches, research registers and key author home pages, which were explored in their entirety. Criteria were set that required material to illustrate a CPTED framework version and to be a published academic document of any format. Excluded were the studies not written in English, where no translation could be obtained, and studies published before 1972. The literature therefore contained the UK and international documents in an academic style only. Bibliographies were also explored to identify documents omitted from the main scoping exercise. The sample was a subset of all CPTED literature and representative since it was as close to exhaustive as systems would allow in terms of obtaining published frameworks. A small number of documents were unobtainable, and one had no translation available. Each document individually illustrated at least one version of a CPTED framework and its component definitions. To rule out the snowballing effect, the source of reference was obtained for each framework so that each definition/term was only used once without counts being distorted by inclusion of duplications (Table 1).

Within each framework, concepts were broken down for further analysis by comparing and contrasting definitions in depth. This indicated that Territoriality was a catalyst in much of the literature, seeming to represent a common goal of the remaining concepts, that is, by implementing CPTED concepts, the expected outcomes are an increase in territorial attitudes of the users of the environment. It therefore required individual analysis before the study continued. The definition of Territoriality within the CPTED framework exemplifies many problems we currently face. Territoriality is central to CPTED, but unfortunately is frequently defined in a very limited fashion (Ekblom, 2011a). Cozens *et al* (2005, p. 331) in their very thorough review of CPTED, noted that it is 'fraught with difficulties associated with definition, interpretation and measurement'. Ekblom (2011a), however, stresses Cozens' failure to tackle it head-on. Research in this article recognised a deeper issue of Territoriality concerning its position within the CPTED framework and a requirement for it to be repositioned within the CPTED structure.

Framework Development Methodology

Framework reconstruction was refined through a conceptual mapping process as textual analysis revealed a diverse array of concepts currently evidenced in academic CPTED

Table 1: Sources of frameworks referenced within the documents and the number of documents to support it. Results show the most prominent to be ‘own interpretation/no reference’, perhaps a potential source of such varied framework versions

<i>Source</i>	<i>Number of papers</i>
Own interpretation / No reference	25
Tien and colleagues	1
Westinghouse Corporation	5
Newman	6
Moffatt	4
Crowe	11
US Housing of Urban Development	1
Soomeren	1
Jeffery	1
Angel	1
Designing our Crime Association	1
Ministry of Justice	1
National Crime Prevention Institute	1
Cozens	4
New South Wales Guidelines	1

frameworks. CPTED’s historical baggage merges theories and components in an illogical format, rather than an integrated model, and subsequently there is no clear theoretical distinction or structure within many so-called CPTED frameworks. This framework was therefore developed from theoretical compounds. The DCA of these terms allowed classification into themes based on the concept definitions. These themes, as a consequence to the similarity of definitions, had a collective argument within each other. To aid interpretation by CPTED users, the framework was structured based on a natural formation of categories, driven by shared hypotheses and supporting theory. CPTED has a very complex theoretical foundation, one of which is deeply aligned with Routine Activity Theory by Cohen and Felson (1979). The premise of Routine Activity is that for a crime to be committed, there must be the presence of a suitable target, a motivated offender, the absence of a capable guardian and a convergence in time and space of all three factors. By increasing Surveillance in an area, capable guardianship will be improved and crime opportunities will be reduced. The concept of Surveillance was therefore developed with the leading premise that by increasing Surveillance in an area, capable guardianship improved. Surveillance comes in two forms, both formal (that is, CCTV, police patrol, sensor systems and so on) and informal (that is, natural, open sightlines, observable layouts, large windows and so on).

A second theory utilised is Broken Windows by Wilson and Kelling (1982) that relates to norm setting and the signalling effect of urban disorder on additional crime. Maintenance and monitoring of such environments are hypothesised to prevent further vandalism and magnification into more serious events. Managing and maintaining the environment enhances a sense of ownership and care, whereas increasing use would aid norm setting by legitimate users hand in hand discouraging illegitimate activities or at least making them more noticeable. The concept of Positive Reinforcement of Legitimate Behaviour was built from this premise, together with the running theme of increasing use of public space and



creating a sense of care and pride in the community. Two principles are therefore within this concept, which together support the overall theme and hypothesis, namely, Activity Support and Image Management/Maintenance. Activity Support constitutes the notion that increasing the use of an area with legitimate users will enhance legitimate social norms. Image Management/Maintenance ensures public space is well looked after, attractive and inviting, therefore signalling a cohesive community through care and preservation.

The third supporting theory to this framework reconstruction is Rational Choice by Cornish and Clarke (1986), suggesting that an offender seeks the most cost-effective means to achieving a goal. If so, increasing the effort needed to proceed renders a target less attractive or valuable. This notion of 'value' and also increasing effort is encapsulated by all three concepts in the proposed framework. Access Control has a running notion of restricting access to targets and ensuring space is not encroached utilising two principles that sustain this hypothesis, namely, Target Hardening and Boundary Definition. Target Hardening restricts access through mechanical means or human security in the form of security guards and police patrols. Boundary Definition uses real and symbolic barriers to define boundaries of private, semi-private and public space leaving an intruder more vulnerable in private space and increasing risk of capture. Real barriers would also act as restriction to access of private property. Surveillance can impose upon the individual offenders' view of capable guardianship and in turn on the measure of 'risk' influencing the value of the target. Image Maintenance could have similar impact through encouraging legitimate users to challenge the offender's behaviour, so increasing risk and effort while reducing target value. These three concepts together, should facilitate the development of a physical environment that encourages Territorial Behaviour among users and an increased perception of ownership to outsiders.

Results

Textual analysis revealed that CPTED terms and concepts vary considerably throughout the frameworks examined and were found to range from three to seven headings. Generally, *Territoriality* (31 examples), *Access Control* (39 examples), *Surveillance* (24 examples), *Activity Support* (22 examples), *Target Hardening* (17 examples), *Defensible Space* (8 examples) and *Image Management* (7 examples) were the seven most recognised concepts. However, the DCA extracted a total of 58 terms (Table 2) used to label these seven components; such a large number immediately indicates the disparity of terms used throughout the academic literature.

Results showed 25 out of 64 papers offered a framework either of the authors own interpretation or unreferenced, followed by Crowe's framework in 11 out of 64 papers and Newman's in six out of 64 papers. Of note here is that the first CPTED framework and demonstration came from Westinghouse Corporation, yet is scarcely referenced in subsequent literature, suggesting it was ignored rather than debated. Also relevant is the high number of documents demonstrating a framework of either the authors own interpretation or without reference to another, which is a potential cause for such diverse framework variations (see Figure 1).

It is a common notion that CPTED concepts are intertwined and overlapped to support each other, yet by analysing 'Territoriality' further it becomes apparent that without it as a

Table 2: This table represents a list of terms found from the documents analysed with the number of times it was featured in the entire sample

<i>Term</i>	<i>Number of papers</i>
Boundary Definition	2
Deflecting Offenders	1
Signage and Bans	1
Target Hardening	17
Building Form	1
Activity Placement	1
Exterior Maintenance	1
Available Control	1
Reinforcing Natural Kingdom	1
Maintenance	7
Real Surveillance	1
Removing Inducements to Crime	1
Image Management	10
Natural Measures	1
Territorial Enforcement	1
Community Building	2
Target Protection	1
Situational Crime Prevention	1
Access Management	1
Mechanical Measures	1
Social Activity Support	1
Image	3
Broken Windows	1
Formal Surveillance	4
Movement Control	1
Defensible Space	8
Space Management	3
Image Milieu	1
Formal Organised Surveillance	3
Activity Programme Support	3
Access Control	31
Territorial Definition	1
Environment	1
Surveillance by Residents	1
Changes in Physical Environment	1
Territoriality	39
Target Hardening through Security	1
Management	2
Activity Generation	1
Natural Supervision	1
Natural Access Control	13
Image Management and Maintenance	1
Motivation Reinforcement	10
Surveillance	24
Activity Location	1
Compatible Building Placement	1
Organised Measures	1
Territorial Reinforcement	12
Activity Support	22
Informal Surveillance	3

**Table 2** *Continued*

<i>Term</i>	<i>Number of papers</i>
Repair and Preservation	1
Place Management	1
Territorial Behaviour	1
Communitarianism	1
Image Maintenance	2
Natural Surveillance	32
Quality Environments	1
Maintenance of Surroundings	1

core concept, the remaining six concepts equate to Territoriality as a mechanism to be reached only through the facilitation of legitimate human behaviour, linking back to the need for a framework that offers guidance to achieve universal goals through effective design. For each concept to have a positive effect on crime levels, it would rely on the facilitation of humans operating within the environment to sustain the physical designs. The desired behaviour consistently relates to the legitimate use and ownership over public space, capable guardianship, challenging offenders, signalling care and preservation over public space. These behaviours entwine with the nature of Territorial Behaviour, yet Territoriality has often been referred to through various design features, such as open sightlines, defining public and private space. However, Territoriality is simply a *natural behaviour by which organisms characteristically lay claim to an area and defend it against members of their own species*, claimed by Howard (1920), an English Ornithologist who became the first to fully describe the concept. We therefore argue that Territoriality should not be classified as a singular concept alongside and equal to others, or labelled with prescriptive design intentions, but the top level mechanism by which the overall goal of crime prevention is to be achieved. The subsequent overlap is due to the need for the remaining components to sustain a suitable environment for this behaviour to occur. Each concept should be recognised for a desired aim to enhance and encourage Territorial Behaviour, with a collective overarching goal of crime prevention.

Within the DCA, overlap occurred between concepts that was to be expected because of the nature of CPTED; however, the mismatch of terms and definitions is not acceptable in such a multi-disciplinary operation. For example, terms used to replace the component of Access Control included 'Building Form' and 'Signage and Bans' within some CPTED frameworks. Terms that substituted Activity Support included 'Communitarianism' and 'Space Management', which were matched because of the similarity of techniques such as placing activities in good locations and a collective outcome such as maximising the use of public space. This conflict of terminology is a significant problem in this field of practice, if CPTED is to be accepted as best practice by all involved in construction and design, a universal framework must be available. Without a shared understanding and mutual priorities and goals, the opportunity for the maximum potential of CPTED may be hindered.

Figure 2 demonstrates the count of papers supporting each component within their framework.

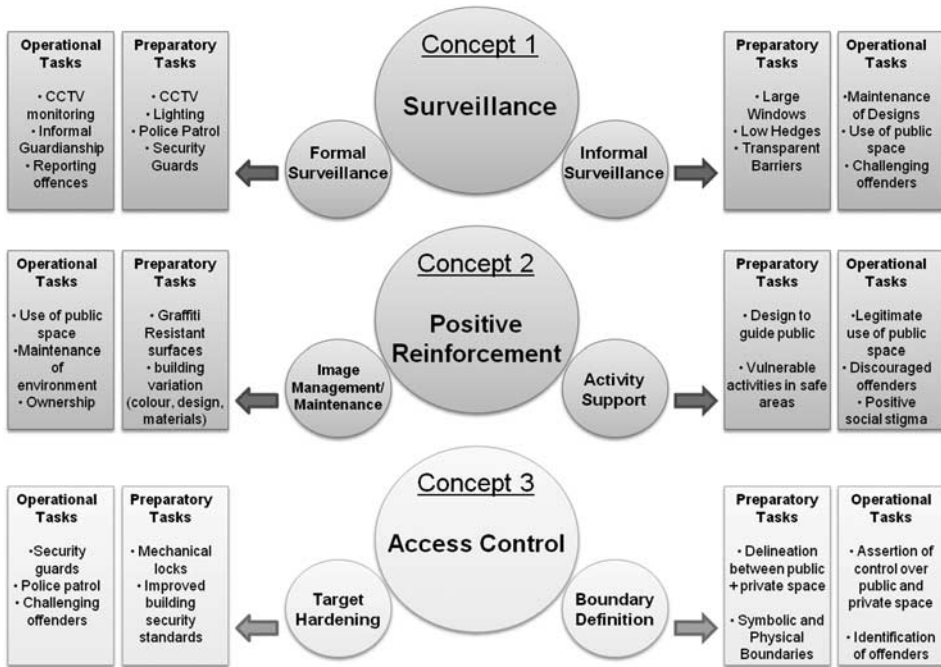


Figure 2: Diagram of reconfigured framework.

The top four most accepted were *Territoriality*, *Access Control*, *Surveillance* and *Activity Support*. Territoriality can be excluded here based on the re-emphasis of its role in the framework from a concept of CPTED to an overall goal. The general definitions of the remaining three were therefore re-emphasised accordingly for the reconfigured framework.

Reconfigured Framework Results

The reconfigured framework promulgates Crowe’s, 2000 version but is structured in a more operational format that can be closely aligned with empirical evidence. It has condensed in format from previously cited versions and represents a clearer, theory-driven structure.

Each of the three concepts and their supporting principles when working together naturally reach a collective outcome of Territorial Behaviour if the correct social conditions allow. Through the successful operation of these principles, Territoriality is achieved. They are therefore considered the ‘Preparatory Tasks’ for the operation of Territorial Behaviour, for example, the design of a suitable environment to allow such behaviour to occur.

The notion of ‘Operational’ and ‘Preparatory’ tasks derived from the work of Ekblom (2011b) who argues that it is unclear whether the concept of Territoriality is ‘socially-ascribed’ or ‘physically-delineated’ in the form of ‘Operational’ and ‘Preparatory’ tasks. He concludes by suggesting that on both the theoretical and practical grounds, it would appear best to consider both of these, under an ecological framework that includes human agents in



relation to their environment. Upon careful inspection of the CPTED concepts, together with the recognition of the relationship between Territoriality and the remaining CPTED framework, it was therefore identified that 'Operational' and 'Preparatory' tasks are present in all of the concepts as they require human behaviour to sustain the designs and enforce Territoriality. Social, economic, cultural and ecological aspects of each individual environment require careful analysis to ensure that effective territorial and therefore operational tasks are supported; this will be referred to as the social domain. Ekblom (2011a) stresses that within CPTED itself, the core concepts are rather carelessly described. He also notes that a source of confusion arises because 'some core activities are about people *preparing* the environment', such as open sightlines or mechanical alarm systems, and others are 'operational prevention in the here and now', such as Natural Surveillance by residents or actually confronting intruders. Territoriality requires a combination of all 'Preparatory' and 'Operational' tasks to ensure the desired goal state is met. Literature in this study reveals these are generally poorly defined and delivered in earlier framework attempts. It is equally important in that case to define the 'Preparatory Tasks' and 'Operational Tasks' for each principle to illustrate the importance of people and an emphasis of the social role in CPTED. The structure of this framework and the subsequent 'tasks' are illustrated in Figure 2.

When considering scale, CPTED is sometimes thought to be limited in its effectiveness beyond the micro-scale of the building and Minnery and Lim (2005) claim that CPTED is only a local, intimate and small-scale phenomenon. Framework concepts, however, need to apply to a variety of scales from the micro-scale of the building to the meso-environments of neighbourhoods/housing estates. Aspects of Target Hardening may only be applicable to individual buildings and Activity Support will be most effective at a community scale, yet the remaining concepts would apply to either. Both forms of Surveillance, Image Management and Boundary Definition will be needed at a neighbourhood level, but will be less effective without the sustainability efforts at the scale of individual buildings.

CPTED has been subject to over 40 years of theoretical development and to a certain extent refinement that is undoubtedly tangled and difficult to interpret. This proposed framework benefits the reader through its structure alone that was built on the basis of previous decades of development, subsequently illustrating the definitions, purpose and collective goals with more clarity. The re-emphasis of Territoriality clarifies the integrated overlap, by the recognition of the role of physical design in creating and extending a sphere of influence and developing a sense of Territoriality through the remaining concepts. This framework has also touched upon the well-known issue of the social domain (or lack of) in crime prevention. The recognition of operational and preparatory tasks for each principle reinforces the need to consider the social dimensions of an environment before physical alterations proceed. This should consider the ecology of the area, for example, investigating issues such as pollution and the effects this has on the behaviour of those in surrounding environments. It should consider culture, for example, enhancing the cultural ambience in an area to create an uplifting atmosphere and bring people together for a common purpose with shared interests. It should also consider the politics of an area and potential restriction of institutional backdrops for legitimate activities and behaviour to thrive. The final aspect should question the economy, and if an area has sufficient economic prosperity to sustain such implementations and maintain areas and physical designs. These issues are extremely important to ensure a bottom up approach, site-specific, detailed evaluations and planning and most of all long-term sustainability.

The following outlines the framework definitions for clarity and will aid the appreciation of how the concepts overlap and integrate. It encompasses many of the concepts already used by CPTED academics and practitioners; however, they are reformatted and re-emphasised for better articulation and understanding.

Goal – Territoriality – *Natural behaviour by which organisms characteristically lay claim to an area and defend it against members of their own species.*

Concept 1 – Surveillance – *A strategy used to observe all users of the environment with the goal of identifying unauthorised persons and deterring unauthorised entry or illegitimate behaviour.*

Concept 1: Principle 1 – Formal Surveillance – *Mechanical forms of surveillance, or physical security/patrol guards.*

Concept 1: Principle 2 – Informal Surveillance – *The design of the physical and natural environment to create clear site lines and open spaces which provide opportunities for capable guardianship through observation of public spaces.*

Concept 2 – Positive Reinforcement of Legitimate Behaviour – *Encouraging positive routine behaviour in public, semi-public and private space with the goal of enhancing community cohesion, making illegitimate behaviour more noticeable and therefore unacceptable.*

Concept 2: Principle 1 – Activity Support – *Placing non threatening activities in public and semi-public and private spaces to encourage respectful legitimate users during their routine activities.*

Concept 2: Principle 1 – Image Management / Maintenance – *Encouraging the public to use attractive, clean open spaces and develop an attachment to the environment, maintenance of these tasks are vital for the sustainability of Activity Support.*

Concept 3 – Access Control – *Strengthening the security of buildings and reinforcing spheres of private space with the goal of restricting access to crime targets or unauthorised areas and increasing the risk for offenders.*

Concept 3: Principle 1 – Target Hardening- *Physical and Mechanical Locks and Alarm systems to restrict access and make buildings more resistant to attack.*

Concept 3: Principle 2 – Boundary Definition – *Defining between private, semi-private and public space through physical and psychological barriers with the aim of making boundaries known to potential invaders and restricting their access through the apprehension of being noticed.*

All concepts within this framework when combined generate a collective function of Territorial Behaviour by providing opportunities for humans to operate within the physical environment.

Important to recognise here is that these concepts contain both aspects of physical design and the way humans use the space and must therefore work in concert to ensure sustainability and an effective territorial outcome. It is perfectly feasible to create a physical environment for Territoriality, but without suitable users of the environment the intended goals will be difficult to attain. This also stresses the importance of site-specific designs. Achieving the preparatory tasks of Natural Surveillance will be more effective in encouraging capable guardianship and observation by users in a general community; however, if applied to a residential care home housing the



visually impaired, the success of natural observation and capable guardianship will be somewhat reduced.

Discussion

Frameworks are essential for CPTED if multi-disciplinary organisations are to plan effectively and deliver sensible allocation of resources. The use of design in crime prevention has grown tremendously since the early 1960s, but some preliminary findings alongside this study indicate that academic work on CPTED is not used as a primary information source by practitioners. Poulson (2013) also claims that topics such as CPTED and Defensible Space that provide guidance on crime and the built environment have been extant for nearly 40 years, yet few have been included in planning tools or guides. This framework allows organisations to gain perspective in the field of CPTED, it can provide a powerful means of supplying focus and improvements in the effectiveness of crime prevention efforts.

This analysis has revealed a deeper illustration of CPTED to uncover the practical necessities needed to ensure a sustainable crime-free environment. The identification of operational and preparatory tasks for each principle in the CPTED framework evidences the need to consider the social domain and to work in concert with planning of environmental design rather than as a bolt on accessory. Saville and Cleveland (1997) offered a 'Second Generation CPTED' to consider similar social aspects, but this is limited by its detachment from the planning process of First Generation CPTED. These issues should be built in to the planning for design as part of a compulsory evaluation rather than an afterthought. The framework unpicks the tangled web of concepts currently causing confusion, to re-emphasise Territoriality and illustrate a running theme throughout each section of the framework; this should enable a clearer illustration to practitioners of the intended outcomes for CPTED.

Conclusion

This article set out to evaluate the current terminological and framework usage throughout academic literature on CPTED. Significant limitations have been identified, such as confusion over original contributions, lost meaning, disparities in definitions and terms and framework inconsistency. We have also noted many inconsistencies in the development of contemporary CPTED, most of which are far removed from original intentions.

This research has confirmed that theoretical and structural development of CPTED is, and to some extent remains confused as CPTED has evolved through successions of disciplines and fields of practice, subsequently developing a rather unclear representation of the whole of place based crime prevention (Ekblom, 2011a), all packaged together under a focal heading of CPTED. We reveal that throughout academia, there are many different interpretations of terms based on a discipline's vernacular understanding; important values and intentions have therefore been lost or diminished through poor lines of communication. Acknowledging the history and development of CPTED allows the difficulties that have developed alongside it to be understood. Original ideas and beliefs were never fully synthesised in original writings (Ekblom, 2011a), and ideas were extracted from a number of competing studies, to

amalgamate into what is now known as CPTED. Individually, supporting theories and drivers of CPTED were shown to contain an evidence base often with valuable deterrent effects (see Park, 1915; Zorbaugh, 1929; Shaw and McKay, 1942; Jacobs, 1961; Wirth, 1964; Brantingham and Brantingham, 1978; Cohen and Felson, 1979; Cornish and Clarke, 1986; Sampson and Groves, 1989), but without efficient synthesis, a lack of structure, direction and organisation. The real values of CPTED seem to have been overlooked.

Restructuring and relabeling the CPTED framework to illustrate the operational and preparatory division within principles allows for improved emphasis of each component part. The movement of Territoriality from a concept to a holistic goal is important, illustrating CPTED's conceptually overlapping nature. With Territoriality as an overarching goal and the recognition and importance of the operational component of CPTED planning, we come back to the work of Jeffery. His original discussions and apparent intentions stated that designing the built environment can provide a behavioural message:

The response of the individual organism to the physical environment is a product of the brain; the brain in turn is a product of genetics and the environment. The environment never influences behaviour directly, but only through the brain. Any model of crime prevention must include both the brain and the physical environment. (Jeffery and Zahm, 1993, p. 330)

This reinforces the need to consider the social domain of CPTED and what conditions are present that could influence the individual organism or restrict ability to engage in Territorial Behaviour and with public space.

Although beneficial for a wider project being undertaken by the corresponding author, this framework is not seen as conclusive as there are other issues that constrain the effectiveness of the CPTED concepts (see Ekblom, 2011a) and these will be approached in some detail at a later date. An ongoing study with colleagues at Northumbria University, however, is considering such issues of framework and terminological inconsistency in the practitioner use of CPTED and results initially confirm a significant lack of transferability between research and practice and between practitioners alike. This research presents the need to address such detail when constructing policies and frameworks, especially in multi-disciplinary collaboration, to recognise the detrimental effects these inconsistencies could create and generate debate on a long standing crime prevention methodology that is far from exhausted in terms of discussion and development.

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Original Article

Designing *in* crime prevention, designing *out* ambiguity: Practice issues with the CPTED knowledge framework available to professionals in the field and its potentially ambiguous nature.

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Abstract Crime prevention in the design of an urban setting displays unambiguous links with behavioural geography, the urban setting and development of sustainable communities, being a strategy that has been extant for over 40 years. This article examines how such strategies have been able to develop (or not) within the design of our environments and undertakes ground breaking analysis of academic input jointly with the response of professional practice. Systematic literature analysis and questionnaire responses from professionals in the field extracted a sizeable and diverse number of conflicting terms used to label Crime Prevention through Environmental Design (CPTED) concepts in both academia and professional practice policies. Realising damaging transferability issues and extreme diversity in the understanding and use of CPTED frameworks between research and practice, this research exposes the risk to the sustainability and integrity of the crime prevention response by design to the human use of space. Frameworks from academic literature and professional policies were analysed evidencing the lack of a universally accepted framework and terminology set throughout.

Crime Prevention and Community Safety (2014) 16, 147–168.

doi:10.1057/cpcs.2014.3

Keywords: crime prevention; CPTED; framework; planning; sustainability

Introduction

Crime in our society continues to concern politicians and citizens alike; in hand with actual crime goes the fear of crime issue shown to significantly affect both communities and individuals in detrimental ways (Chandola, 2001; Green *et al*, 2002; Stafford *et al*, 2007; Jackson and Stafford, 2009 and others). Criminologists may look to environmental criminology to provide theories and explanations of the relationship between crime and the built environment and Cozens (2011) provides the links between academic theory and the planning processes in the western world, although it is perhaps most formalised in the United Kingdom. Taylor (2003) discusses Crime Prevention through Environmental Design (CPTED) within psychology but makes the clear links between crime prevention in the built environment and behavioural geography, noting in turn environmental criminologists considerations of the urban setting and land use on a macro level affecting human activity. Geography's links with the CPTED theme of designing in crime prevention to the built and mainly urban environment are clear, spanning areas of activity from the human use of space on a micro level (access and routes into/through buildings) to regional land use and urban development generating a more strategic outlook.

Environmental theories and explanations of crime would suggest that the built environment in which we operate (victims of crime and offenders alike) can influence human activity, and so act to prevent those activities deemed to be deviant in nature. Such design of the environment, labelled CPTED, has become a familiar field in contemporary crime prevention, evidenced particularly in English Speaking and Northern European countries; but more recently expanding south to Eastern Europe, Turkey and the Middle East, where crime prevention has traditionally adopted more offender and community-orientated approaches (Ekblom, 2011a). CPTED is based upon the straightforward belief that crime results in part from the opportunities presented by the physical environment in which we operate. It is therefore considered that by re-designing such environments, criminality is somewhat reduced.

CPTED has a long theoretical history, involving contributions from diverse disciplinary backgrounds causing, for some, rather complex systematic debates. Design changes in the built environment to the detriment of criminal activity were initially brought about by Elizabeth Wood from Chicago Housing who aimed to enhance the quality of life for residents, and developed a series of guidelines to assist the improvement of security conditions of such environments (Wood, 1961). Urban planner, Jane Jacobs, sparked some of the earliest discussions of the crime and urban decay relationship, generating widespread interest in the relationships between environmental conditions and crime (Jacobs, 1961). The first acknowledgement of the active role citizens take in crime prevention by the diagnosis of opportunities in the environment was by

Schlomo Angel (1968) and the principles of CPTED are deeply rooted in his work, with the focus on the observer and their interaction with design. Unfortunately much of this focus has been lost in later years with poor reflection of many social aspects of crime and a significant overemphasis on target hardening and fortification aspects of design (see Hillier, 1973; Frohman *et al.*, 1977; Booth, 1981; Atlas, 1990; Dillon, 1994; Tijerino, 1998; Hillier, 2004; Landman and Liebermann, 2005; Le Goix, 2005; Smith, 2007).

The term CPTED was coined by criminologist C. R. Jeffery in 1971. Jeffery carried out work based on experimental psychology represented in Modern Learning Theory; he also expressed the need to consider human behaviour and its adaptation to physical environmental influences. Unfortunately, much of his seminal contribution to the social aspects of CPTED was subsequently sidelined (Robinson, 1996). Architect Oscar Newman (1972) developed the concept of Defensible Space, which, with the assistance of the National Institute of Law Enforcement and Criminal Justice (NILECJ, now the US National Institute of Justice), offered prescriptive design solutions to crime issues but under the focal heading of CPTED. Within 3 years, Westinghouse National Issues Centre Consortium undertook research to demonstrate Newman's CPTED design solutions; yet with an extensive focus on architecture in the first ever CPTED demonstration, CPTED was subject to sweeping changes of emphasis and direction and much of the earlier socially focused contributions were abandoned. Decades of continuous research and refinement of CPTED has developed from this point but literature researched and discussed for this article evidences that CPTED is still an emerging concept and further refinement and development is essential for it to remain practically sharp and empirically up-to-date.

Definitions of CPTED vary, but the most commonly cited (Gibson and Johnson, 2013) was given by Timothy Crowe of the US National Institute for Crime Prevention in 2000 while it has been more recently re-defined by Ekblom in 2009.

At the heart of the overall concept of CPTED is the ability to reduce opportunities for crime through effective planning and design to produce a built environment that provides and encourages empowerment to legitimate users and the marginalisation of the illegitimate.

CPTED is not therefore something that is done by the individual, nor is it a 'bolt on' accessory to the built environment to be considered as an afterthought when the time comes to reduce criminal opportunities. Instead it is a necessary part of the overarching process of urban design, and it naturally follows that the integration of CPTED principles into the built environment requires understanding and cooperation between the diverse actors involved in that process. To this end behavioural geography and that of urban development has a large part to play. CPTED is (in the United Kingdom) an integral part of the planning process and as a crime prevention methodology features in centralised planning guidance. There are issues to be resolved on the nature and success of

integrating CPTED in this way, as discussed particularly by Kitchen (2009) and also in this article, but it is here and would appear to be here to stay. Preventing crime in the environment is a recognised pre-requisite of creating sustainable urban living and working environments, and we have been (trying) to do this for millennia with Iron Age forts and medieval walled towns; settlement design has always tended towards supplying safety and security for occupants and legitimate visitors (Cozens, 2007). If consideration of crime and victimisation is important for creating sustainable environments, and the argument is well made that it is (see Cozens, 2007, 2008; Gamman and Thorpe, 2009; Marzbali *et al*, 2011; Larimian *et al*, 2013), then the geography of crime and behavioural geography have an important role to play within urban development.

There is in fact a demonstrable paucity of studies attempting to develop a holistic CPTED framework for academic research and practice, even though CPTED concepts derive from over 40 years of academic consideration and research in the field. Such a lack of a holistic framework to provide an informed overview is potentially a significant obstacle for both theoretical development and practical implication. Examples of the few attempts at framework provision date from Westinghouse, 1977 demonstrations (see Bickman *et al*, 1978 and Kaplan *et al*, 1978), Crowe (2000) and Ekblom (2009).

For the purpose of this article a ‘framework’ can be seen as a set of concepts organised to facilitate the understanding and operationalisation of a complex overlapped crime prevention approach. A framework should aim to organise the component parts of the approach in a suitable format leading to the understanding of the complex relationships and drivers behind them. A ‘Concept’ refers to a theory-driven classification of common principles with a shared desired goal/aim. A ‘Principle’ will be referred to as a fundamental proposition that serves as the foundation for a system or process within the concept. A framework is subsequently presented in this article, which attempts to develop a general understanding with the aid of effective communication. It is important at this stage to clarify the meaning of such terms to keep the framework analysis, development and discussion consistent and understood by all readers.

Research presented here originated from a need to identify an established, current CPTED framework in order to provide a benchmark from which further work could be aligned. Instead it became apparent that academically focused CPTED frameworks were lacking. Those that had been iterated were at times confusing and at odds with each other, using a myriad of terms to describe and delineate similar features (Gibson and Johnson, 2013).

This article considers in detail the frameworks that lie behind the concepts of CPTED, and in so doing will propose a revised and less ambiguous CPTED framework by reconstructing components and suitably describing the intended roles of each. This is designed to serve as a supporting and guiding mechanism, to facilitate easy definition and transferability throughout cross-disciplinary

research, and to aid the prevention of crime through the design of the environment. It offers the academic and the professional alike understanding of the system of CPTED and describes in detail, their interrelatedness.

Having considered the academic and found a noticeable and significant lack of transferability to professionalisation, a second project was developed to examine the use of CPTED in that professional arena. In England and Wales this is a statutory requirement; local authorities must consider the prevention of crime throughout all areas of their activity, including the planning process. Internationally, the use of crime prevention in design may not be so formally incorporated in urban planning processes but such activity is practised, and samples were forthcoming from beyond the United Kingdom. The question considered by the authors, having identified that academia had failed to provide a suitable overarching working CPTED framework and language commonplace for practitioners of all relevant disciplines, was what knowledge base do such professionals therefore draw upon to follow this requirement? In addition, and perhaps more importantly, does that knowledge base provide a framework clearly derived from CPTED research and in turn therefore, theory-driven?

While Cozens (2011) considers theories of environmental criminology and concludes a need to improve upon knowledge dissemination in this field, this article critically considers the available knowledge base for the concept of CPTED itself provided by academia, and what is available for dissemination and use among planning professionals. Through a structured, systematic and critical review of academic texts to provide an evidence base, we argue that academia, while considering and developing CPTED for over 40 years, have to a degree failed planning professionals. Academia is yet to develop and work with a common language, a common structure or common framework for CPTED (Gibson and Johnson, 2013), yet fully accepts that this is a crime prevention strategy, which, by its very nature, is reliant on a multi-agency response. In turn that multi-agency response may at times involve a myriad of actors and professes a governmental policy response in the United Kingdom in order to be successfully and consistently disseminated within urban development.

Given this gap in knowledge apparent from academic studies we take a snapshot of policy and knowledge material available to professionals in the field. We likewise find this material wanting in terms of working with a common language, or accurately reflecting the knowledge base and theoretical underpinnings of CPTED. As Cozens indicates (2011) CPTED is increasingly becoming a tool to build sustainability into the urban environment, as remaining safe from criminal victimisation while outside the home is an intuitive cornerstone of sustainable communities (Du Plessis, 1999; Armitage, 2007; Cozens, 2007; Armitage and Monchuck, 2009). The UK Government make the link between crime prevention and sustainable communities clear in their 2004 guide entitled 'Safer Places: The Planning System and Crime

Prevention' (Great Britain. Office of Deputy Prime Minister, 2004), with the opening paragraph of the introduction from the Minister of State saying 'Safety and security are essential to successful, sustainable communities. Not only are such places well-designed, attractive environments to live and work in, but they are also places where freedom from crime, and from the fear of crime, improves the quality of life'. The guide provides useful advice to planners and others alike on developing crime prevention within urban plans, covering the same environmental theories of crime that Cozens (2011) discusses, although he argues that there is an identified knowledge gap in the planning community concerning such theories of crime and their place in urban development. Paulsen (2013) similarly argues that not only is crime prevention compatible with planning goals, failure to consider it will actually reduce the likelihood of achieving many of the goals planners cherish. Therefore without crime prevention consideration, their fight for sustainable communities would be somewhat hindered (2013, p. 4).

This article will propose a potential remedy to the lack of a suitable CPTED framework through the development of a deeper, improved and further integrated framework, useful for both practice and research and developed through phase one of the study. It will then report on the findings of the second phase of research into the knowledge base currently drawn upon by professionals in the field when considering crime prevention within urban design.

As with the academic literature examined for CPTED frameworks, significant diversity was found to exist in professional practice, providing a very mixed and often lacking crime prevention approach to design. We do not seek to be critical of professional practice in this aspect of the work, nor suggest that our research has done anything other than take a small snapshot of the available material in practice, perhaps highlighting a need for further research. The authors simply put these results forward as indicating the potential risk posed to the accomplishment of a holistic crime prevention strategy in urban design. Such risk results at least in part, from the lack of a suitably defined and communicated CPTED framework originating from academia, which would enable the knowledge base to be articulated in a common language with common goals and objectives.

Phase one – Academic frameworks

This first phase of the study aimed to evaluate the diversity of CPTED frameworks within academic literature. It assessed the clarity of the academic knowledge base that may be available to those who work to provide CPTED in our urban environments. Ultimately this first phase of research and analysis led to the development of a new holistic CPTED framework as clarity was found to be lacking.

Methodology

The main part of this study uses Directed Content Analysis (DCA) from which frameworks were extracted and the content was analysed in depth. DCA is a methodology within the social sciences used for studying literature content in relation to themes, words, authorship, authenticity or meaning. Content analysis provides a summarising, quantitative analysis of text, which relies on a scientific method with attention to objectivity, reliability, validity and generalisability. When DCA is used, the researcher begins the analysis with a theory or relevant research findings as guidance for the identification of themes or content; this is often incomplete. The ultimate goal is to validate or extend conceptually the framework or theory itself (Hseih and Shannon, 2005).

Sixty-four papers representative of an exhaustive search for material were used to provide integrity for the DCA. The systematic sampling frame adopted covered a multi-disciplinary array of electronic databases, journal archives, broad internet-based searches, research registers and key author home pages, which were explored in their entirety. Inclusion criteria for study required material to embody a CPTED framework version, be published in an academic document but presented in any format, therefore providing considerable scope. Excluded material were non-English texts with no translation available and those published before 1972, the year that CPTED was initiated and documents that contained no framework for CPTED and therefore required no further analysis. No documents were written by the same author as this would cause bias in the frequency of framework versions used, although it was anticipated that authors using more than one framework version would be duplicated, this was not the case. Bibliographies were explored in their entirety to identify documents omitted from the main scoping exercise. The sample was as close to exhaustive as systems would allow and was therefore classed as a representative subset of all CPTED literature in terms of framework provision. A small number of documents were unobtainable and one had no translation available to the authors.

The final literature sample contained documents displaying at least one version of a CPTED framework and a set of component definitions, a variety of academic formats and published from a number of countries worldwide; although most prominent in the United Kingdom, USA and Australia. The snowball effect was diminished as reference sources were recorded so ensuring that definitions and terms were only used once without counts being distorted by inclusion of duplications.

Within each framework found, concepts were broken down for further analysis by comparing and contrasting definitions in depth. This indicated that 'territoriality' was a catalyst in much of the literature through its representation as a common goal of the remaining concepts that is by implementing CPTED concepts, the expected outcomes are an increase in territorial attitudes of the users of the environment.

Results

Overall the textual analysis of extracted frameworks revealed varied and diverse CPTED terms and concepts, with frameworks containing a range of three to seven distinct topic sub-headings. Generally, *Territoriality* (31 examples), *Access Control* (39 examples), *Surveillance* (24 examples), *Activity Support* (22 examples), *Target Hardening* (17 examples), *Defensible Space* (8 examples) and *Image Management* (7 examples) were the seven most recognised concepts. Second stage analysis sought to establish if a common language was in use in describing and explaining these CPTED frameworks. The DCA of phase one extracted a total of 58 terms typically used to define concepts within the CPTED frameworks, immediately indicated the disparity of terms used throughout academic literature in this field. Examples ranged from such diverse concepts as ‘Reinforcing Natural Kingdom’ (Territoriality), ‘Deflecting Offenders’ (Target Hardening) and ‘Communitarianism’ (Activity Support) to the more common and understandable ‘Natural Surveillance’ and ‘Target Hardening’.

Ranked by the number of supporting documents, results showed 25 out of 64 papers offered a framework either of the authors own interpretation or completely unreferenced to its source, followed by Timothy Crowe’s framework shown in 11 papers and Oscar Newman’s in six.

Research identified issues with Territoriality beyond that of definition, mentioned by Cozens; namely its position within CPTED frameworks. The definition of territoriality within the CPTED framework exemplifies many problems we currently face as it is central to CPTED, but frequently defined in a very limited fashion (Ekblom, 2011a). Cozens *et al* (2005, p. 331) conducted a very thorough review of CPTED in which they noted its difficulties associated with definition, interpretation and measurement; yet Cozens failed to tackle the problem head on (Ekblom, 2011a). Research in this article recognised a deeper issue of territoriality concerning its position within the CPTED framework and a requirement for it to be re-positioned within the CPTED structure.

All previous frameworks examined propose territoriality as one of a group of concepts to be considered within the particular framework being utilised, and as such it becomes a concept that can be considered alone. The intertwining and overlapping nature of the CPTED concepts is comprehensively acknowledged, yet by analysing ‘territoriality’ alone it becomes apparent that without it as a core concept, the remaining concepts equate to territoriality as a mechanism to be reached only through the facilitation of legitimate human behaviour. Each concept requires the facilitation of a legitimate human activity within the environment to have a positive effect on crime levels while sustaining the physical designs of CPTED. The desired behaviour consistently relates to the legitimate use and ownership over public space, capable guardianship, challenging offenders, signalling care and preservation over public space. Such

behaviours link with the nature of territorial behaviour, although territoriality is commonly referred to through prescriptive design solutions for example open sightlines, defining public private space through real and symbolic barriers. Territoriality is in fact a *natural behaviour by which organisms characteristically lay claim to an area and defend it against members of their own species*, claimed fluently by Howard (1920), an English ornithologist who became the first to fully describe the concept.

We therefore argue that territoriality should not be classified as a singular concept alongside and equal to others, or labelled with prescriptive design intentions, but the top level mechanism by which the overall goal of crime prevention is to be achieved. The subsequent overlap constitutes the need for the remaining components to sustain a suitable environment for this behaviour to occur. Each concept should be recognised for a desired aim to enhance and encourage territorial behaviour, with a collective overarching goal of crime prevention.

For the remaining concepts, the sub-division and grouping of definitions into categories was performed accordingly. Overlap occurred between them which was to be expected because of the nature of CPTED; however, the mismatch of terms and definitions is unacceptable in such a multi-disciplinary operation. The terminological adaptations mentioned earlier such as ‘Communitarianism’ as a replacement for Activity Support were matched owing to the similarity of techniques, such as placing activities in good locations and a collective outcome such as maximising the use of public space.

The sub-division of concept definitions recognised underlying theory that merged definitions into three main concepts. It also revealed two principles within each concept and two components to each principle, namely ‘Preparatory tasks’ and ‘Operational tasks’, in which principles require both tasks to reach a successful territorial outcome. Preparatory tasks use physical design to build an environment that enables the growth of territorial behaviour, for example, the Informal Surveillance *preparatory task* may include large windows and low hedges to create open sightlines and allow users to observe and offenders to be seen. The *operational task* in this instance would be a bottom-up approach by ensuring the required social conditions allow capable guardianship in that space at all times to sustain the goal of observing public space. Design alone is not a panacea for territoriality, the social dimension of the area and the capability and willingness of users must be considered to facilitate the intended goal. The notion of ‘Operational’ and ‘Preparatory’ tasks derived from the work of Ekblom (2011b) who argues an uncertainty of whether the concept of Territoriality is ‘socially ascribed’ or ‘physically delineated’ in the form of ‘Operational’ and ‘Preparatory’ tasks.

With careful consideration of the CPTED concepts, together with the conscious relationship between territoriality and the remaining CPTED framework, ‘Operational’ and ‘Preparatory’ tasks were identified to be present in all

of the concepts as they require human behaviour to sustain the designs and enforce territoriality. Territoriality requires a combination of all 'Preparatory' and 'Operational' tasks to ensure the desired goal state is met. Literature in this study reveals Operational and Preparatory tasks are generally not defined and delivered in earlier framework attempts. It is important in that case to define the 'Preparatory Tasks' and 'Operational Tasks' for each principle to illustrate the importance of people and an emphasis of the social role in CPTED. The structure of this framework and the subsequent 'tasks' are illustrated in Figure 1.

Framework reconstruction

From the DCA, the process of framework development was driven by theoretical knowledge together with an analytical process used to group definitions for each concept extracted from the framework versions. Sixty-four framework papers were extracted in total and for each identified framework definitions of the concepts within were extracted. The concept definitions were then compared and contrasted and based on existing theoretical knowledge definitions were grouped into three theory-based categories discussed below. Although a degree of overlap was noted over 90 per cent of concept definitions aligned suitably with the theme of the theories identified, those few not aligned bore no resemblance to the remaining concept definitions. Although the definition and heading terminology of concepts were sometimes confused because of different perceptions, a level of interpretation was required by the authors as to what category the definition aligned.

On the basis of the collective terminology and definitions extracted, the analytical process allowed three theory-based concepts to be constructed (see Figure 1). Concept 1 is *Surveillance*. Surveillance includes two principles of formal and informal surveillance. Formal Surveillance represents *mechanical forms of surveillance, or physical security/patrol guards*. Informal Surveillance represents *the design of the physical and natural environment to create clear site lines and open spaces*, which provide opportunities for capable guardianship through observation of public spaces. The two components of operational and preparatory tasks mentioned earlier are applied directly to these principles to represent the separate but unified requirement of physical design and human operation in the form of social, ecological, cultural and economic support.

Concept 2 is *Positive Reinforcement of Legitimate Behaviour*. This includes two principles of Activity Support and Image Management/Maintenance. Activity Support is the *placing of non-threatening activities in public and semi-public space* to encourage respectful legitimate users during their routine activities. Image Management/Maintenance *encourages the public to use attractive, clean open spaces* and develop an attachment to the environment; maintenance of these tasks are vital for the sustainability of Activity Support. Each principle similarly comprises preparatory and operational components with the same rule as the previous concept.

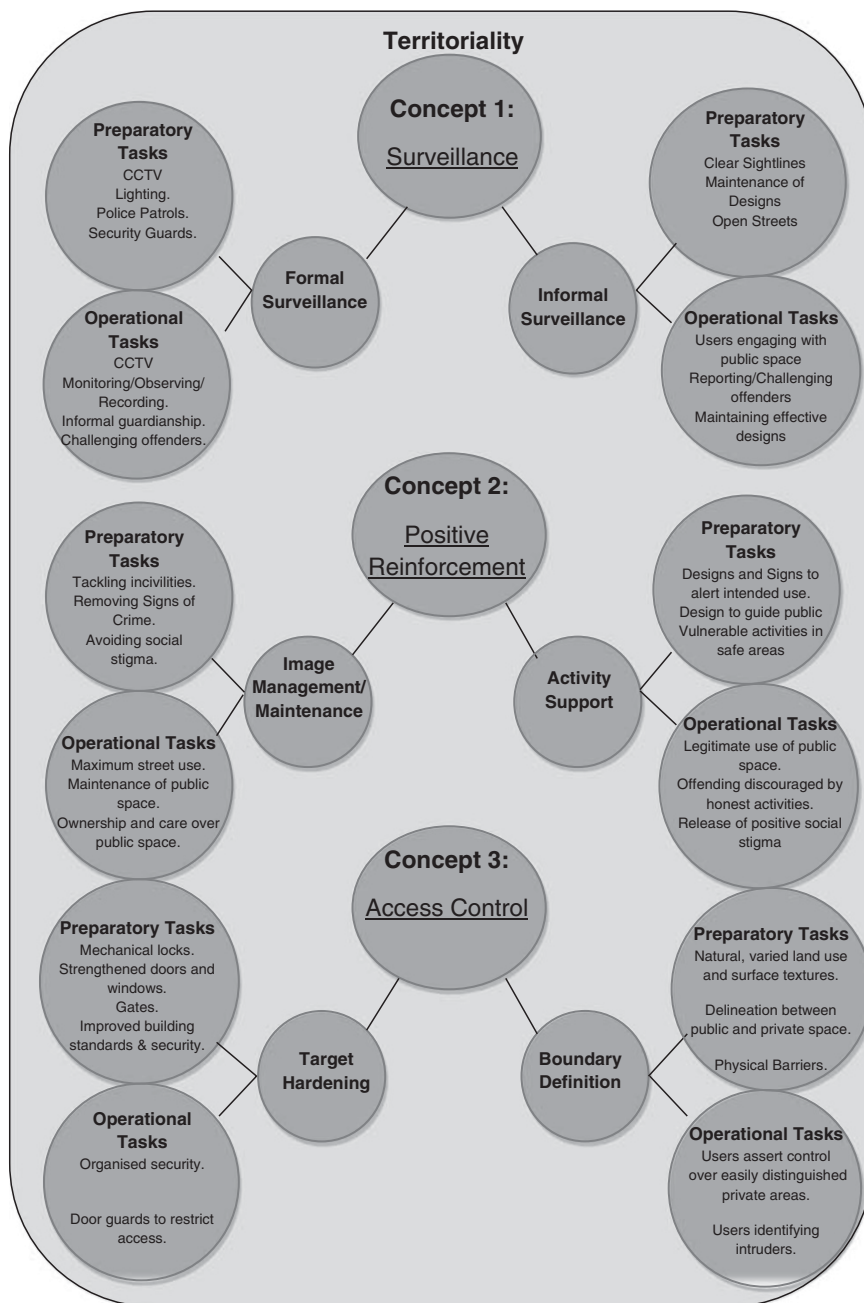


Figure 1: Reconfigured framework for CPTED.

Concept 3 is *Access Control*. Access Control includes two principles of Target Hardening and Boundary Definition. Target Hardening includes *physical and mechanical locks and alarm systems* to restrict access and make buildings more resistant to attack. Boundary Definition is *defining between private, semi-private and public space* through physical and psychological barriers with the aim of making boundaries known to potential invaders and restricting their access through the apprehension of being noticed. Again, the same rule of preparatory and operational tasks is applied here.

Concepts and principles inherently overlap; however, this process is intended to highlight the importance of theory in the development of these principle headings and how such use facilitates knowledge transfer. The repositioning of 'territoriality' as an overarching goal also facilitates the ease of understanding in that the concepts individually represent a required goal, but when combined and overlapped, they collectively facilitate territorial behaviour. It is also stressed that without some principles, others would not sustain. For example, CCTV is a preparatory task for surveillance (use of technology designed to observe people) and therefore has a primary objective of observation. Surveillance alone will not control access, it is not the 'key in the door', but when combined and overlapped with the access control operational task of users asserting control (CCTV monitoring), access control can be achieved. It is not intended for these principles to operate in isolation but rather to sustain and work in concert.

Although the format of this framework is condensed, its structure is represented with more clarity. This framework is structurally supported by theories and territoriality is repositioned as an overall mechanism that must be achieved to ensure effective crime prevention as a universal goal for CPTED. It follows that the number of preparatory and operational tasks under each concept could be potentially infinite as there are for instance many ways to prepare the environment for surveillance or access control, therefore defining this as the basis for a flexible framework that can be integrated into practice.

Phase one discussion

During a development process, the implementation of CPTED would require stakeholders to follow a framework or set of guidelines. Without a shared understanding of mutual priorities and goals, and the occurrence of terminological and definition discrepancies, the opportunity for the maximum potential of CPTED strategies may be hindered. Recurring problems of this nature may cause significant financial burdens to building and landscaping companies, not to mention the psychological and financial cost of community safety and fear of crime. The significant paucity of studies to take on the facilitation of a holistic framework provided a substantial gap in knowledge for this study to fill and the results have shed considerable light on the state of the current CPTED approach.

A second important issue manifesting itself is the inconsistency of CPTED frameworks currently evidenced in academic literature. Academics and practitioners alike need focus and guidance to ensure a universal understanding is reached. Varied frameworks can cause misunderstanding of goals and underlying values of CPTED concepts can be lost. To date academia has only been able to provide a significantly diverse knowledge base and framework guidance for CPTED even though there has been 40 years of knowledge generation and consideration. It was therefore hypothesised that professional use of CPTED would be somewhat flawed as it is argued in this first stage that academia, as the providers of a knowledge base, are yet to build a CPTED language and framework for clear dissemination to practitioners.

Phase 2 – Practitioner Knowledge Base

This second phase sought merely to establish a small ‘snapshot’ of the knowledge base available to and used by professionals when considering a crime prevention approach to their designs. Time and resources were too limited to consider an exhaustive study or the collection of a representative sample, therefore the study was limited to a questionnaire that was distributed, mainly via the World Wide Web through special interest group forums, to a variety of relevant professionals. Participants were also sought through the professional newsletters of the Royal Institute of Chartered Surveyors (RICS), the Royal Institute of British Architects (RIBA) and the Association of Chief Police Officers (ACPO) but with minimal success. This allowed for a small number of current crime prevention terms and frameworks being used in practice to be collected and examined, highlighting how or if these frameworks were related to CPTED as defined in the DCA of the academic literature.

The authors stress the ‘snapshot’ nature of this collection of data but results maintained the provision of such a diverse CPTED knowledge base; and the low response rate was also considered evidence of the low level of interest and tolerance for such crime prevention approaches.

Methodology

The international study saw respondents from the United Kingdom, Ireland, USA, the Philippines, Australia and New Zealand, as well as Canada and Trinidad take part. The questionnaire was targeted at, and completed by practitioners whose role included awareness of and use of crime prevention techniques in work involving the planning, design or consultation on the built environment. Professionals that took part in the study included planners, architects, urban designers, and crime and security consultants.

Questionnaires were developed to cover two themes, the CPTED knowledge base of professionals in the field as reported here, and issues concerning mixed

terminology to be developed through a second research strand being undertaken by the authors. The questionnaire asked both open and closed questions and consisted of just eight questions in total, although one section required respondents to consider a list of terms and select/comment on those in regular use. Respondents were asked through three questions to provide brief details of their profession and were then asked at what point in their field of work they considered crime prevention, where their knowledge base for crime prevention was drawn from in the form of policy documents or frameworks that they referred to, and how they used that knowledge base. The remaining questions related to the terminology issues. For the purposes of research reported here the relevant knowledge base question was as follows:

Question A3. ‘What crime prevention policy/framework/guideline do you use or refer to (in your work), if any?’

It is the answers to this question, which we now report on. Being sought was an insight into the knowledge base drawn upon by professionals when considering crime prevention in their professional capacity and the synthesis between that knowledge base and CPTED.

While the research theme appeared to generate significant levels of interest, responses to the questionnaire were disappointingly limited and only 42 completed questionnaires were returned, albeit from a variety of professions. Completion of the questionnaires identified core material used by the participant when considering crime prevention in their line of work, the knowledge base and reference points utilised. Following receipt of the completed questionnaires’ collation of the documents (policies, strategies, academic works and the like) quoted in answer to question A3 took place and in all cases the reported documents were found to be available for scrutiny to the authors. A breakdown of occupations for respondents is shown in Figure 2.

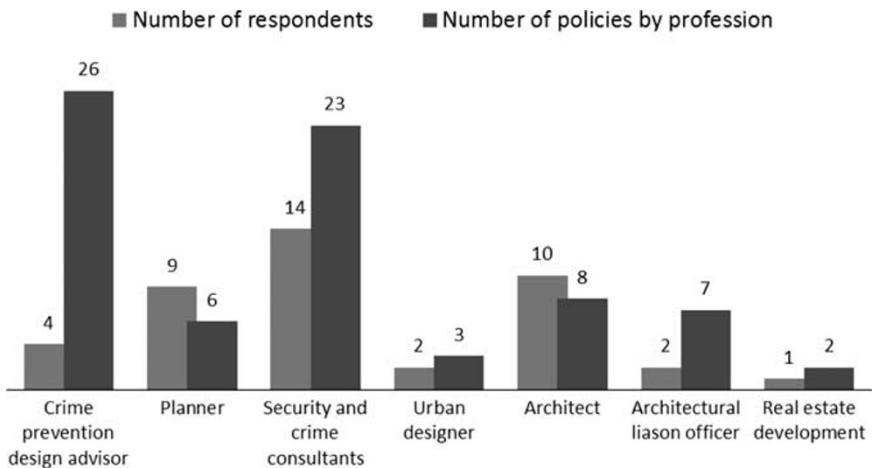


Figure 2: Respondents professions versus knowledge base documents.

Analysis of the knowledge base documents was required to establish if the quoted material provided structured guidance on developing crime prevention in the design of the built environment, and ultimately if that guidance followed the concepts and principles of CPTED. Primary content analysis categorised documentation into those containing a crime prevention *framework* and those featuring crime prevention but not providing a framework for development within design or planning of the built environment. Documents in the second of these categories were excluded from further analysis while those that did contain a crime prevention framework were further examined using qualitative coding techniques. Inclusion criteria for this second subset of documents followed the earlier definition of a framework:

For the purpose of this article a framework can be seen as a set of concepts organised to facilitate the understanding and operationalisation of a complex overlapped crime prevention approach. A framework should aim to organise the component parts of the approach in a suitable format leading to the understanding of the complex relationships and drivers behind them.

Documents therefore needed to relate to the design of the built environment, contain more than one crime prevention concept, and give an unambiguous explanation or definition of its meaning in relation to crime prevention so that it could be assessed, followed and implemented in to designs by professionals.

An initial methodology of extracting the core topic headings or themes from these frameworks and, by seeking definitions from within the context of the originating policy document allowing for the topic heading/theme to be compared to CPTED concepts was abandoned. Many documents failed to define the terms they were using as topic or theme headings, so lacking contextual definition and potentially creating confusion. In addition the topic or theme headings, without seeking an explanation or definition, could not be aligned with a CPTED concept or principle in a straightforward manner. For instance the topic heading ‘Activity Mix: Eyes on the street’, as one such example, could potentially be aligned with the concept of Surveillance; however, its explanation within the document aligned it within Positive Reinforcement of legitimate behaviour in the form of Activity Support. The contextual explanation discussed appropriate levels of human activity and ‘promoting a compatible mix of uses and increased use of public spaces’, making no mention of surveillance or the term ‘Eyes on the street’ used in the topic heading. It therefore became necessary to extract only the core terms and explanations of topic and theme headings in order to seek to group them through comparison with knowledge of CPTED.

Without a definitive academic or professionally accepted CPTED framework with explanation of terms, as evidenced in phase one of this study, the

benchmark against which core terms and explanations were contextualised became the proposed new framework. Such textual coding allowed for each knowledge base document to be assessed against CPTED concepts, principles and ultimately academic theory

Results

Forty-two respondents completed questionnaires and a total of 39 different policies were collected from those respondents for analysis, firmly indicating no industry standard being in place. Eleven respondents did not refer to or use any formal policy, framework or set of guidelines in relation to developing crime prevention in their work, although two were developing internal documentation to cover this. Five of these 11 stated they relied on personal experiential knowledge of CPTED rather than any formal knowledge base. These 11 included three planners, four crime and security consultants and four architects. Five originated in the United Kingdom.

Twenty-seven of the 39 documents were excluded from further textual analysis. Primary analysis had found that these excluded documents contained no frameworks relevant to crime prevention. Although in many crime prevention did feature, this was either a brief non-core mention, or the documentation was better described as a design guide more specifically related to available products that may aid crime prevention, rather than being a framework to incorporate crime prevention concepts in design.

Of the remaining 12 documents, frameworks were extracted from all that fell within the inclusion criteria. No frameworks were identical, indicating that there is no universal framework being used in practice relating to crime prevention. All were generally similar in format, consisting of a variety of thematic headings followed by explanatory text.

In order to identify links with CPTED the explanatory text from each thematic heading of each of the 12 documents was scrutinised. Where the explanatory text provided an explanation or definition of the thematic area being explained, this was extracted and, without reference to the thematic heading, compared to the new CPTED framework concepts and principles. Alignment of the thematic explanation to a CPTED concept and subsequently principle was then possible.

Fifty-nine thematic explanations were extracted from the 12 analysed frameworks. Table 1 examples this process listing three definitions/explanations of thematic headings found within reported documentation. Each of these explanations has been considered against the new CPTED framework and the corresponding concept and principle has been allocated. These three examples translate to the CPTED concept of 'Access control' but note that it was not considered possible with the first example to delineate the principles involved.

Table 1: Definition alignment

<i>Example term</i>	<i>Aligned concept & principle</i>
Creating an environment where residents exercise a greater degree of control, through some type of physical or symbolic barrier or change of surface or colour of footpath	Access control
Entrance arrangements that resist hostile entry	Access control – Principle 1
Access for the public is clearly identified	Access control – Principle 2

Table 2: Ambiguous themes

<i>Topic/Theme</i>	<i>Explanation</i>
Neighbourhoods	Places that promote a sense of ownership, respect, territorial responsibility and community will make an important contribution to crime prevention
Layout; clear and logical orientation	Places laid out to discourage crime, enhance perception of safety and help orientation and way-finding
Image and milieu	The capacity of design to influence the perception of a project's uniqueness, isolation and stigma

The six principles outlined in phase one were found to be separately described within 36 different explanations and definitions in the professional documents that contained a crime prevention framework that could be further analysed, many of those descriptions being far from self-explanatory. These 36 explanations utilised 43 different topic/theme headings and no single framework examined covered all three CPTED concepts of surveillance, access control and positive reinforcement.

Within the examined frameworks CPTED concepts are given uneven weighting with Access Control being described on 18 occasions, Surveillance 11 and Positive Reinforcement nine. The documents also created a number of concepts/principles not aligned with CPTED such as 'Anonymity', 'Neighbourhoods' and 'Adaptability'.

Within the frameworks examined there were a total of 59 explanations/definitions extracted of which 23 did not align to CPTED concepts or principles. Territoriality was found to be mentioned in four of the 23 explanations not aligned to CPTED concepts but no explanations were provided to achieve territoriality. Table 2 provides some examples of topic headings/themes within frameworks, which could not be aligned to the concepts or principles within the CPTED framework being used as a benchmark.

Other results confirmed that 50 per cent of the frameworks had components that were categorised in a single academic concept more than once, revealing repetition and lack of clarity in the meaning of these terms that are being used in practice.

Phase 2 conclusion

This part of the research claims to do no more than present a small snapshot of practitioner activity in the field of applying CPTED to the built environment. It had been hoped to gather a larger sample than was ultimately possible and the lack of engagement by professionals in the field was disappointing. In many respects, this final phase mirrored the results from phase one, clear indication of the lack of a universal framework and knowledge base leading to a diverse array of sometimes unhelpful terms and descriptions causing potential confusion. The simple result of 48 practitioners providing 40 different crime prevention knowledge base documents suitably examples the diversity in the built environment professions in terms of incorporating crime prevention within design and planning. With the majority of these documents actually failing to provide a recognisable and functional crime prevention framework, those practitioners having to use such material are left in an invidious position with little help available, as the earlier research establishes a significant lack of clarity stemming from academia, which can be seen as the knowledge provider for CPTED. It may be argued that CPTED in practice is unlikely to align directly with academia as some adaptation would be required for the development of a practical tool and also that the framework proposed in phase one may be seen as a 'new' framework. It is stressed, however, that the framework proposed in phase one introduces no new concepts, although the terminology is adapted somewhat to reflect the knowledge gleaned over the past 42 years. The process of alignment carried out did not seek distinct alignment in terms of concept headings and so on, but rather of definition themes, as there are known (and sometimes obvious) discrepancies in the terminology used. Definitions of professional policy frameworks were analysed by all three authors separately and a collective conclusion drawn for each as to whether the concept definition proposed bore any significance to concept themes in academia. Those definitions that were identifiable with academia in terms of their anticipated goal or guidance were aligned with the academic framework proposed. This process of alignment would produce the same results if the policy frameworks were aligned individually to every single framework extracted from academia, as the new framework merely brings together and restructures all other existing frameworks. With regard to the practicality of the academic framework and the potential for alignment with professional policy frameworks, the frameworks identified in policy documents provided no guidance for users besides a very simple and unpractical definition. It is acknowledged that the academic frameworks also lack detailed guidance; however, many policy documents provided reference to the work of academics but frameworks that were provided did not reflect the theoretical basis of this material and no information was provided as to how it has been developed or adapted.

Discussion

This research originated as a requirement to establish a benchmark for further work but instead found academia to be lacking in provision of a holistic, accepted CPTED framework that could be disseminated for academic research, understanding and as a knowledge base for professional practice. In two distinct phases the research has examined academic knowledge, and then taken a peek into the knowledge base drawn upon by professionals in the field. In both areas of application a holistic, universal and clear framework for the overall concept of the ability to prevent crime through the design of the built environment has been lacking. It is accepted that phase two researched a small ‘snapshot’ of professional practice rather than a truly representative sample. However, all indications and feedback received during the course of the project point towards a similar result being obtained were a full-scale study undertaken, which in itself would be time consuming and complex given the diverse nature and sheer numbers of practitioners. The engagement of professionals in the field was found to be disappointing and again feedback from those who did take part was to the effect that this would be a problematic area for future research.

The potential risks posed to crime prevention and community safety within the designed and planned urban environment are self-explanatory. If CPTED is to be acknowledged as a valid and worthwhile design component then a common language through a common knowledge base must be brought to the fore, in a similar way that a common curriculum is developed in education to ensure parity of understanding, without dictating outcomes or failing to acknowledge the value of flexibility and innovation, which is equally as essential.

Utilising CPTED is an area of crime prevention work universally accepted as requiring significant cooperative multi-disciplinary working relationships. A conclusion can be drawn from this research that such partnership work will struggle to communicate effectively where there is such a lack of a common language and understanding. While perhaps not so damaging on a localised scale where practitioners and local government are able to converse relatively easily on an informal as well as formal basis, a major barrier presents itself once larger geographical scales come in to play, and where consistency of practice is to be reflected. The lack of clarity and therefore understanding that has come to the fore in this research risks severely weakening the development and application of crime prevention in the built environment, even though such a concept as ‘designing *in* crime prevention’ is generally accepted and certainly promoted by governments, both locally and nationally. Without such an established, evidence-based and clearly understood framework, it becomes almost inevitable that diversity in approaches will follow. This will perhaps lead to a significant risk of losing sight of the core CPTED precepts, weak prevention focused design and a risk of practitioners becoming disillusioned

by the boundaries of CPTED, for it to then become a synonym for anything vaguely ‘crime prevention’.

The authors suggest in this article that restructuring and relabelling the CPTED framework and so clearly illustrating the division between operational and preparatory tasks within principles is a step forward, which allows for improved emphasis and visibility of theory-driven components. In addition the movement of territoriality from a single concept to a holistic goal is important, allowing for the mechanisms provided by the three concepts to be focused on a suitable aim. With territoriality as an overarching goal as opposed to a standalone concept and recognition of operational components, we are returned to the work of Jeffery and his conclusion of the ability to provide a beneficial behavioural message:

The response of the individual organism to the physical environment is a product of the brain; the brain in turn is a product of genetics and the environment. The environment never influences behaviour directly, but only through the brain. Any model of crime prevention must include both the brain and the physical environment (Jeffery and Zahm, 1993, p. 330).

This new framework is not put forward as conclusive. The authors recognise that there are further constraining issues upon the overall effectiveness of the CPTED concepts (see Ekblom, 2011a). These issues need to be tackled with further research from academia but with the cooperation and multi-agency approach that is applied to the operationalisation of crime prevention. Academia alone cannot hope to create a valid working language for a matter that is firmly placed in the operational arena.

Acknowledgements

The authors express their sincere thanks for the financial support from Concept Building Services (Southern) Ltd who have generously provided funding for all aspects of this research project.

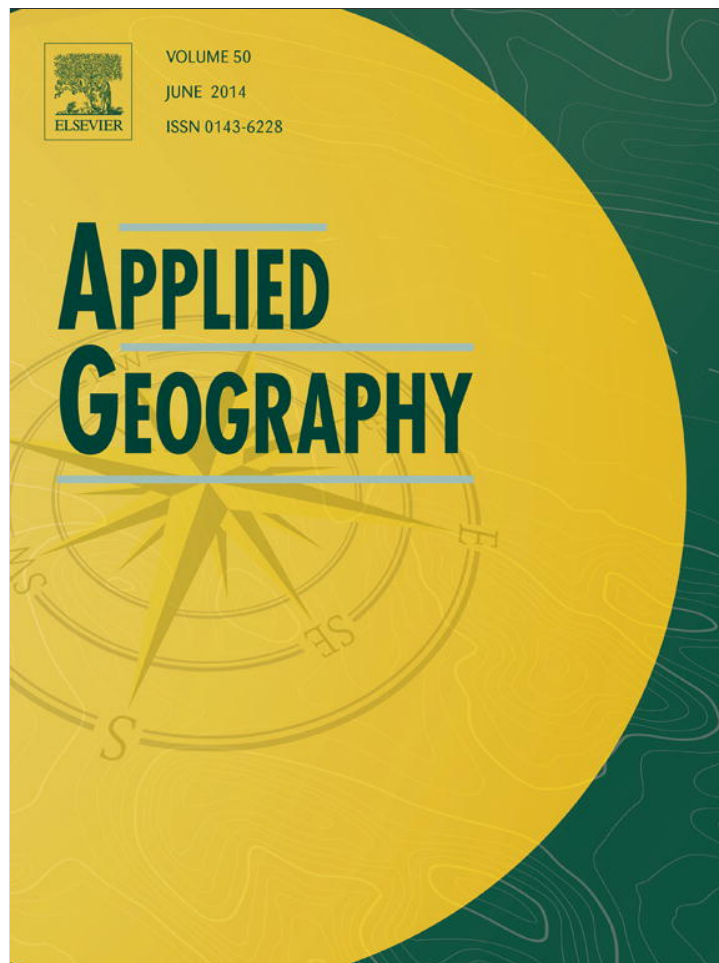
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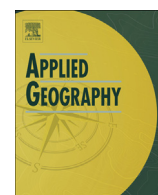
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Applied Geography

journal homepage: www.elsevier.com/locate/apgeog

E.U. migrant criminal activity: Exploring spatial diversity and volume of criminal activity attributed to inter EU migrants in England



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A B S T R A C T

Keywords:

Crime
EU migration
U.K. policing
Police
Spatial diversity

European Union expansion over the last decade has generated many studies, surpassed in number only by governmental comment and media headlines following this general theme. Issues and knowledge explored and expressed have been many, one being a hard to evidence crime-migration nexus leading to constructive empirical studies focussing on the accession to the EU of predominantly East European nations and ensuing migratory patterns. Appertaining to this study is geographic focus on crime committed by inter-EU migrants in England, resulting from holistic research of a contemporary EU statute concerning inter-state sharing of bio-informatics, seeking contextual knowledge to the benefit of policy makers. The geography of inter-EU crime in England identifies spatial dispersion and regional areas of activity on a meso scale. The activity of individual nationalities is examined in a spatial manner displaying distinct differences in movements on a regional (meso) scale. Results improve on current knowledge of the criminality of inter-EU migrants but also identify and call for further research in a conceptual development as localised criminal activity draws an international investigatory perspective.

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Introduction

As global travel and legitimate trading of services, commodities and products increases then so do opportunities for illegal activities on a macro geographic scale (Fijnaut & Paoli, 2004; Joossens & Raw, 1995; Passas, 2002). Equally such globalisation creates opportunities for people movement, and consequently for offenders to commit criminal offences within the country they find themselves domiciled in. Within Europe this feature of free and unrestricted movement for citizens of European Union (EU) countries is well established, considered to be at the core of EU citizenship (Krings, Bobek, Moriarty, Salmonska, & Wickham, 2013; Solivetti, 2010) and theoretically 'transcends borders' (Ciupijus, 2011: 542). Intra-EU movement has become a common political and social issue, focusing significantly on migration from countries accessing the EU over the last decade, and as a feature of human activity receives considerable academic study. Alongside there has been increasing political and media pressure on the relationship between immigration and crime (Alonso-Borrego, Garoupa, & Vazquez, 2012). For countries hosting large numbers of immigrants, crime has been blamed on foreigners for many years (Canton & Hammond, 2012;

Solivetti, 2012) and Bianchi and Pinotti (2012) argue that this alleged crime-migration nexus has long been situated in policy maker and public interest agendas. The EU Survey of Income and Living Conditions (EU-SILC) confirms the issue influencing negative perceptions of the indigenous populations (Boeri, 2010). In the United Kingdom (U.K.) this situation is equally apparent despite British crime displaying a steady fall over the last decade (McLaren & Johnson, 2007; Rasinger, 2010).

This media based crime-migration nexus, in terms of intra EU migration, is problematic to evidence. Bianchi and Pinotti (2012) consider its existence within Italy between 1990 and 2003. Examining reported crime across Italian provinces they conclude that "neither the overall crime rate nor the number of most types of criminal offence are significantly related to the size of the immigrant population", but do raise questions concerning the perception of the crime-migration concept. Alonso-Borrego et al. (2012) studied the nexus between global migrant groups and crime in Spain, noting the political and public concerns but also that there was a distinct correlation between the two over the preceding decade.

UK research has shown no significant relationship between migrants and the rate of violent crime (Bell, Fasani, & Machin, 2010). Jaitman and Machin (2013) argue that the axiom has had little study although research has been increasing, but consistently found it hard to evidence an impact of immigration on a countries

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Table 1
Police arrests in Nottingham City 2010–2012 and outcomes.

Years covered (15 Jan, end 31st Dec)	Total no of arrests for criminal offences	No of detainees charged with criminal offence	No of detainees with outcome of 'No further action'	No of detainees dealt with by diversion at police station ^a	Percentage of detainees with outcome of 'no further action'
2010	35,638	13,917	11,286	7653	31.67
2011	33,935	13,240	10,858	7071	31.99
2012 (begin 1st Jan)	28,948	11,132	9328	5582	32.22

^a Outcomes include; Conditional Caution, Final Warning, Fixed Penalty Notice Issue, Reprimand & Simple Caution – arrests and disposals of Restorative Justice are rare. (Nottinghamshire Police, 2013).

crime. No causal impact of immigration on crime in England is found whilst a more focused consideration of arrests in the London area similarly identifies no immigrant differences from the arrests of natives.

To date much of the academic input to understanding this internationality of illegal activity has concentrated on organised crime, although this label creates discussion and some would say is a misnomer in itself. There is an accepted lack of a single agreed definition of the term (Hall, 2010; Zoutendijk, 2010) and it has been described as both contested and ambiguous (Fijnaut & Paoli, 2004; Hall, 2010). Geography in terms of such criminality is captured but dependent upon the countries involved. Hall (2010) encourages geographical debate, highlighting that whilst a number of geographers have considered aspects of organised crime it remains an area of human geographical enquiry far from substantive or central. Whilst informative and prudent Hall follows the international nature and presentation of organised crime as an aspect of contemporary globalisation, his central core therefore being somewhat limited to criminal activity across state borders.

Little, if any, work has been reported considering the geography of EU migrant crime in England. In his necessarily brief portrayal of the issue Wilson (2009) succinctly summarises the overwhelmingly local nature of crime, albeit emphasising that transnational crime (Wilson's definition being 'an offender operating in one country on a relatively local basis but a national of another') has increased over approximately the last 20 years. He hypothesises concentrations following a spatial zone marking core E.U. economic and logistical corridors, approximated as an arc from North West Spain, through central Europe and into the U.K. via channel ports. With a very limited amount of U.K. arrest data he further suggests the consequence of such economic and logistical corridors on crime may be of greater influence than national boundaries and pertinent to Police Forces/Agencies within such zones to be communicating effectively with international zone members as much as Forces within their own country. Increased cross-border communication is a potentially valuable observation for individual English Police Forces to consider if spatial diversity of crime by non-UK E.U. migrants is not an issue of generic national impact. Spatial diversity is therefore pertinent to further enquiry. Crime by non-UK E.U. migrants was expected to cluster in the central south (London and environs) and the south east (Kent/Essex – areas providing Channel ports) due to the simple logistical nature of travel to the English Isle and prominence of entry points, whilst diversifying and focusing on areas with predominant subject populations.

Geographic research reported here arises from a wider E.C. funded project concerning the European Unions 'Prum Convention'. In short this Convention, signed in 2005 and incorporated in to legislation in 2008, concerns the safe and timely exchange of bio-informatics (D.N.A., Fingerprint and vehicle registration data) between E.U. states.

Within the Prum Convention information is to be exchanged between authorities which are "responsible for the prevention and investigation of criminal offences" (Article 1), with no formal definition of why, other than for the purpose of crime prevention

and investigation. There is therefore no requirement for this activity to be linked to organised crime (however, one may define that concept) but an implied requirement or assumption that one state will seek information from another, on the basis that there has been some form of cross-border activity in relation to the criminal matter being investigated. Terms 'cross-border', or 'transnational' in respect to criminal activity when considering the Prum Convention duly become potential misnomers. As such it is clear that the Convention will go beyond the issue of 'organised crime', catering for a single offender in one state whose home or origin is elsewhere in the E.U. and whose criminality could be localised in nature and scale.

This convention therefore creates the investigatory tactic of submitting bio-informatics seized from a crime scene/during an investigation to an 'international' data base(s), searching for the identity of offenders through matching bio-informatics with those from an offender known in another country. With no statutory limitation on the nature of the crime under investigation it provides a 'transnational' aspect to offences which are often likely to be wholly localised in nature with no known international aspect, generally previously limited to an understanding of 'organised crime' which has invariably been studied and reported upon with a transnational or cross-border identity. Significant transnational Justice Department/Policing Agency activity may ensue with such a refocusing on approaching localised crime. Potential tactical, strategic and policy responses creating international cooperation for localised crime has rarely been explored, such concepts usually being grounded in aspects of organised crime which has a generic flavour of inter-state activity and requirements. Marking localised and low level crime, something the Geography of Crime sub-discipline has & continues to have significant input to at this spatial level (Chainey & Ratcliffe, 2005; Johnson, 2013; Johnson et al., 2007; Le Beu & Leitner, 2011; Lowman, 1986), with an international cooperation theme calls for human geographical enquiry through its varied sub-disciplines.

Table 2
Reported and detected crime estimations. BCS 2010/11.

BCS crime type	Percentage of crime reported to police 2010/11	Police recorded crime type	Percentage of rates of sanctioned detected offences
Theft from the person	29	Other theft	22
Vandalism	34	Criminal damage	14
Minor/no injury assault	34	Violence against the person	44
Burglary – nil stolen	79	Burglary	13
Burglary – property stolen	80	Robbery	21
Theft of vehicle	96	Offences against vehicles	11
		ALL CRIMES	28

From: Chaplin et al. (2011). *Crime in England and Wales 2010/11: Findings from the British crime survey and police recorded crime* (2nd ed.). In Home office statistical bulletin 10/11: London: Home Office.

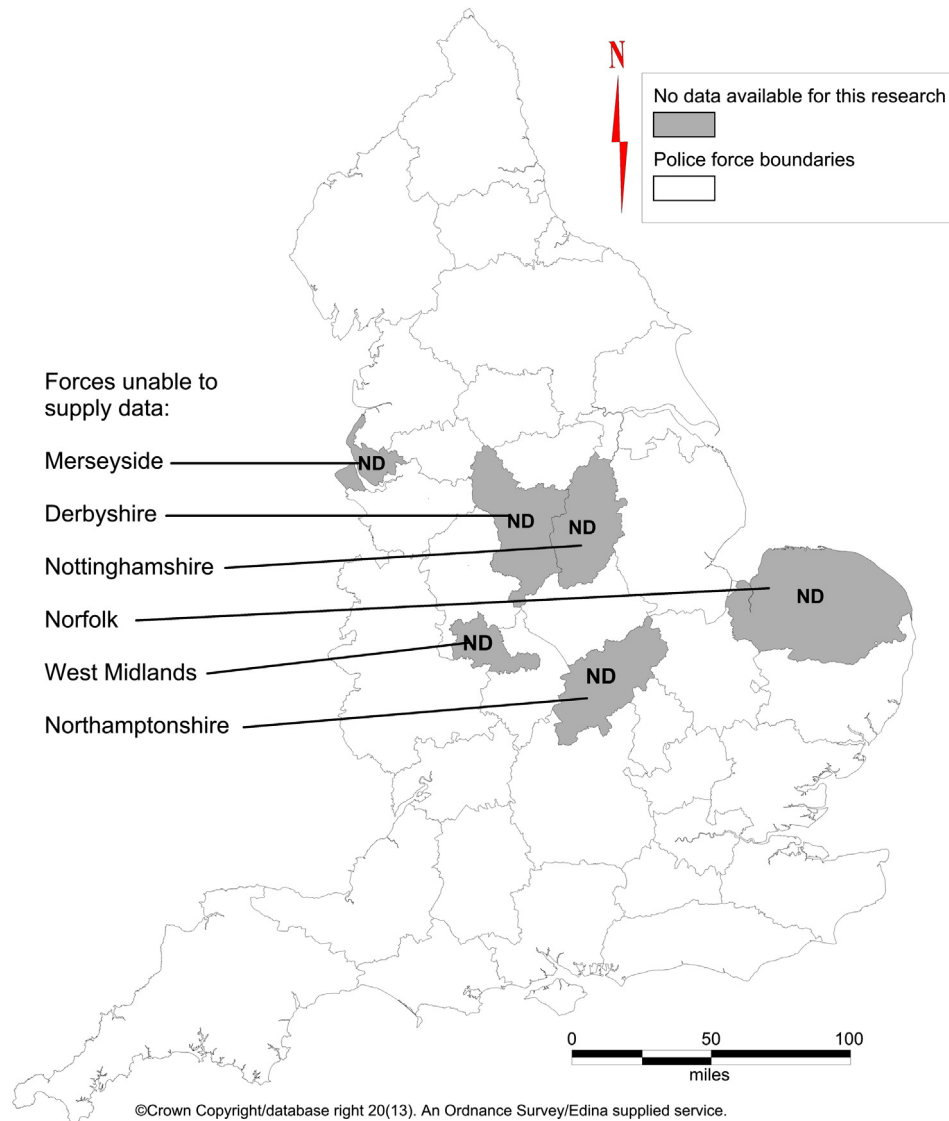


Fig. 1. English Police Force areas requested to supply data.

This research, though the U.K. is not a signatory to the Prum Convention, sought to explore crime committed in England by EU nationals through publicly available data. Jaitman & Machin's (2013) claim that research considering the immigration-crime nexus has been limited to date is confirmed through literature searches which also identify a trend of empirical studies at a macro level. This research considers potential spatial diversity of crime by migrant groups in the context of location within England and policing impact. Uniquely levels of crime committed by offender nationality are examined and show significant diversity. Identified spatial diversity by migrant groups posing potential issues to Police Forces in England suggesting a national response through creating holistic international policing links may not be suitably focused without a micro scale understanding of migration-crime culmination.

Research here is presented through five sections, the first being a brief explanation of the relevant accessions to EU membership since 2004 and ensuing migration groups before moving forward with a discussion of the methodology employed. This methodology section also critically considers the integrity of publicly available data in use. Analysis and results are presented in the third section followed by a full discussion and a final conclusion.

EU accessions

Accessions to EU membership over the past decade has been fully examined, requiring little further explanation here other than a brief introduction (Albertinelli, Knauth, Kraszewska, & Thorogood, 2011; Bishop, 2004; Favell, 2008; Longhi & Rokicka, 2012; McCollum & Findlay, 2011; Rasinger, 2010; Stenning et al., 2006).

In 2004 10 countries joined the EU (labelled the A10 countries), of which eight were in East and Central Europe: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia (labelled as the A8 countries, the remaining two being Cyprus & Malta). 2004 enlargement essentially increased the population of the EU by 75 million leading to inter-EU migration patterns developing as an East to West short term and circular phenomena (Albertinelli et al., 2011). Employment within A8 countries was greater in industry and agriculture than it was in the EU15, in 2001 ranging from 4% of employment in agriculture for the EU15, 17% for Lithuania and 19% for Poland (Bishop, 2004). As a guarantee the EU offers Free Movement of Workers to citizens, however, in 2004 considerable concern was expressed by all but Sweden, Ireland and

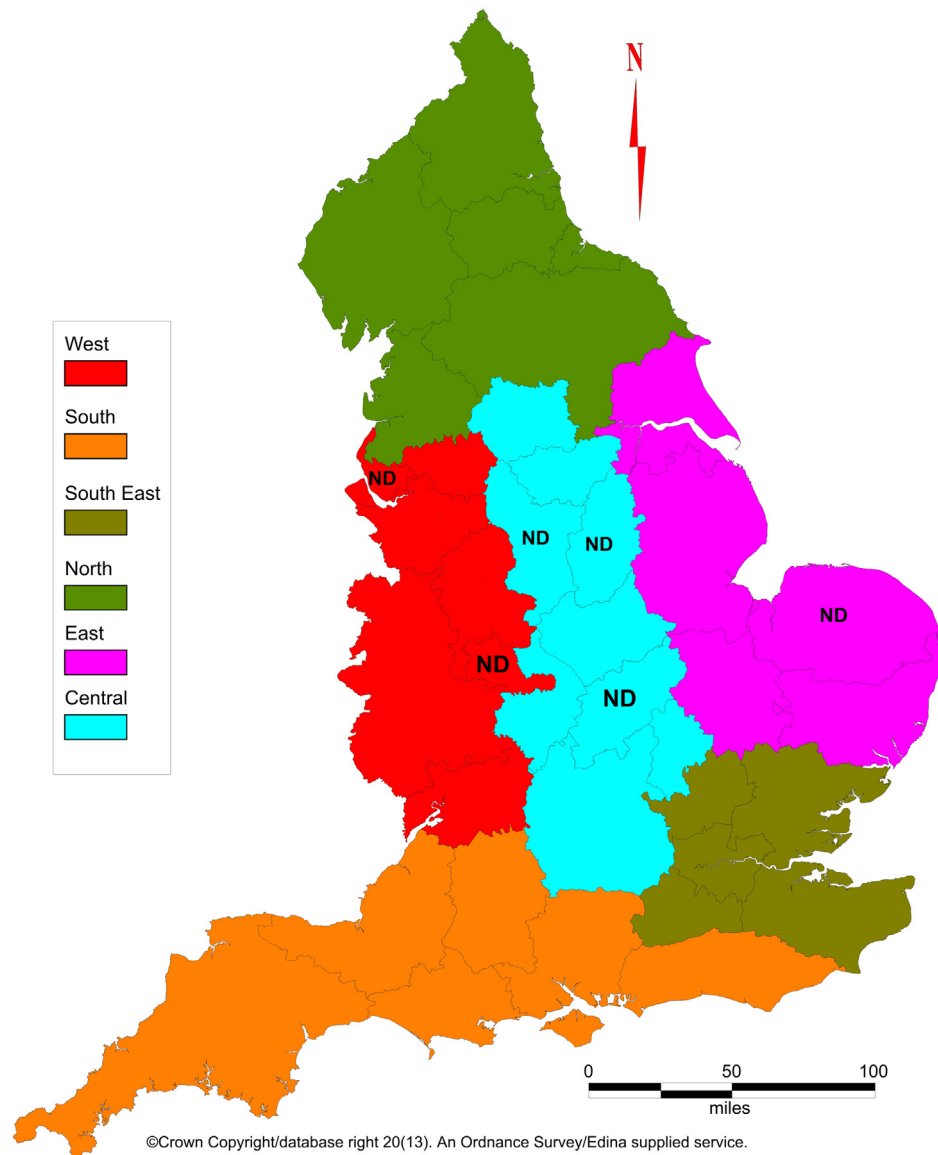


Fig. 2. Analytical Zone Creation: English police Force boundaries.

the U.K. over the potential impact that migration from East European members (A8) may have on their own economic and labour markets. All but these three chose to impose restrictions (to last up to 7 years) in various forms on A8 migrants, effectively restricting migration from East to West, particularly limiting access to labour markets. In the U.K. access to labour markets was unrestricted, albeit A8 migrants were obliged to register under the Home Office Workers Registration Scheme (WRS) if employed for a month or more unless self-employed. By the 1st of May 2011 all such restrictions in the U.K. were lifted.

By the 1st of January 2007 Bulgaria and Romania had also joined (labelled A2 countries) but some 3 months prior the U.K. announced restricting access to the labour market and therefore welfare benefit systems for A2 immigrants.

Researching EU internal migration and determining meso or micro scale population is problematic. Eurostat, the statistical office of the European Union situated in Luxembourg, provides information generally limited to a geographical scale of country or region, and recognising at least partial incompatibility of state data

sets due to differing collection methodologies and geographies. Inter-EU free movement is most visible by the shedding of many border controls, 'official papers' are not a requirement for migrants and circular movement, often from short term or seasonal employment, is a feature of East-West migration that becomes difficult to quantify (Albertinelli et al., 2011; Harris, Moran, & Bryson, 2012). On the first of January 2014 current U.K. labour restrictions imposed upon A2 immigrants are due to be lifted, although this remains a topic high on the political and public agendas at this time.

Methodology and data use

Data were sought from all English Police Forces ($n = 39$) on the nationality of all people *charged* with a criminal offence during 2011. As opposed to arrested or convicted, *charging* an offence falls between the two. *Charging* is the lawful process formally notifying an arrestee of the intention to prosecute. Following an arrest and subsequent investigation case evidence for all but some minor

brought to the attention of the Police (Johnson, 2013). The British Crime Survey (BCS) is a face-to-face victimisation survey across England & Wales but is limited to personal crime. Providing some carefully considered contrast with Police recorded crime figures, not all categories of crime between the two datasets are suitable for comparison. The BCS has consistently shown that the likelihood of reporting crime significantly changes dependant on the type of crime occurring, as does the detection rate by the Police (Chaplin, Flatley, & Smith, 2011). Estimations provided in the 2010/11 survey of the percentage of all crime by crime type that is actually reported to Police are shown in Table 2, noting that of all crime considered by the survey it is estimated that only 28% is reported.

Requests to English Police Forces were made under the Freedom of Information Act 2000 (FOIA) which came into force in 2005 (Great Britain, 2000). This act requires all public authorities to provide a right of access to any information held, albeit subject to exemptions. Requests require two initial stages; establishing if information requested is held and what extraction and provision will incur in terms of staff cost. Forces will freely provide data within relatively low staff costs but if exceeded will require payment prior to collection and data release. Police compliance with the FOIA and general management and governance of this activity has been found to be positive (Cooke & Sturges, 2009; Screene, 2005).

Forces were requested to provide the number of persons charged during 2011 by nationality. Six were unable to provide data, unable to provide data freely or provided data in a format that could not be aligned in a satisfactory manner with other forces (see Fig. 1). Data from the Metropolitan Police Force (outer London) and the City of London Police were combined to create one area known collectively as 'London'.

Greater Manchester Police provided data as requested for 2011 with questionable integrity. Claiming not to have charged any individual of Romanian nationality in 2011 and being the only reporting Police force not to have done so yet a major city by nature, these data were queried but confirmed, in addition stating they had charged 884 Romanian nationals in 2012. A similar situation was apparent regarding the Irish nationality, recording 10 charges against Irish nationals in 2011 but 540 in 2012. For all other nationalities examined Greater Manchester routinely ranked as high in counts of charges, unsurprising considering the size and nature of the city.

There remains some inconsistency within the charge data received. In all cases it was produced as a count of *people* charged with an offence. Based on arrests which led to a charge being made these sub sets do not account for individuals being arrested and charged with multiple offences as the count provided is singular, being a count of one individuals arrest that led to him/her being charged. In a minority of cases a count of offences for which individuals were charged after arrest (which may be multiple) are also supplied, so presenting an overall count. Minimal impact on the overall total counts of crime is anticipated in this analysis, one of the most common being on matters akin to driving offences where an arrestee charged for driving under the influence of alcohol may also be commonly charged for other driving related matters.

For crime data to be spatially contextual a suitable rate needs to be calculated, commonly reflecting the volume of crime per population. Data on population counts from the 2011 U.K. National Census being contemporary to the collected crime data were collated and spatially transformed to Police Force boundaries.

Census population data hinge on respondents being 'usually resident'. Composition of non-UK nationals is likely to be significantly affected by what the Census refers to as 'short-term residents' who were not required to comply: those usually resident outside the UK but living here for between three and twelve

Table 5
Global Morans I values.

	Morans I	Normality Z	Randomisation Z
Italian crime counts	-0.041081	-0.201014	-0.256179
Italian crime rates against force crime	0.026742	1.344247	1.620093
Italian crime rates per force area population	-0.006092	0.596156	0.741745
Portuguese crime counts	-0.037532	-0.120151	-0.150529
Portuguese crime rates per force crime	0.030624	1.432704	1.493068
Portuguese crime rates per force area population	0.006080	0.873500	0.924875
Latvian crime counts	-0.048930	-0.379841	-0.426090
Latvian crime rates per force crime	-0.016535	0.358239	0.383024
Latvian crime rates per force area population	-0.020319	0.272024	0.278693
Lithuanian crime counts	-0.031539	0.016385	0.019940
Lithuanian crime rates per force crime	0.007491	0.905637	0.958014
Lithuanian crime rates per force area population	-0.001830	0.693273	0.748066
Polish crime counts	-0.039379	-0.162253	-0.199061
Polish crime rates per force crime	-0.002056	0.688122	0.685948
Polish crime rates per force area population	-0.014533	0.403839	0.408296
Romanian crime counts	-0.016112	0.367866	0.461747
Romanian crime rates per force crime	0.130821	3.715574 ^a	3.730124 ^a
Romanian crime rates per force area population	0.121575	3.504901 ^a	3.663220 ^a

Theoretical mean = -0.032258.

^a Two tail p-value 0.001.

months. Through the census material 2,442,976 persons gave an EU country (non U.K.) as a country of birth, with 1,114,368 claiming birth in a country achieving accession to the EU since 2001. Also recorded were 187,900 'short term residents', although this sub-set receives no further public output other than gender and age breakdown. Whilst caveats must be considered with census material it provides a publicly available data source including relatively small scale geo-referenced data yet portrays a robust collection methodology on a national scale. In this analysis a national geographic population data set was sought that could provide a standard allowing crime rates per population count to be calculated and utilised.

A8 migrants employed in the UK were required to register with the Worker Registration Scheme (WRS) between 2004 and 2010, thus a total of 1,033,915 migrants from the A8 countries registered (McCullum & Findlay, 2011). WRS recorded details of location and employment type, providing a useful measure with which to investigate distribution of migrants in the workforce, spatially, temporally, and by employment sector (Harris et al., 2012; McCullum et al., 2012). Again there are caveats to be considered; WRS only recorded data on employed A8 migrants until its demise in 2010, the fee charged for registering may have deterred engagement, lack of enforcement, and double counting as removal/ending of employment is not counted are all to be recognised (McCullum & Findlay, 2011; McCullum et al., 2012).

WRS data from 2004 to 2010, linked with National Insurance number statistics (nino), has a focus on A8 migrants and identifies employment sectors of hospitality and catering, agriculture, manufacturing and food processing as the most significant areas of A8 economic activity. Of these it is suggested that 40.3% of the agricultural sector workforce was composed of A8 migrants whilst 10.4% of the Hospitality and Catering workforce came from the same source. Geographically it is noted that;

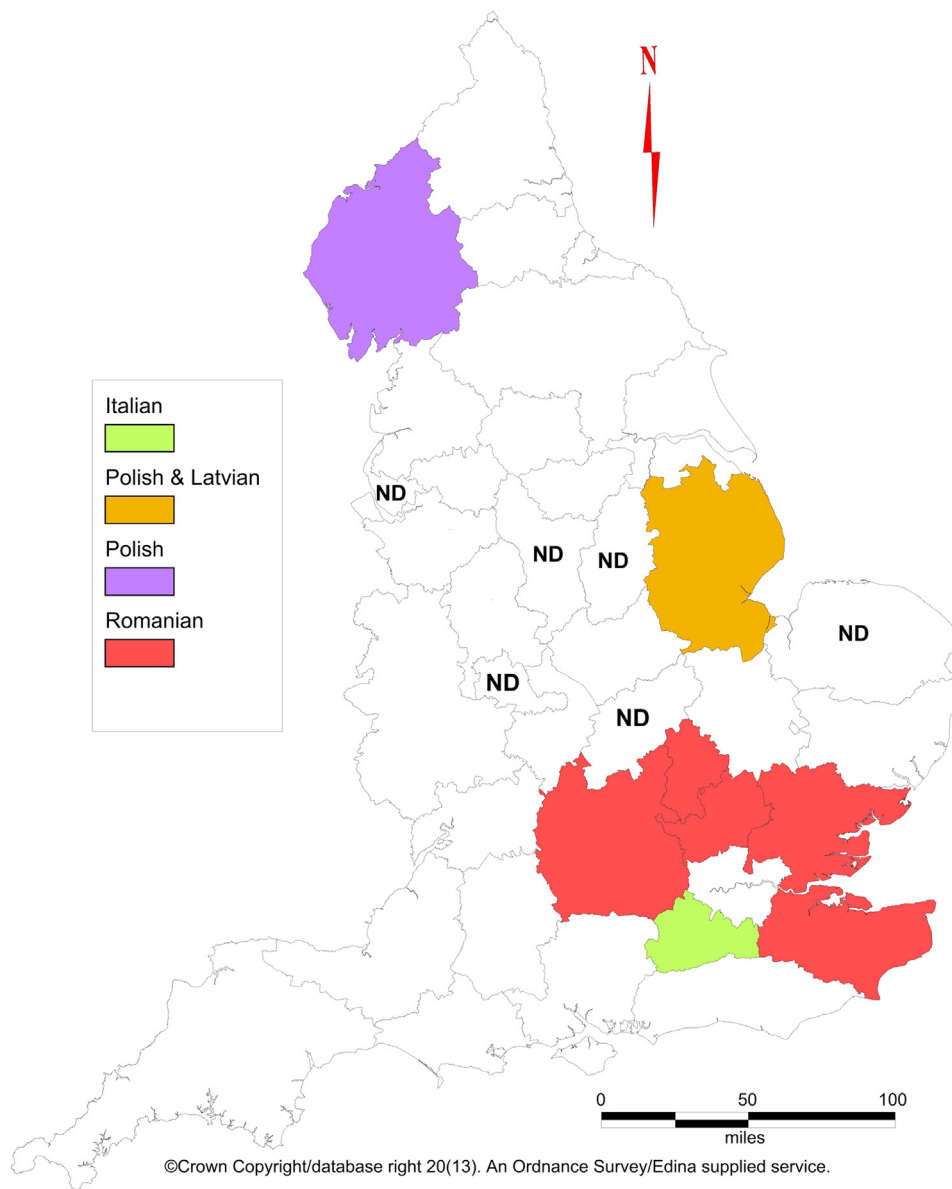


Fig. 3. Police Force areas displaying Local Morans I adjusted Z scores >1.96 with high value intensity measurements.

“The potential importance of A8 migrant labour to the agriculture sectors is very striking and certainly accounts in part for the strong spatial concentration of A8 migrants in certain parts of the country.” (McCollum & Findlay, 2011)

Since A8 accession the UK government has operated a Seasonal Agricultural Workers Scheme (SAWS) and the Food Processing Sectors Based Scheme (SBS). The SAWS scheme allowed fruit & vegetable growers to employ Romanian and Bulgarian migrants as seasonal employees for periods up to 6 months but was capped at an annual figure of 21,250 UK seasonal employees. In September 2013, announcing the closure of the scheme as of January 2014, the Government stated “At present, UK growers recruit about one third of their seasonal workers from the EU2, and about one half from the EU8.” (Great Britain, 2013)

Just 6 months after the A8 Accession a Trades Union Congress study of contact with A8 migrants seeking/in employment noted recruitment within industries and services such as food processing,

hospitality and agriculture. Research found a noticeable geographical trend moving away from the London area where only 23% of contacts were located, a sizeable reduction since 2001. The report further quantifies geographic location by reporting 13% of Eastern European workers in the South East, greater than 40% in rural areas of the Midlands, East Anglia and South West, defining the counties of Lincolnshire, Norfolk, Kent & Sussex as employing the largest numbers. (Clark, 2004).

Stenning et al. (2006) comprehensively study a number of data sources, including the WRS, researching A8 accession and the migrant impact on a smaller geographic scale than had previously been undertaken. Similarly they note the move away from London and urban areas to smaller towns and rural locations, linking with employment in hospitality/catering and agriculture. Thematic mapping of various aspects of migrant locations across England (Population distribution, Female migrants distribution, Agriculture and food workers distribution and distribution throughout other employment sectors) visually presents regions of the country as being high in value.

Table 6
Police Force areas displaying local Morans > 1.96 or < -1.96 .

Force	Zone	Romanian rate per total crime		Romanian rate per total population	
		Intensity	Z score	Intensity	Z score
Bedfordshire	Central	0.228004	2.855676	1.544562	2.474300
Hertfordshire	South East	0.393130	5.860118	2.284819	5.223857
South Yorkshire	Central	0.007049	1.961211	0.052099	1.422113
Thames Valley	Central	0.260248	2.751637	1.625714	2.011854
Kent	South East	0.306764	3.811372	1.805906	3.111977
Essex	South East	0.206132	2.514643	1.188440	1.580709
Mean values of distribution		0.136839	1.019751	0.875929	0.904193

Force	Zone	Polish rate per total crime		Polish rate per total population	
		Intensity	Z score	Intensity	Z score
Surrey	South East	0.114775	-1.772150	0.653485	-2.281222
Lincolnshire	East	0.447754	-2.157382	1.912147	0.298483
Cumbria	North	0.335224	-2.086477	1.820517	-0.777612
Mean values of distribution	0.200096	0.151748	1.300325	0.124163	

Force	Zone	Latvian rate per total population	
		Intensity	Z score
Lincolnshire	East	1.902538	2.055303
Mean values of distribution		0.419674	0.128661

Force	Zone	Italian rate per total crime	
		Intensity	Z score
Surrey	South East	0.037224	2.225663
Mean values of distribution		0.017848	0.316216

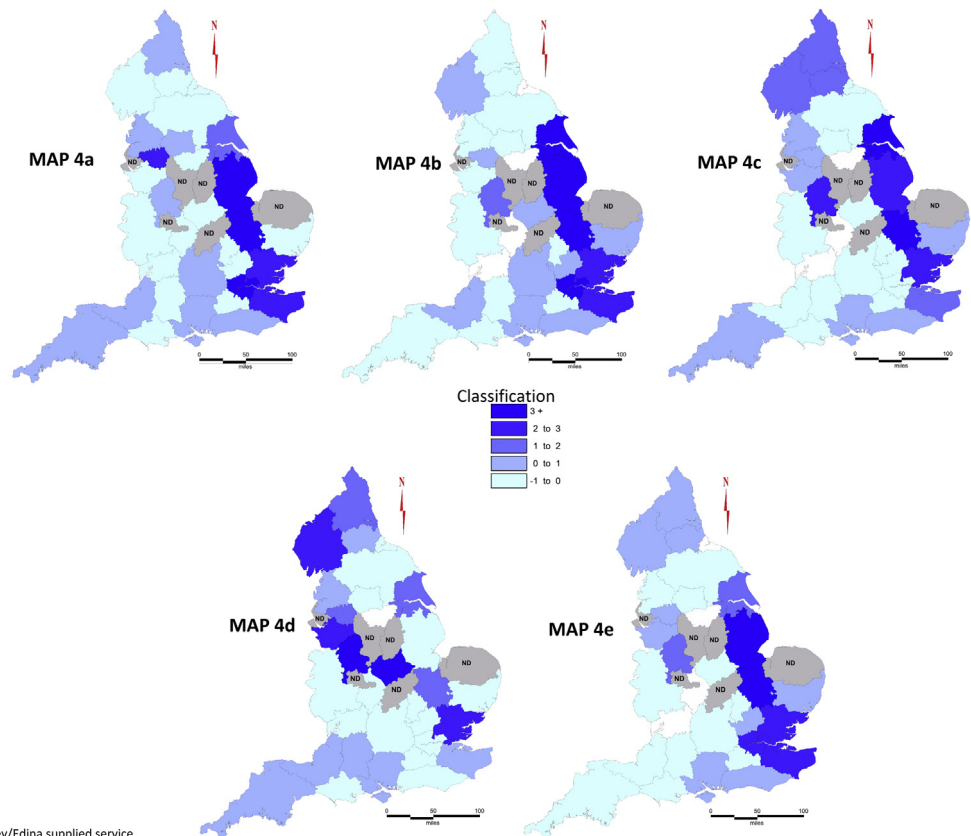
More contemporary research in 2012 evidences A8 migrants displaying greater dispersion across England than all other immigrants, less concentration in London and increased likelihood to be located in the Midlands and North West than the rest of the South West (Longhi & Rokicka, 2012).

Collectively literature has examined EU migrants locale utilising a regional approach to the country which is also pertinent to employment sectors, particularly agriculture and food processing. Examination of thematic maps produced here similarly suggests that Police force areas of England displaying fluctuating levels of prosecution charging activity cluster in regions or 'zones'. In order to quantify such a feature zones were delineated as displayed in Fig. 2.

Within Police force areas providing data, counts of EU nationalities were available for French, German, Irish, Italian, Portuguese and Spanish nationalities as constituents of the original EU15 countries. In relation to A8 accession countries only populations of Polish and Lithuanians are provided at this time. Finally Romanian populations are available as one of the two A2 accessions countries. Additionally 2011 crime figures are publicly available for all Police forces, total crime recorded for the responding Police Forces being 3,106,315, indicating that non-UK EU nationals charged with offences accounted for approximately 1% of all recorded crime.

Counts of prosecution charges received for all non-U.K. EU nationals were prepared and the absolute deviation of counts from the median value of the distribution established per nationality. The Median Absolute Deviation (MAD) provides a robust method to identify outliers within data sets, a method of measurement generally undertaken by establishing values that are 2 or 3 standard deviations (SD) from the mean as opposed to the median, so identifying particularly high or low values and an indication of data diversity. Establishing the MAD provides a method of greater

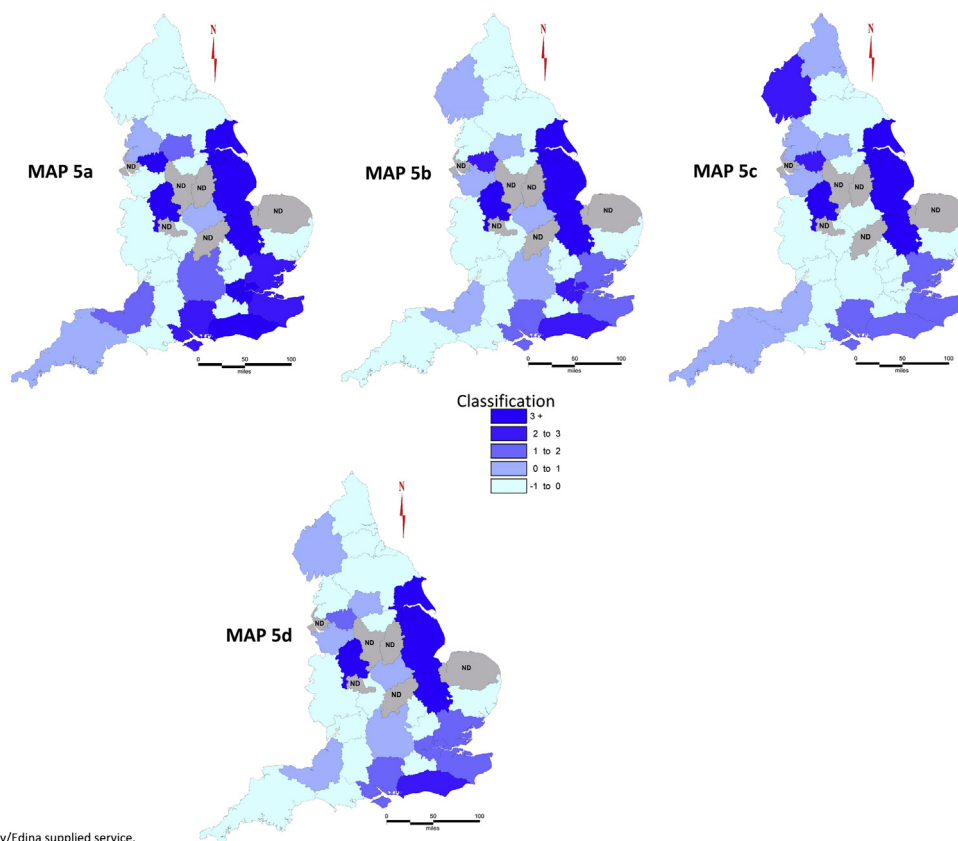
Map 4a - MAD factor: charge counts
Map 4b - MAD factor: charge rate by population
Map 4c - MAD factor: charge rate by EU population
Map 4d - MAD factor: charge rate by Lithuanian population
Map 4e - MAD Factor: charge rate by all force crime



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Fig. 4. Lithuanian nationality ND = No Data. Colour White = MAD factor < -1 .

Map 5a - MAD factor: charge counts
 Map 5b - MAD factor: charge rate by population
 Map 5c - MAD factor: charge rate by EU population
 Map 5d - MAD Factor: charge rate by all force crime



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Fig. 5. Latvian nationality. ND = No Data.

robustness than use of the mean and SD values due to mean values (and consequentially SD) being susceptible to outliers apparent in this data, and far more apparent in the counts of charges at force level. Within such a highly skewed data set use of the median absolute deviation, as opposed to standard deviations from the mean which are reliant on the mean value, can be used to reliably identify counts that are extreme. Scale used of 2 or 3 (or more) as multipliers of the MAD to indicate extreme values are subjective and choice is reliant on the researcher (Leys, Ley, Klein, Bernard, & Licata, 2013). Crime data tend towards routinely skewed distributions and an often encountered issue in Policing practice is identification of impact when considering resource provision, often through use of the mean and SD values.

The concept of the MAD identifying outliers for removal can be reconsidered as providing a high integrity measure of the extremeness, or otherwise, of categories; in this case nationalities or Police force areas. Classification of 'extreme' therefore becomes the decision level that would otherwise be used to reject outliers from data. Here it was considered that values $\geq 2 \times$ the MAD are suitable identifiers of extreme values (Miller, 1991), the purpose being to use the MAD as a robust and simply transferable method identifying categories of note for further or enhanced analysis as opposed to removal or disregard. The MAD is a measure of dispersion, or spread, around the median of the data set and the multiplier, termed the MAD factor in this analysis, offers the advantage of indicating the distance of the value from the decision criterion of ≥ 2 .

The MAD decision criteria was used to evidence selection of nationalities for analysis following which rates of prosecution charges by each responding force area were established as:

1. Rate of charges against total force crime
2. Rate of charges against force area total population
3. Rate of charges against population of non-UK EU nationals per force area
4. Rate of charges against population of the nationality under examination per force area

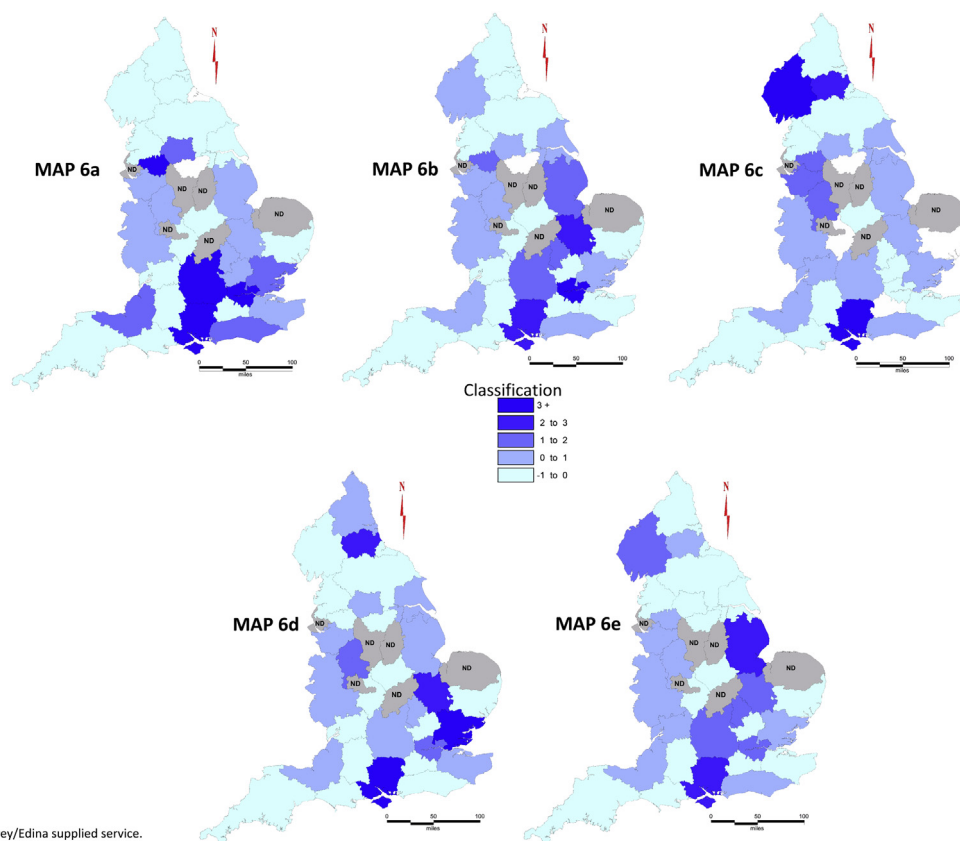
Of these rates and the simple counts of charges per force area MAD factors for each were calculated, identifying at the same decision level those areas displaying extreme values within distributions.

Geographic diversity can be visualised through choropleth mapping utilising the boundaries of English Police Forces. For each EU nationality choropleth maps displaying the geography of crime rates and counts of prosecution charges were compiled.

In each case the MAD across all responding forces was calculated and the choropleth data range displayed as a function of the MAD factor, readily identifying those areas with nationally high or low counts.

Choropleth mapping is a popular methodology and visualisation technique yet a number of geographical concerns are inherent. Pertinent is the ecological Fallacy as it is accepted that crimes non-randomly cluster in space and clearly they will cluster where opportunities exist for them to occur, which in a predominantly rural Police Force area may be spatially significantly limited. Thematic maps presented in this research examine spatial diversity for non-spatially specific patterns of activity and generalised patterns of behaviour on a meso scale. The Modifiable Areal Unit Problem is unavoidable but unlikely to present issues with the methodology adopted.

Map 6a - MAD factor: charge counts
 Map 6b - MAD factor: charge rate by population
 Map 6c - MAD factor: charge rate by EU population
 Map 6d - MAD factor: charge rate by Polish population
 Map 6e - MAD Factor: charge rate by all force crime



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Fig. 6. Polish nationality. ND = No Data. Colour White = MAD factor < -1.

Results

Of the 26 EU nationalities examined 74% of all prosecution charges aligned with A8 and A2 nationalities. Poland, Romania and Lithuania accounted for 59% of all prosecution charges. Table 3 displays prosecution charge counts and associated MAD factors by nationality, identifying nationalities displaying extreme counts and thus extracted for further analysis. Applying the mean plus two standard deviations to this distribution only identifies Romania and Poland as high measures, the mean being significantly affected by the high value outliers and skewed distribution.

In order to quantify such a feature counts of Police Force areas within each pre-delineated zone displaying an MAD factor ≥ 2 were collated in to Table 4, displayed as a proportion of the total number of forces in the respective zones. MAD was calculated for each zone distribution, MAD factors identifying zones displaying extreme measures for each nationality.

Of the five methods utilised to provide a contextual measure rates per nationality population and EU population appear poor, a feature anticipated due to minimal census counts disregarding short term residents other than at the macro level. Counts for Lithuanian's, Latvian's and Romanian's are very low, being in the low hundreds in some force areas whilst those of Polish, Portuguese and Italian's becomes far higher, responding to nationalities that have had far longer histories of UK links.

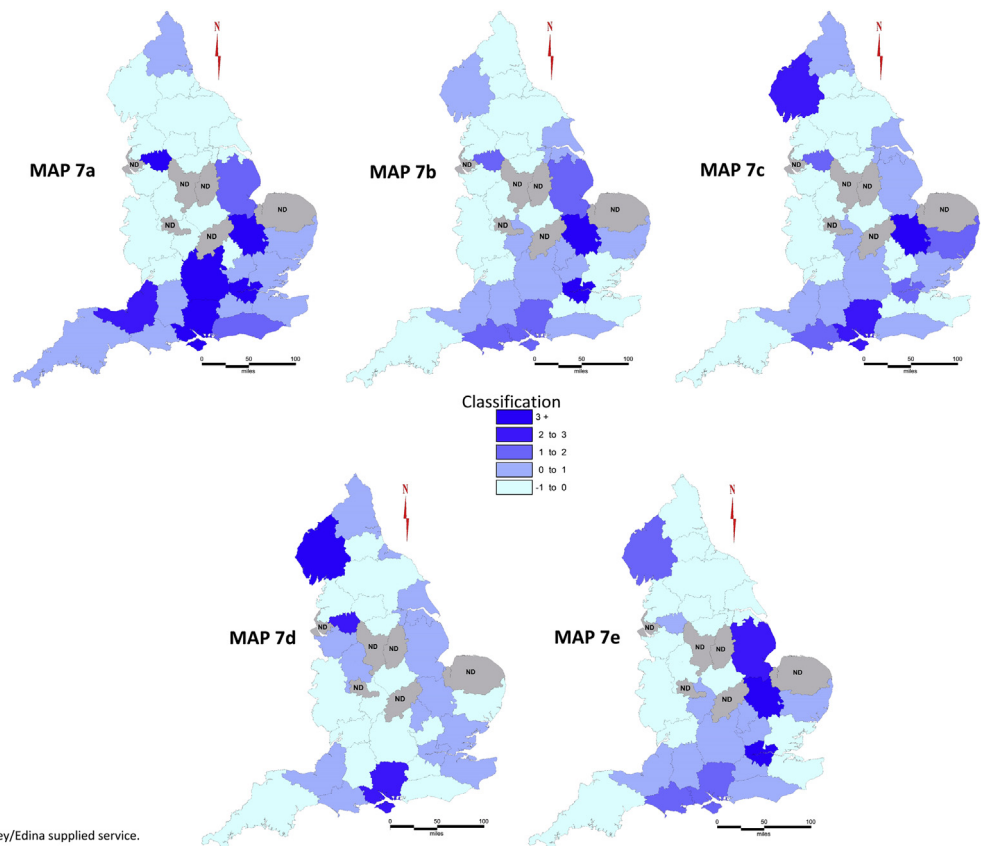
Measures of spatial autocorrelation were employed for the counts of charges by nationality, rates of migrant charges per nationality by force area population and lastly by force area total 2011 crime. The Morans *I* statistic provides a global value accounting for spatial diversity of such crime across the country of England, whilst

a Local Morans *I* provides a measure for each Police Force area indicating its similarity or dissimilarity with neighbours. For each Police Force polygon the various counts and rates were associated with centroids, so aligning each with an attribute for calculation of Morans *I* and Local Morans *I*. Table 5 reports the result of Morans *I* tests, however Police forces which failed to supply data were excluded from this global analysis resulting in a spatially random (expected) Morans *I* value of -0.032258 , often referred to as the theoretical mean. Values greater than the theoretical mean indicate a positive spatial autocorrelation (clustering), whilst an inverse result indicates negative spatial autocorrelation. Significance testing is carried out with reference to a standard deviation measure of the sample but two assumptions are available. First that the standardized variable has a sampling distribution following a normal distribution (the *normality* assumption) and second that each observed value could have occurred anywhere and so the location of those values is unrelated (the *randomisation* assumption) (Levine, 2004). Z scores for each assumption are reported in Table 5.

Positive spatial autocorrelation is exhibited by all but Italian, Latvian and Polish crime counts, however, it is only the Z values for Romanian rates per force crime and rates per population which can be considered statistically significant, reporting a *p*-value of 0.001, thus allowing the null hypothesis that no spatial autocorrelation exists in Romanian data to be rejected.

Local Morans *I* provides a valuable indication of neighbouring similarity or dissimilarity. A positive value indicates that a Police Force area has neighbouring areas with similarly high or low attribute values; the Force area is a part of a cluster albeit reference must be made to the observed value (count or rate) to

Map 7a - MAD factor: charge counts
 Map 7b - MAD factor: charge rate by population
 Map 7c - MAD factor: charge rate by EU population
 Map 7d - MAD factor: charge rate by Portuguese population
 Map 7e - MAD Factor: charge rate by all force crime



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Fig. 7. Portuguese nationality. ND = No Data.

identify if this is a 'hot' or 'cold' spot. Alternatively a negative value indicates neighbouring Force areas with dissimilar values, suggesting that it is an outlier. These values are, however, only considered significant on considering corresponding standardised Z scores (Levine, 2004).

Local Morans *I* was calculated for each Force area providing data using attributes as applied to Global Morans *I* and a standardised Z score obtained. For each nationality high negative Z scores less than -3 are apparent for London counts of crime, accentuating the outlier status of London due to extreme counts of charges. High values outside of London were limited in number and only in the case of Romanians were values $>2 \times 1.96$ seen.

Charges against Romanian migrants display positive 'hot' clustering with regard to rates against the total crime for force areas in a zone best described as the South East expanded upon from the regions boundaries in this research. Outside of this 'zone' there are no high Z scores for Romanians appertaining to 'Hot' areas of high values. South Yorkshire displays a positive Z score but with low intensity indicating clustering as a 'Cold' spot.

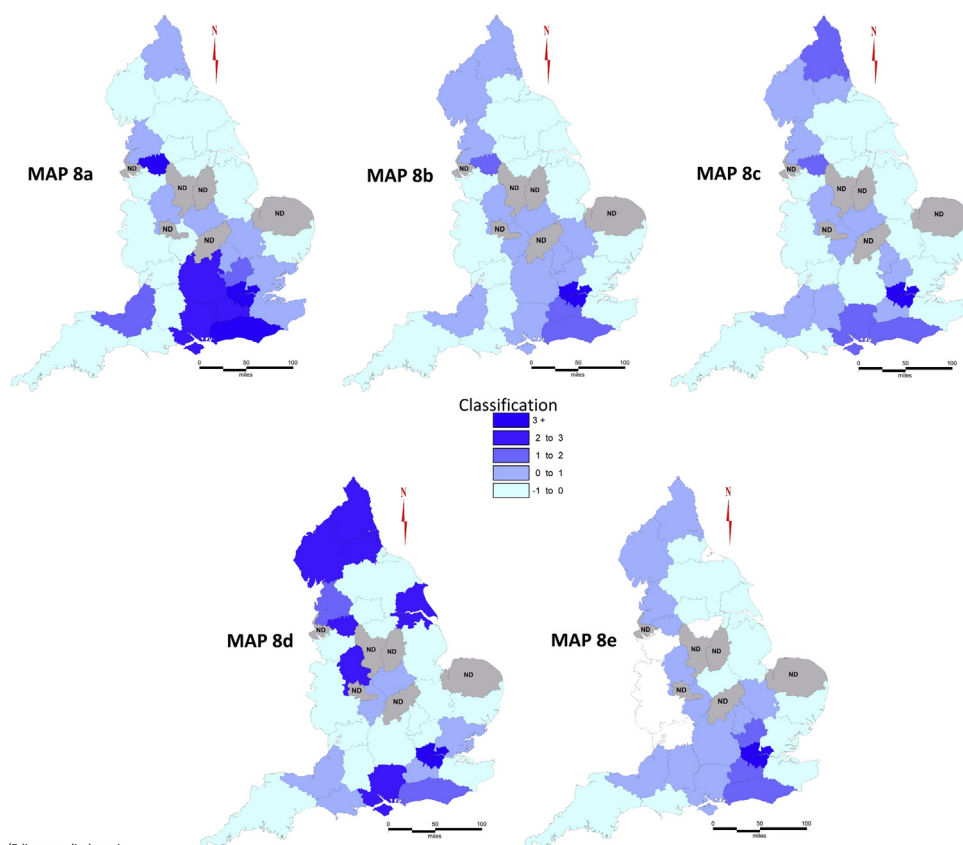
Polish and Latvian's both display 'Hot' activity in Lincolnshire, however for Polish nationalities a negative Z score is obtained indicating that Lincolnshire is an outlier of Polish activity, whereas the Latvian Z score is clearly indicating 'Hot' clustering in this East zone Police Force area. Additionally for Poles Cumbria (North) is a high value outlier whilst Surrey (South East) is one of low value. Italian nationality charges as a rate per total force area crime display one high positive Z score in Surry. Fig. 3 maps the 'Hot' areas identified through Local Morans *I* examination where Z scores are >1.96 , Table 6 reports values displaying Z values >1.96 or <-1.96 with corresponding area, type and intensity of observation, the

zone within which the area is located and mean values of relevant total distributions as an indicator of intensity high or low status.

Lithuanian and Latvian Nationality maps (Figs. 4 and 5, respectively) consistently highlight the Eastern zone as containing force areas displaying MAD factors in excess of 2, with the exception of the rate of charges per Lithuanian population. The spatial distribution of Lithuanian's and Latvian's committing crime to a comparatively high volume is clearly focused throughout the East and parts of the South East. In the South East there is inconsistency between the two nationalities; Lithuanian's featuring to a greater degree in London and especially Sussex whilst Latvian focus remains on Essex, Kent and London. Distribution is distinctive from other nationalities and may be created by land use in the East being agribusiness related and potentially utilising high numbers of seasonal workers and so relatively high populations, albeit with temporal seasonal attributes. McCollum et al. (2012) report on Spatial, sectoral and temporal trends of A8 migrant labour noting an influx to particular labour market sectors such as agriculture and service industries. Their analysis suggests that whilst agriculture employs only about 1% of the population one quarter of those employees in 2011 could have been from A8 countries. Additionally they conclude that regions such as the East attracted a high numbers of WRS applicants. It is only Latvians who display extreme values in Western zone force areas as a rate per total population or per total force crime although both nationalities feature in the area of Staffordshire together with others. Greater Manchester is clearly a city of attraction but data integrity in this location is questionable.

Conversely Polish nationality maps (Fig. 6) display a far more general dispersal across the country with Hampshire on the South coast being a consistent force with high MAD factors. There is little

Map 8a - MAD factor: charge counts
 Map 8b - MAD factor: charge rate by population
 Map 8c - MAD factor: charge rate by EU population
 Map 8d - MAD factor: charge rate by Italian population
 Map 8e - MAD Factor: charge rate by all force crime



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Fig. 8. Italian nationality. ND = No Data. Colour White = MAD factor < -1.

evidence beyond this feature of a spatial concentration of activity. Cumbria in the North West has a MAD factor of 3.9 when measuring a per EU population rate, however the Polish population rate is recorded as 49.5% of the non – UK EU population in Cumbria. The area includes the renowned Lake District, a significant seasonal attractor for the hotel/catering/service trade and appears as an almost 'stand alone' location for most nationalities examined.

Portuguese nationality maps (Fig. 7) suggest similar general spatial diversity but drawn to the South and East. High MAD factors routinely appear in Cambridgeshire and in terms of EU or nationality population also in Cumbria although actual counts are extremely low and of limited value. Limited repetitive patterns are identified other than a minimal count distribution ranging from 0 to 100 across the country, although most force areas count less than 50. London records 944 charges and is unquestionably the centre of activity.

Counts of prosecution charges against Italian's (Fig. 8) identify London and adjacent force areas in the South as high in volume. No other rates used corroborate this impact, high values being limited to London except on consideration of the rate per Italian population, which is in the low hundreds for many force areas displaying a high rate. Italian's charged in London amounted to 1514, the next highest area being Greater Manchester at 50 and all other areas ranging from 0 to 35 therefore displaying no spatial diversity outside of London.

Romanian's display an immigration focus in the South East with some transference of a limited nature to other areas (Fig. 9). Nationality maps suggest Kent in the South West corner of the country being the one force area with a consistently high MAD factor whilst no areas display high counts as a rate per total crimes, the only nationality to display this feature.

Examination of zones establishes MAD factors aligned to each for all rates and counts used (Table 7). A consistent issue appertains to the South East and East which is visually apparent from the choropleth maps, the East being influenced by Latvian and Lithuanian offenders. Values for the rate of charges per nationality populations and EU populations differ somewhat, confirming the anticipated lower integrity of census data for EU and nationality population figures.

Rates of prosecution charges calculated against total recorded crime for Police Forces are consistently low, none breaching 0.4% of total crime for any force. Data drawn from the BCS (Chaplin et al., 2011) indicate generally low detection rates for acquisitive crime, offences against vehicles being lowest at 11% with offences of violence greater at 44%. Whilst significantly high rates are recorded for 'Other Offences' and Drug Offences, such matters primarily being offences discovered through investigation and not recorded until Police action is taken.

Discussion

Research questions to examine the overall impact of the media apparent immigrant-crime nexus were not a requirement for the overall project this research stems from. Analysis undertaken does confirm other reported work, that besides media attention there is little evidence of A8 or A2 migrations becoming a 'crime wave' in England.

Research requirements sought to geographically explore crime committed in England by EU nationals using publicly available data and consider the impact of that crime on England's Policing, specifically the use of certain aspects of information and intelligence

Map 9a - MAD factor: charge counts
 Map 9b - MAD factor: charge rate by population
 Map 9c - MAD factor: charge rate by EU population
 Map 9d - MAD factor: charge rate by Romanian population
 Map 9e - MAD Factor: charge rate by all force crime

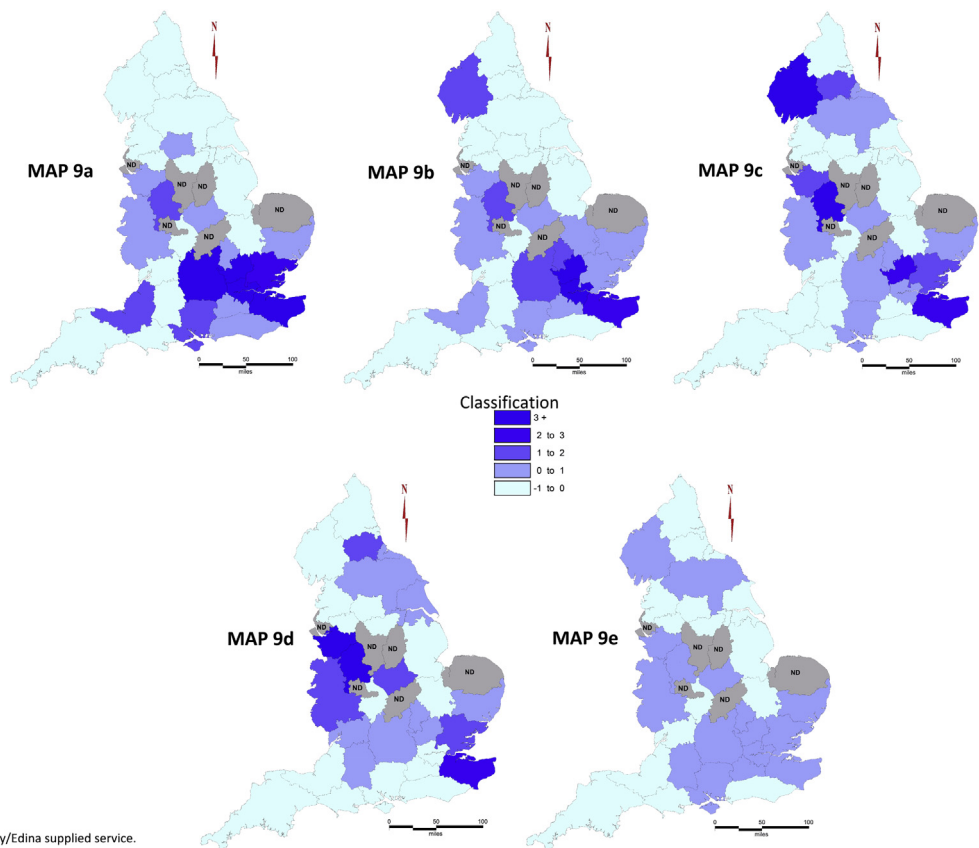


Fig. 9. Romanian nationality. ND = No Data. Colour White = MAD factor < -1.

exchange at inter-state levels. Anticipated spatial features were a clustering of crime in the south east with dissemination to the south, west and east to focus on zones with particular labour opportunities, venturing to the far north of the country being more limited. Analysis confirms that the use of rates of crime per EU or individual nationality population as a measure is poor due to the anticipated nature of the data collection. Rates per total population, less affected by internal measurement issues, provide an improved contextual outlook.

Analysis and Geographic Information System (GIS) mapping of available data confirms anticipated patterns of criminal activity regarding A8 and A2 migrants, but notes a wider potential dispersion of Polish and other EU nationalities which have a longer time line of movement into the UK. Particularly apparent is distinctly low criminal activity in a central zone of England with high activity in selected force areas dependent on the zone in which they exist and the nationality of the immigrants in question.

Table 7
 MAD factors per zone.

	Rate per EU population	Rate per nationality population	Rate per total force crime	Rate per total population	Rate per charge counts
West	0.4	1.3	-0.2	0.0	0.1
South East	-0.4	0.2	1.6	2.7 ^a	2.1 ^a
East	2.1 ^a	-0.4	3.8 ^a	2.7 ^a	0.8
Central	-1.8	-1.0	-0.7	-0.7	-0.5
South	-0.9	-0.2	0.2	0.0	-0.1
North	0.4	1.0	-0.7	-0.7	-1.4

^a MAD factor ≥ 2.

Such geographic dispersion, such as that displayed by Lithuanian's, Romanians and Latvian's impacts a limited number of generally clustered Police Forces, and corroborates comments by Wilson (2009) that it may be pertinent for such forces, either through joint or singular activity, to develop effective communication with Police agencies in relevant migratory source countries. Such joint working, already used in the London area with Romanian Police, may utilise an exchange of useful information and intelligence on individuals together with consideration of forensic data and intelligence gleaned from crime scenes and offenders. In 2011 it was reported that formal Police requests for conviction information yielded a 30% match of EU nationals subject to criminal proceedings in the UK having previous convictions in their home countries, a process which does have formal channels of notification but is generally limited to post charge/conviction action (ACPO Criminal Records Office, 2011).

Spatial patterns of nationalities display degrees of overlap and heterogeneity however, given the non-random spatial dispersion of crime it is proposed that identified forces may benefit from more detailed micro scale analysis. Crime has an environmental factor, spatial elements that are inherent in commission, relevant to the location of commission (Chainey & Ratcliffe, 2005) and unlikely to be observable at the meso scale such as this research undertakes. A reflection of the Ecological Fallacy and often subject to the Modifiable Areal Unit Problem (MAUP) it should be expected that micro scale examination of data will uncover further clustering with no discernible 'transnational nature' being apparent. Often linked to opportunity through a routine activity theory explanation (Cohen & Felson, 1979) and the generally localised spatial behaviour of offenders (Brantingham & Brantingham, 1981, 1984; Chainey &

Ratcliffe, 2005; Johnson, 2013) analytical work of this localised nature is inherent in all English Police Forces at a tactical level (a requirement effectively driven by their national intelligence management process). Use at a strategic level and within strategic priority setting is however more limited. Such work would glean a greater knowledge base of the location and nature of offending; however contemporary English Police Force analytical tactical requirements (in general) risk potentially divisive activity if environmental criminology philosophy is strictly adhered to. Without further information gathering acknowledging and understanding the nature and needs of migrant communities within Police areas of responsibility to additionally inform intelligence analysis, the potential exists for any 'transnational' nature of offending on a local scale to remain hidden. Such work may also inform knowledge upon which requirements for inter-state communication can be built for positive investigatory, community safety and crime prevention benefits. It is suggested that there is need to identify and consider seasonal trends that may be apparent as well as pro-active Police force activity influencing the level of offences leading to prosecution charges, as there are potential examples within the received data.

Conclusion

This paper investigates spatial dispersion of crime committed by EU migrants on a macro (country) level seeking meso (Police Force area) scale indicators of requirement for potential inter-state communication. Previous academic, political and business related work has firmly established the agricultural and service provision markets as part drivers for the geographic location of A8 and A2 migrant domicile destinations, and research presented here firmly links criminal activity with those same geographic zones. Identification of benefits to relevant Police forces in England from such inter-state working now lie in developing further analysis at a Police force scale utilising generally non-publicly available database sources.

Types of crime committed by charged EU nationals was requested but proved difficult to obtain in formats that became comparable or were suitably detailed. Generally it was found that non-UK EU nationals were charged with predominantly low level offending such as minor thefts and a very limited number of offences of violent behaviour. Whilst further data is required for empirical robustness and suitable levels of integrity, data received to date enhances the concept of 'transnationalisation' of localised criminal activity, localised in terms of offender decision making, Police reaction/investigatory methods and community impact. This conceptual development calls for further research in human geography sub disciplines to consider impact on a wider scale, beyond that of impacting on an offender or investigation.

Acknowledgements



With the financial support of the Prevention of and Fight against Crime Programme European Commission – Directorate-General Home Affairs. The views expressed in this publication are solely those of the author and do not indicate agreement or acceptance by the research fund provider, the European Commission is not

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Records Management Journal

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Article information:

To cite this document:

Derek Johnson, Edward Hampson, (2015) "Utilising the UK Freedom of Information Act 2000 for crime record data: Indications of the strength of records management in day to day police business", Records Management Journal, Vol. 25 Issue: 3, pp.248-268, <https://doi.org/10.1108/RMJ-05-2015-0020>

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Utilising the UK Freedom of Information Act 2000 for crime record data

Indications of the strength of records management in day to day police business

Received 15 May 2015
Revised 10 September 2015
Accepted 18 September 2015

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Abstract

Purpose – This research paper aims to consider the use of the UK Freedom of Information Act 2000 (FOIA) as a resource providing access to otherwise unavailable data from the UK Police forces. Not seeking to be a critical examination of Police practice, it offers insight to many aspects of records management appertaining to the police service provision of recorded crime. Authors consider whether record management is sufficiently integrated into police practice, given the transparency called for by the FOIA, contemporary societal needs and the growing requirement to provide high value evidence led assessments of activity both within and external to the service.

Design/methodology/approach – FOIA was utilised to collect data from all police forces in England and Wales through multiple requests. Carried out over a 15-month period, three requests were collated and responses compared, allowing for examination of compliance with the legislation and reflections on the manner in which records were sought and ultimately disseminated.

Findings – Generally, responding to FOIA requests was well managed by English Police Forces. Methods of data management and collection practice were exposed which the authors suggest pose questions on the strength of records management consideration that may be worthy of further work. Configuration management of records is highlighted as an essential function given the disparity of data releases experienced.

Research limitations/implications – This research highlights the FOIA as a valuable methodological tool for academic researchers, but it is limited in respect of seeking firm contextual explanation of the Police internal procedures to answer requests. By making common requests over a long time period to the same Police forces, it provides a clear study of FOIA processes and raises potentially significant questions for records management consideration.

The financial support was provided by the Prevention of and Fight against Crime Programme European Commission & Directorate-General Home Affairs. The views expressed in this publication are solely those of the authors and do not indicate agreement or acceptance by the research fund provider or by Essex Police, England; the European Commission is not responsible for any use that may be made of the information contained therein.

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Practical implications – Findings provide advice on developing use of the FOIA as an academic methodological resource and reflect on the findings impact on internal police use of data and information records.

Originality/value – This paper allows for reflection on the importance of high-value records management in the day-to-day business of the police service and questions whether such knowledge areas are suitably considered. Covering an area of little previous academic enquiry, the research informs criminal justice practitioners of areas for potential further discussion and academic researchers on the validity of using the FOIA as a valuable information source.

Keywords Databases, United Kingdom, Freedom of information, Data retrieval

Paper type Research paper

Introduction

Within the UK, constructive recording of incidents of crime, their investigation and outcomes is a default responsibility firmly placed upon Police Forces, being integral to the day-to-day business activity of policing. Historically, management of those crime records has facilitated policing activity ranging from general police patrolling to investigation, high-level management information and, ultimately, the reporting of statistics to central government. Following the first tranche of British Crime Survey (BCS) data in 1982 (the nation's first national social survey of crime victimisation), access to crime records began a slow, very limited/restricted movement toward sharing with external researchers and undergoing in depth analysis.

Crime Prevention appears firmly on the political agenda in 1987, slowly evolving from sole Police responsibility to a shared multi-agency responsibility (Moss and Pease, 1999; Liddle and Gelsthorpe, 1994) requiring dissemination of Police records to non-police agencies by 1998. This new focus on multi-agency crime prevention coupled with other changes in policing methods developed the use of Police-held crime information from predominantly administrative to significantly operational. Internal analytical requirements became necessary to support investigatory, preventative, management and day-to-day policing activity.

In 1996, the Criminal Procedure and Investigations Act effectively placed a statutory label on the investigatory record. This statutory "label" becomes applied to material within an investigation that must be disclosed to the defence in any subsequent judicial proceedings, so requiring recording and archiving to allow access should a prosecution case be developed, failure to suitably do so creating potential legal difficulties.

By 2000, changes in Policing methodologies were underway on a national basis with the introduction of the National Intelligence Model (NIM) which, by 2004, had to be in place and operational within all Police forces in England, Wales and Northern Ireland (Ratcliffe, 2012). The NIM is essentially a business model with focus on prioritisation of tasks and a cyclical process to manage policing. It rapidly enhanced the use of intelligence and information and created a multitude of analytical requirements. Systematic but fundamental analysis sought defined management products sourced primarily from internal records with the crime and investigation record as core to enhance and benchmark day-to-day policing tasks and manage the direction of investigative and general policing activities. Policing by Intelligence continues to this day, resulting in each UK Police force recruiting to and maintaining analytical structures in order to maintain the intelligence-led policing methodology demanded. Sourcing the crime and investigatory record as a core data-rich source for (ultimately)

predictive crime analysis such as crime hotspot mapping has firmly switched its use to day-to-day internal Policing business. Therefore, as a functional item, the crime record has changed face rapidly and repeatedly since the turn of the century from being a generally administrative feature to a core item of source material for the management and direction of policing activity through the NIM.

In 2005, the Freedom of Information Act 2000 (FOIA) ([Great Britain 2000](#). Freedom of Information Act, 2005) changed that face yet again, as until then, records maintained minimal non-Policing functionality. They were Police-created, Police-held and Police-owned other than through a central government or legal requirement, neither of which openly led to public dissemination of the detailed record or parts thereof. The FOIA was introduced through a recognisable desire to promote transparency and trust in the government and related public service activity. It was considered to be progress in reducing the barriers to data access ([Lee, 2005](#); [Cooke and Sturges, 2009](#); [Fowler *et al.*, 2013](#), [Shepherd *et al.*, 2010](#)) and suddenly made the crime record accessible to all for a host of external activities (in part only given that many variables may contain information subject to restricted access via other legislation such as Data Protection).

Reported research in this paper derives from an ongoing project considering the criminal activities of inter-EU migrants and spatial diversity, requiring a baseline position to be established concerning the volume of such crime committed in England with spatial reference. In the UK, information relating to the nationality of offenders is not stored centrally and existing data within the criminal court system fails to provide suitable geo-references. Project requirement dictated the need for data from Police Forces in England and Wales ($n = 43$) on the nationality of all people charged with a criminal offence during 2011, 2012 and 2013 together with type of criminal offence committed and gender, utilising the police force areas as a core geo-reference.

Policing presents a unique case to consider with regard to the FOIA. During the preparation period between 2000 and the final enactment in January 2005, the Association of Chief Police Officers of England, Wales & Northern Ireland[1] (ACPO), undertook the role of developing preparedness for Police forces ([Great Britain, House of Commons Constitutional Affairs Committee, 2004](#)). Following the 2005 enactment, they coordinated the creation of required publication schemes, developing and continuing to maintain a central reference unit and guidance to all forces. Understandably, there is a highly significant commonality between all forces in the information they produce through common aims and requirements, an advantage ACPO held onto in their role of developing policies on behalf of the Police Service as a whole. They now produce for all forces a 154-page comprehensive manual of guidance on the operation of the FOIA ([Association of Chief Police Officers, 2011](#)).

We consider the use of the FOIA and offer an insight in to the intricacies of Police-held crime data, the need to consider data corroboration and the use of the FOIA as a research tool for academic enquiry. Given the expected levels of commonality in recording requirements between forces (although systems and processes were expected to differ) and national guidelines, high levels of consistent approaches to FOIA requests and data supply were anticipated. Results indicated potentially significant data uncertainty apparent within data releases, and we discuss the implications of this for development of academic research methodologies. Internal Police data use and analysis is also reflected upon, identifying configuration management as a factor to be considered and possibly enhanced in the development of internal analytical strategic

products. Configuration management here is the management of changes, i.e. version control. It would be helpful if analysts not only knew which version they were working on but also what version a database reaches in a specified period; for example, working on Version 2 when the database in question tends to reach Version 30 every 12 months. This information would indicate the degree of potential uncertainty in the data and therefore the credibility of their results. It would also pose management questions.

Proceeding with two short sub-sections discussing data need and the FOIA, our methodology used in this research for the extraction of data using the FOIA is then given. Results are described and summarised providing an understanding of data discrepancies experienced and the responses of Police Forces upon seeking explanation. Discussion follows on the impact of the study's findings, and the paper concludes with reflection and development of a guide to FOIA use for academic researchers.

Data need

Secondary data is often a core requirement for social research, but can be problematic to obtain; however, the value of the FOIA as a useful and effective tool when seeking secondary-source material is recognised (Murray, 2013; Lee, 2005). Openly available data sources exist which can be interrogated for analysis (Brown, 2009) and generally hold data collected by others for various purposes (Thomas, 1996). These open-source information sets make the use of secondary, government-collected data valuable with its benefits of high quality and scale which are otherwise problematic (Smith, 2008). Equally, such released information may reveal the existence of material inaccessible at such an open-access level and the FOIA adds value to research on the work of any public agency (Walby and Larsen, 2012; Lee, 2005; Savage and Hyde, 2012).

Brown (2009) acknowledges FOIA use as being of particular interest to those studying criminal justice or criminology, providing perspectives and interest beyond studies of the public agencies themselves and firmly linking with (but not limited to) social sciences and human geography. Fowler *et al.* (2013) undertook a systematic review of FOIA use in healthcare research. They note the limited number of publications detailing FOIA use in that field but acknowledge the potentially valuable resource that it has become. Lee (2005) presented work considering the FOIA and possible uses for the social sciences. Prepared in 2004, this pre-emptive discussion of potential research use in the UK suggested the act had potential to extend the range of information resources available and be viable and positive.

Research suggests that the most common users are journalists and individuals (Shepherd *et al.*, 2009; Frontier Economics, 2006), and it is not being fully exploited for academic research, although the actual extent of its use by academics is unclear (Brown, 2009; Murray, 2013, Fowler *et al.*, 2013). Potential as a tool to obtain information is high; however, in practice, utilisation is not necessarily straightforward. The Constitution Unit of University College London publish a guide intended to advise academic researchers (Bourke *et al.*, 2012), and this we would recommend to all, noting also our final concluding comments of this paper.

In general terms, data concerning offenders and nationality to the level required for the core project are not openly available or published but were known to exist within English police force data collection methodologies. Gaining access to the number of persons charged with a criminal offence, their nationality and the type of offence committed were therefore undertaken through formal FOIA requests to all forces.

From the internal policing perspective, data are unsurprisingly core to the policing function. Since the introduction of the NIM, data and information analysis has leapt to the fore compared with just a few years prior. All forces now employ analysts and researchers and have developed bespoke analytical units to service the operationalisation of the NIM. Significant commonality across forces exists within such structures, but, generally, they can be considered bespoke in terms of individual Police Force structures and policing requirements. Data and, in this case, access and understanding of the crime investigatory record have become fundamental to internal crime analysis activity serving NIM products and informing policing strategies. In somewhat simplified terms, analytical functions within analysis units are dichotomous, captured under the two umbrellas of tactical and strategic activity to produce aptly named “intelligence products” to inform decision-making. An emphasis is maintained throughout that such analytical products should seek to step beyond reporting and in to interpretation through inference development. At the tactical level dealing with day-to-day, week-to-week business, analysts are likely to have clear understanding of data complexity and volume, in the main dealing with relatively localised contemporary issues and witnessing changes on a daily basis. Strategically data need is almost diametrically opposed, seeking instead data at the higher management and geographic level to inform target setting and resource prioritisation through informed analysis and interpretation of data from much longer time periods, typically annual or bi-annual aggregated data sets such as that sought for the research reported. Internally, therefore, the need for accuracy and integrity of data is paramount. Analytical output informs policing decisions at all levels within Police forces themselves but also across the shared policing responsibilities of formal partnership activity. Poor management of records, archiving and configuration management has the potential to impact significantly on an ever widening range of activity through reduction in analytical accuracy.

Freedom of Information Act 2000

Access to information is a human right (United Nations, 1948), with importance of that access right highlighted by the United Nations (UN) since its inception in 1946 (Mendel, 2000). More recently, the UN Secretary General has emphasised the need for a right to information, and for governments to be transparent in calls for the historic culture of government secrecy to be addressed (United Nations, 2010).

Legislation providing access to information and data held by governments and public agencies is not an English phenomenon. It is recorded by Banisar (2006) as being apparent in 70 countries worldwide whilst in progression with 50 others. Hazell and Worthy (2010) extend this to 90 countries with freedom of information structures apparent in 2010. The UK was one of the last countries of the developed world to adopt such access legislation (McClellan, 2010) beginning with a 1997 Government white paper acknowledgement of an “entrenched culture of secrecy” (Great Britain, Parliament, House of Commons, 1997, paragraph 7.2) and emphasising a desire to shift from the secrecy culture (Stead, 2008) towards one of openness. The resulting Freedom of Information Act 2000 (entering in to force in 2005) is shown as part of a government agenda to “increase openness, transparency, trust and accountability in the public sector” (Shepherd *et al.*, 2010). It provides a formalised process through which access to information can be requested. There exists a clear government drive for the release of such information to improve public trust in national justice agencies (Smith, 2006; Great

Britain, Home Office, 2010; Chainey and Thompson, 2012). With almost routine journalistic reference to the FOIA, its existence and ability to supply information from public bodies has become well known.

The FOIA 2000 seeks to freely provide public access to information that is held by all public authorities in England, Wales and Northern Ireland by obliging those authorities to publish certain information concerning their activities and providing members of the public with the right to request any information. Positions created under the Act strongly favour disclosure of information unless justification for refusal can be provided to the requester under one (or more) of the exemption conditions within the legislation. All public authorities are bound by a publication scheme laying down a minimum set of information they must publish. It has become general practice to openly publish FOIA requests received via authority Web pages, together with the information disclosed or the decision not to disclose.

The request must “describe the information” that is desired [FOIA Section 8 (1c)], which, whilst important to respond properly, requires the applicant to know how to ask for the information they want (Brooke, 2006), potentially putting the applicant at disadvantage if unfamiliar with the manner in which information is stored (Wadham *et al.*, 2011).

If the information requested is held by the authority and deemed disclosable, dissemination is required unless the estimated cost of complying would exceed the appropriate limit [FOIA, Section 12(1)]. Free disclosure can be refused if collation of the requested information exceeds the (current) limit of £450 in terms of resource use (staff time) (£600 for requests to central government, Parliament or armed forces). Requesters will be notified that the information is held, but it is often acceptable for the information to be disclosed if extra costs are covered by the requester.

Since its enactment, work has been published providing greater detail of the formalities, exemptions and procedures of the FOIA than reported here. The ICO and ACPO produce valuable breakdowns of detail (Information Commissioners Office, 2013; Association of Chief Police Officers, 2011; Lee, 2005; Fowler *et al.*, 2013; Bourke *et al.*, 2012; Shepherd *et al.*, 2009; Birkenshaw, 2010, Hayes, 2009 and others).

Methodology

FOIA requests reported here were made to each of the 43 Police Forces of England and Wales.

Over a 16-month period, three requests were made as indicated in Table I seeking additional information with each request as the project methodology unavoidably developed over time.

These three requests were primarily made as data provision for spatial diversity analysis within the project (Johnson, 2014, 2015; Ludwig, 2015) but also facilitated comparative analysis of Police records explained within Table II. Comparison of Police Force FOIA abilities was not a core remit of the research and remains so but following receipt of disclosures over time an assessment of data uncertainty increased in importance. Comparison of data sets provided one perspective on the potential for error to be apparent and its impact on analytical results whilst corroborative data were also sought from other sources not reported upon here. Anonymity of Police Forces is considered necessary within this paper, emphasising the general records management as opposed to public body study theme of this paper.

Table I.
FOIA requests

Request	Request date	Data requested	Temporal parameter of request
Request 1	April 2013	Counts of individuals charged with a criminal offence by nationality recorded and type of crime	Calendar years 2011 and 2012
Request 2	February 2014	Counts of individuals charged with a criminal offence by nationality recorded and type of crime	Calendar years 2012 and 2013
Request 3	July 2014	Counts of individuals charged with a criminal offence by nationality recorded, specific crime type, age and gender. Data request limited to 8 particular nationalities only	Calendar years 2011 and 2012

Table II.
Comparisons of
FOIA requests

Request	Linked request	Comparative potential
Request 1	Request 3	2011 counts
Request 1	Request 3	2012 counts
Request 1	Request 2	2012 counts
Request 2	Request 3	2012 counts

Post comparison letters were sent to each Police Force detailing discrepancies identified between provided data sets, inviting explanation regarding discrepancies or identification of potentially erroneous data sets. Letters provided an opportunity for forces to explain the various data discrepancies and were not submitted as formal FOIA requests.

Dutton (1991) succinctly states “No branch of science can bear fruit unless its findings can be qualified by the various uncertainties to which the measurement and analysis of its data are subject”. Whilst primarily considering uncertainty within spatial data and analysis, Dutton’s comment remains pertinent. Comparing FOIA requests provided an ability to examine data and analysis integrity whilst exploring wider questions highly pertinent to the overall project.

Within the project, an early decision was made that responses to FOIA requests would not be formally challenged, and unless obviously incorrect data were supplied, the response was exceptionally slow or similar administrative-type issues arose. With no project remit to undertake in depth research or enquiry in the field of FOI the decision not to challenge through formal channels (Police or Information Commissioners Office) was considered unethical within the project parameters and beyond project resource abilities.

Results

The results provided here do so through the lens of information collation activity without reflection on crime and nationality which has been published elsewhere (Johnson, 2014).

Of all outcomes from this work perhaps the most impactful was on researchers time. Following Request 1, the majority responded within regulatory time limits of 20

working days and, ultimately, all forces responded to all requests made. Responses were inconsistent in format and interpretation of the request made, with some providing results by financial year or aggregating 2011 and 2012 data. Seven forces provided crime types with counts of all foreign nationals combined and no delineation by nationality, requiring further submissions to be made. One Force failed to respond for five months.

After the second request, responses were received in a far more timely and acceptable manner and this experience was maintained following the final request in June 2014. Only one force failed to meet regulatory time limits (response received after 41 working days). It became very noticeable that, across all forces, significant improvement had been made in response procedures since the first request in early 2013.

The 2013 request succeeded in directly gaining at least some of the requested information from 39 of the 43 forces in England and Wales.

Three refused disclosure on the grounds of exceeding the cost limit, but others were able to extract the requested information within the permitted “free” time provision, suggesting potential over complexity with the recording systems of these three forces.

Questionably, one northern force applied Section 40 of the FOIA stipulating information is exempt if constituting personal data as defined by the Data Protection Act 1998 ([Great Britain, Data Protection Act, 1998](#)): “data which relates to a living individual who can be identifiable from those data”. The force disclosed total numbers of offenders of each nationality but declined to provide information on nationality and crime types, as to do so would allegedly result in a high level of potential identifiability. The requested information did not seek names, biographic data or data at any geographic scale below that of the entire force area, and it remains unclear how revealing the crime types that different nationalities were charged with at such a geographic scale could lead to identification of individuals.

Differing or poor interpretation of the request also emerged as a significant issue. One southern force rejected disclosure, referring to its previous release and publication via a third-party requester. Examination confirmed that this previous disclosure related to significantly different material leading to a further submission for the correct information which was ultimately disclosed.

Thirty-six forces contacted in 2014 disclosed some results. As previously, one applied Section 40 and disclosed only figures for nationality, not broken down by crime type, due to their judgement that it would constitute personal information.

One force applied Section 30 stating information is exempt if it has been held for the purpose of criminal investigations either currently or in the past. No other force applied this exemption, and this was not applied in relation to the previous request to that same force for that same information but for a different time period, although chronologically similar. Two forces, having refused the previous request due to exceeding the time limit provided the information in full in 2014. One refused the request claiming not to record nationality, although they had disclosed requested nationality information in 2013.

Of those forces disclosing full results including a breakdown of crime types for each nationality, 15 aggregated offences into broad crime-type groupings, whilst others provided specific offences. Generally aggregated results aligned with Home Office crime-type categories which are publicly available; thus, the itemised results could be grouped and compared. Three forces used broader bespoke categories, from which it was not fully clear which offences were included or not included.

Comparative analysis resulted in significant dissimilarity between data sets provided and also Police Force responses. Comparison was possible across the 2011 and 2012 data sets requested to varying degrees, identifying apparent disparity between disclosed data sets (Table III). In total, 21 Police Forces offered explanations; two accepted that incorrect data sets had been disclosed and forwarded replacements.

Of the explanations provided, content analysis readily identified five distinct themes of Database fluidity, Interpretation of requests, Method of data extraction, System change and Incorrect data supply as explanations of disparity through recurrent terminology and common content. Table IV provides examples of textual responses for each theme and theme frequency.

All requests made had related to persons *charged* with an offence. As opposed to arrested or convicted, *charging* an individual with an offence falls between the two, being the lawful process formally notifying an arrestee of the intention to prosecute. At conclusion of an investigation, case evidence for all but some minor offences is referred to a prosecution lawyer and the records assessed to confirm or deny that a formal charge is appropriate and what that criminal offence is. It is a process fundamentally different to that of arrest (Johnson, 2014) and can only arise if the evidence to support an offence being committed in the first place is apparent.

In response to the explanation seeking letters, two Police Forces provided responses indicating questionable interpretation of records held. Neither force provided further data to correct original responses.

Force “a”:

4662/13 requested information in relation to foreign nationals charged for an offence. The response to this request included all arrests for all offences.

FOI 5,826/14 [...] [...] [...] [...] In order to retrieve this biometric detail crime reports were analysed. Not all arrests made will lead to a crime report being submitted as after investigation no criminal offence may have taken place and therefore no requirement for a “crime” to be recorded.

Force “b”:

The information for each of these requests has been checked and it has been found that the data for each request was compiled differently as the person completing the request interpreted it slightly differently, that is: one listed all arrests regardless of disposal rather than only those where an offender was charged, hence the numbers are greater.

	Request 1	Request 2	Request 3
Responses (<i>n</i> = 43)	38 data responses	39 data responses	39 data responses
Year parameter provided	28 calendar 10 financial	39 calendar	39 calendar
	Request 1 -vs- Request 3	Request 1 -vs- Request 2	Request 2 -vs- Request 3
Comparable force data sets	26	24	30
Data year comparable	2011	2012	2012

Table III.
Comparison parameters

Theme	Example	Volume
Fluidity	<p>“.....possible explanations for the difference in figures We have identified the nationality of a charged person when previously none was given We have amended the nationality, following further enquiries, to the correct nationality and the new one is either a nationality that you are/ are not interested in The person arrested was bailed at the time of the first ‘snap-shot’ for an offence and then at a later date has been recalled and re-arrested for further offences charged and bailed to appear at court” “Data based on the same time period but requested on different dates will produce different results; this is because the Crime recording system is a live system which is constantly subject to change” “Each report is run as at a different date, and is only accurate as at the day the report was run” “Similarly where a person gives one ethnicity at first contact, then provides different ethnicity at a later date or is found to have given inaccurate information originally, the records will be updated”</p>	11
Method	<p>“It appears that the previous responses were actioned by different people and using different systems, this has been raised as an issue and as such the response data has been amended” “.....possible explanations for the difference in figures: The requests have been dealt with by different people and the information has been retrieved in different formats, either persons arrested and charged or all of the charges laid against individuals”</p>	7
Interpretation	<p>“The figures for the first two requests were extracted from the custody system and the third from the crime recording system. Different systems and different interpretations of requests will undoubtedly produce different figures as different parameters have been used to extract the information” “Upon review of the requests you refer to, it would also appear that as they were done at different times by different members of staff, they have been interpreted slightly differently”</p>	6
Incorrect Systems	<p>Incorrect data supplied, new data included within two responses “Police installed a new Custody System at the end of September 2011 and information was imported from the old system however cannot be automatically updated it would require the manual identification and updating of information which is why there would be no change in the data”</p>	3 2
No response	No response to letter received	8

Table IV.
Examples of
explanation themes
identified

Force “a” makes the point that should the result of an investigation be that no criminal offence has been committed no crime record will be apparent so that arrest/investigation may not be traced within the search method conducted. It is equally apparent that if no criminal offence is established, then no prosecution charge will be forthcoming. Force “b” uses interpretation by the operator as a reason, but, in fact, this led to incorrect data being supplied, as no request was made for the number of persons arrested.

One force response appeared overly defensive in nature, almost alluding to comparison of data being unlawful in itself. Summarised below, the response began by

repeating a standardised caveat provided with the initial disclosure that the databases used are a “live” system and subject to change as incidents are finalised. A final sentence stated “It should be noted that for these reasons this force’s response to your questions should not be used for comparison purposes with any other response you may receive”. Which was then repeated as “[...] however information held can change as data is amended therefore for this exact reason separate (sic) response should not be compared”.

There followed:

Whilst giving maximum support to individuals genuinely seeking to exercise the right to know, the Commissioner’s general approach will be sympathetic towards authorities where requests can be characterised as being part of a campaign. Therefore with regard to this request and other requests on this topic we are including a warning under Section 14(1)(Vexatious Request) of the Freedom of Information Act that any future similar requests may attract this exemption.

The apparent decision to characterise requests (and the final letter seeking explanation) as being part of a campaign is difficult to explain given that the final letter began by introducing the reason for requests as part of a European Commission (EC) funded study on the cross national provision of bioinformatics data for cross-European Union policing purposes.

Comparison was one stage in triangulation of data to affirm integrity for spatial analysis but only conducted on data provided for eight nationalities Czechoslovakian (CZ), Irish (IE), Latvian (LV), Lithuanian (LT), Polish (PL), Romanian (RO) and Slovakian (SK). Within this paper, total quantitative results are too expansive to display. [Table V](#) provides the example for 2011 data supplied in Requests 1 and 3, comparisons between other data sets and calendar years bore similar results.

Values shown in [Table V](#) record the numerical difference between data sets. When taken as absolute values, these represent the number of records changed over a 15-month period. For each matrix of request differences, the numerical distribution of record changes is significantly skewed, indicating mean values to be significantly impacted by outliers such as values recorded within Metropolitan Police data due to high numbers. Evaluating significant volumes of record changes was therefore undertaken through identification of values with Median Absolute Deviation greater than or equal to two. This method negates significant outlier influence commonly seen when using mean values and standard deviations. A matrix displayed in [Table VI](#) identifies Police Force data sets, indicating significantly high volumes of record changes between FOIA requests made compared with the overall number of computational comparisons available within each. Nine forces are seen to display significantly high values, of which three only feature in single comparison subsets. Of the eight forces that did not respond to the final letter seeking explanation, six feature in this matrix.

Discussion

Using the FOIA as a research tool brings challenges; use of the legislation and types of data obtained may not readily fit recognised categories of research design and data classification ([Savage and Hyde, 2012](#)). It does however provide a useful and valuable mechanism for information retrieval, providing access to otherwise inaccessible information/data.

Disclosed data quality is clearly dependent on the quality of information gathered, stored and the information management systems in use ([Great Britain, Parliament,](#)

Police force	CZ	IE	LV	LT	PL	PT	RO	SK	Total ^a	% age change ^b	Explanation								
1	-	3	+	10	+	2	-	84	-	33	+	8	+	11	-	3	154	24.18	Interpretation + fluidity
2	-	4	-	13	-	9	-	341	-	14	-	8	+	24	-	4	417	44.55	Fluidity + method
3	0	-	13	-	2	-	88	-	1	-	2	-	18	+	3	127	34.99	Interpretation	
4	-	1	-	10	-	5	-	32	-	29	-	7	-	28	0	112	45.16	No response	
5	-	1	-	1	+	1	+	32	+	13	+	0	0	0	0	37	25.52	No response	
6	-	3	+	2	+	1	-	31	+	9	+	1	-	15	6	68	46.90	Interpretation	
7	0	0	-	1	-	1	-	5	+	10	+	2	+	18	0	36	60.00	No response	
8	-	112	+	395	-	95	-	232	-	360	-	67	+	179	86	1526	109.23	Incorrect	
9	+	9	+	14	+	6	+	26	+	33	+	1	+	28	11	128	131.96	Incorrect	
10	-	9	-	39	-	29	-	114	-	176	-	28	-	38	12	445	40.16	Fluidity	
11	+	1	0	0	-	4	-	229	-	13	-	1	+	1	2	251	21.49	Fluidity + interpretation	
12	0	+	20	+	1	+	71	+	35	+	6	+	2	2	171	63.33	Method + interpretation		
13	0	+	9	-	30	-	273	-	31	+	2	+	1	0	346	46.57	No response		
14	-	58	-	317	-	124	-	1667	-	713	-	296	-	470	51	3696	33.21	No response	
15	0	0	0	0	+	10	+	10	-	2	+	1	+	12	0	25	15.53	Fluidity + interpretation	
16	-	7	-	1	-	1	-	20	-	9	0	0	-	10	1	48	36.36	Fluidity	
17	+	18	+	19	+	1	+	71	+	48	+	2	+	14	5	178	52.20	Fluidity + interpretation	
18	+	13	+	4	0	0	-	6	+	11	+	3	0	0	37	35.24	Systems		
19	+	43	+	66	+	1	+	125	+	15	+	15	+	102	40	392	2063.16	No response	
20	+	4	-	5	+	6	+	106	+	54	+	7	+	107	13	302	49.19	No response	
21	+	4	+	51	+	57	+	56	+	178	+	95	+	61	3	505	252.50	Method + incorrect	
22	+	0	0	0	-	1	-	30	0	0	0	0	0	0	31	10.80	Fluidity		
23	+	4	+	12	+	55	+	117	+	119	+	23	+	33	13	376	51.93	No response	
24	+	0	-	1	0	0	+	4	+	4	0	0	8	0	17	17.00	Fluidity		
25	+	44	+	31	+	36	+	95	+	131	+	7	+	37	66	447	59.60	Method	
26	0	+	10	0	0	0	-	13	+	22	+	4	-	5	0	54	40.00	Method	
% age change ^b	0.4	15	4.5	2.3	6.9	15.8	2.4	1.3											

Notes: ^a Sum of difference between request 1 and request 2; ^b difference between requests expressed as a percentage of request 1 data

Table VI.
Matrix of police force
data sets displaying
median absolute
deviation <=2

Police force	2012 R1-v-R3	2012 R1-v-R2	2012 R2-v-R3	2011 R1-v-R3	Explanation
A ^a		2.13			Method
10 ^b	2.07			3.52	Fluidity
B ^a		2.83	2.24		No response
14 ^b	24.57	31.35		24.46	No response
19 ^b	2.99	4.68		4.59	No response
20 ^b		3.77	2.19		No response
23 ^b	3.53			2.94	No response
C ^a		5.35			No response
25 ^b				3.8	Method

Notes: ^aForce does not appear in Table V; ^bforce appears in Table V as per numerical indexing

House of Commons, 1997; Holsen, 2007). Responding to an FOI request requires knowledge of information held and its location and retrieval methods which may be significantly complex (Taylor and Burt, 2010). Within large organisations, undertaking complex and diverse functions FOIA staff may be disconnected from operations and therefore reliant on management information systems providing legitimacy and adequacy.

The time-consuming demand for information through FOIA applications is unpredictable by nature (Ross and Whittaker, 2009) and that unpredictability can hamper efforts to resource a workload that is constantly changing (Shepherd and Ennion, 2007). A study of UK Local Government implementation reported on a local authority where FOIA requests had greatly increased which the respondent claimed was “hard to manage and we’re finding it very hard to meet the 20 day target” (Richter and Wilson, 2013).

A few forces claimed to be unable to provide data on the nationality of persons charged, as, apparently, this is only recorded at arrest and not when a person is charged. The claim that nationality is recorded at the beginning of an offender’s criminal justice process but remains non-transferable may be questionable in light of EU rulings of 2008 and 2009 requiring nation states to provide each other with conviction histories of individuals and record nationalities (European Commission, 2008, 2009).

An interesting example to emerge in terms of data collection, quality and process is exemplified by one large northern force. Initial disclosure was aggregated for the two-year period of 2011 and 2012 with no specification of which year crimes occurred. These results indicated that in the two-year period, there were 964 charges made against one national group. The results received in relation to a further request for clarification by providing data only for 2011 showed no charges against that national group and confirmation that the data were considered to be correct. Given the subsequent national analysis of the inclusive data sets received, it was difficult to imagine that no offenders of this nationality were charged with offences in this force area in 2011, yet 964 were charged in 2012. Questioned at the time of disclosure and subsequently the FOIA unit stance remained that the disclosure was fully correct until the final explanation seeking letters were sent. In response, it was acknowledged that the data were wholly incorrect and an apology was issued. An unrelated request to police forces concerning

expenditure on interpreters again highlighted the issue of data quality and whether the information disclosed can be considered accurate. The request asked for total annual spend on interpreters and for annual spend on each of eight specified languages. One force provided total figures lower than the expenditure for three of the individual languages quoted and subsequently accepted erroneous disclosure.

Uncertainty, therefore, exists throughout the process of producing, recording and ultimately disclosing administrative data. As the requesting researcher is unlikely to be fully aware of the information collection, recording and management practices of the organisation the integrity of data disclosed in response to FOIA requests cannot be assumed and must be carefully considered. As this research progressed, it became ever more apparent of the need to consider each disclosure and assess integrity on a one-by-one basis. Assessment opportunities are enhanced when making identical requests to multiple agencies but would be problematic for a singular, limited number of requests or requests to one agency.

Inconsistencies raise analytical barriers and were even evident where two forces share a “joint information management unit”, one providing fully detailed information specifying numbers for each individual offence, whilst the other aggregated offences into broad categories. Thus, effective analysis and comparisons by the receiving researcher were hampered, indicating poor internal communication within the joint unit.

Also apparent were inconsistencies in the application of exemptions. [Taylor and Burt \(2010\)](#) reported through interviewing public body employees that there was considered to be a lack of consistency in interpretation and understanding of exemptions. Such an issue was experienced in this research, with one force applying Section 40, one applying Section 30 and a further three refusing disclosure on the grounds of cost despite the other forces being able to freely retrieve and disclose the requested information. Of these it is difficult to explain why only 2 of the 43 forces contacted refused information access under Sections 30 and 40 whilst cost issues may be due to complexity of in-force recording systems and is more intuitive.

Across the Police Service of England and Wales, responses were generally good, timely and appropriate in an administrative context. Inconsistencies in approach and interpretation were evident and potential for disclosures to lack integrity requires consideration in the methodological model utilised. Our projects’ analytical model led to relatively easy identification of outliers. Triangulation and comparison methods may be appropriate within other research projects. Poor integrity of disclosed data risks additional burdens of FOIA requests being made and may reflect poorly on the FOIA management of the data providers.

In 2012, the House of Commons Justice Committee reviewed the FOIA with evidence received from numerous sources. ACPO-written evidence included the growing volume of FOIA requests received. This showed an increase across seven years of some 20,000 annual requests to Police Forces, and provided the statement that:

Currently force FOI resources are reducing whilst the number of FOI requests continues to grow, against this backdrop the current situation in performance is not sustainable.

Evidence also called for consideration of the imposition of fees to requesting under the Act ([Great Britain, House of Commons Justice Committee, 2012a, 2012b, 2012c](#)).

In this research, many disclosures received suggested a limited approach being taken due to poor resourcing as opposed to a negative view of the act itself and requirements

to disclose. Upon reflection, project researchers perceived a “hurried” or “take the easy route” approach to disclosure percolating through, with the possibility of this approach being driven by poorly resourced high workloads and a drive to reduce costs.

From the perspective of internal data requirements, now essential to the Intelligence-led Policing model, [Ratcliffe \(2012\)](#) clearly describes its history, development, philosophy and methodological shift, identifying capture of data and information analysis as a fundamental requirement. All Police forces in England and Wales have existing crime analysis structures, hierarchies and specialised units calling upon analysis of internal and external data to offer tactical and strategic direction. Coupled with the need to justify activity and use of police powers, the accurate analysis and interpretation of information held in police records became integral to day-to-day business activity. Force crime and intelligence analysts possess ability to access full internal data sets with an understanding of data collection methodologies in use. With tactical, short-term localised analysis, the recognition of data set updating and alteration becomes integral to the daily analytical functions. The results from this research provide some insight on the labyrinthine nature of Police records and their management, albeit from a focused external perspective. We particularly identify the need to acknowledge, understand and assess configuration management of records within the analytical world of policing. Pertinent predominantly to strategic products our results would suggest that greater assessment of integrity risk may be worthy of development and integration within internal strategic assessment products, coupled with analytical skills and audience understanding of suitable indicators. With some forces reporting significantly high volumes of record changes between requests an assessment of integrity risk for internal analytical products increases in importance, particularly as many of those analytical products may be used to influence resource provision or policing activity.

A lack of widely understood common definitions of probabilistic terms is a key challenge for the analyst wishing to avoid the risk of misinterpretation when communicating uncertainty, thereby unwittingly contributing to ill-informed policy decisions. Critical understanding and explanation of information uncertainty was a matter touched upon by Lord Butler during his 2004 report reviewing intelligence for weapons of mass destruction for the UK Government ([Great Britain, Parliament, House of Commons, 2004](#)). This risk-based approach is all the more timely as central Government priorities increasingly focus on the reduction of threat and harm in broad thematic terms where information is at best incomplete but often ambiguous or lacking. Emphasis on threat and harm therefore requires the use of more sophisticated forms of analysis such as Structured Analytic Techniques (SAT) advocated by [Heuer and Pherson \(2010\)](#) and widely used by a diverse set of government agencies rather than those currently found in most traditional NIM compliant strategic assessments. Techniques will need to evolve into useful thematic products moving beyond description into forecasting whilst retaining agility to provide early warning alerts where appropriate.

Results within this paper highlight the fluid nature of police records, complexity impacting on data searching and retrieval techniques and the importance of maintaining high level records management to ensure suitable data integrity is maintained and fully transferable. Analytical techniques and the requirement to inform high-level management of policing in an honest, transparent and gainful manner may be

seen as “changing the face of police records” further and as such uncertainty within such analytical products should be assessed, measured and presented as integral elements. Records management will need to be structurally integral to improve the knowledge base and results from this paper confirm such a requirement.

With fluidity of databases being a core reason for disparity, greater use of and internal staff knowledge of the importance and relevance of configuration management within records management becomes important. Table VI indicates forces making very significant volumes of changes to records to the extent where an analytical product in 2014 (Request 3) may potentially display very different results from one in 2013 (Request 1). One northern force records a total of 662 charged offenders during 2011 (Request 1) across the eight nationalities but by the time of Request 3 this had increased to 1,671 for the same 2011 period.

Conclusion

Access afforded by the FOIA is valuable. Research conducted would not have been possible without this formal mechanism to obtain the required data; results received have been useful, interesting and informative. However, as a research method, FOI is not without limitations; a considered, planned approach is essential for multiple applications. Studies attempting to evaluate academic use have so far found relatively little published academic works using FOI as a methodology.

From our experience of using FOIA through multiple information requests, a number of recommendations emerge:

- Proportionate use in the context of demand on both public resources and academic research resources.
- Fully explore the possibility of required data having been previously released.
- Create clear and precisely worded requests; use terminology found within organisations being contacted where possible.
- Do not assume that accuracy is inherent in the information received. Consider methods enabling auditing of responses such as comparisons or triangulation.
- Recognise that all requests made and responses received will be openly and fully published by authorities from which information is sought. Consider wording of requests to ensure protection of research sensitive issues.

Indications are apparent that adherence to ACPO national guidelines are weakening, a possible outcome alluded to within their representation to the House of Commons Justice Committee in 2012. Likely to be budget-driven to match financial cuts a further concern expressed was cost to Police Forces of internal reviews and responses to the Information Commissioners Office following complaints. Risks of poorer performance (reducing costs) leading to increased complaints (increasing costs) exist and reducing FOIA resourcing may be counterproductive in the longer term.

With so few disclosure refusals apparent in this paper, it is suggested that forces should collectively consider greater release of information via open-access publication than is currently undertaken. An immense amount of diverse information is held and the extent of FOIA requests received indicates (unsurprisingly) that the general theme of “Policing” will always be of interest to the public. Openly publishing material may relieve pressure in the long term, and it is suggested that further research to better

understand requesters knowledge desires may facilitate successful open-access publication and significantly inform the issue.

Clarity in responses to FOIA requests was also often lacking and suggested to the researchers involved that the function of FOIA units had become to manage a disclosure in the easiest way (for the force) rather than seeking to satisfy the requester. Poor understanding by FOI managers of the data held by forces becomes apparent in some of the explanations offered around data disparity.

With the ethos of improving “[...] openness, transparency, trust and accountability in the public sector” (Shepherd *et al.*, 2010), the very large disparity between data disclosures from some Police forces is an issue for further research and exploration. Each force FOIA response included a default caveat that the databases were fluid in nature but fluidity was not the sole explanation provided or gleaned for these discrepancies and when given by some they failed to satisfactorily explain such high volumes of record changes. The FOIA is a means of improving trust and accountability but a full understanding of the management of records and relevance of configuration management must be maintained and communicated.

The FOIA does offer a positive addition to the academic researchers toolbox. Planning of requirements and resources is emphasised and that planning should include simple logistics, a generic email address and tracking due dates. We also suggest that planning for time spent researching the public body(ies) through websites, published documents and previously disclosed FOIA requests is equally as important. Basic context forming activity presents an opportunity to develop knowledge on the relevant organisations ability to respond, consistency in approach, interpretation, favoured terminology and nature of data held.

The UCL Constitution Unit guidance paper (Bourke *et al.*, 2012) concludes with “Three golden rules of FOI” which can be headlined as follows:

- (1) Use it well and ask the right questions.
- (2) Make contact with the officials.
- (3) Be prepared for it to take time.

Whilst we would endorse this document as a useful guide, we would add one comment and two further rules.

Making contact with officials is a useful and clearly sensible activity if possible. However, funding cuts have clearly been impactful with communication avenues streamlined and automated, making such pre-emptive contact sometimes problematic or, indeed, impossible. An additional rule of “Be prepared to challenge” is unfortunately unavoidable but a proportionate decision should be considered as such challenges will be resource impactful for all parties concerned. A second additional rule is suggested as “attempt to seek pre-emptive knowledge of relevant data collection methodologies employed”. The here described research project had a singular and significant advantage; in depth, contemporary and significant personal knowledge of the crime data recording systems used by UK police forces within the research team. Such knowledge was invaluable in the required planning process to maximise responses and assess the integrity of the disclosures received.

Note

1. ACPO was replaced in April 2015 with the National Police Chiefs Council (NCPC). Throughout this paper, reference is made to the original form of ACPO existent at the time of research and results.

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1. Kevin Walby, Alex Luscombe. 2018. Ethics review and freedom of information requests in qualitative research. *Research Ethics* 75, 174701611775020. [[Crossref](#)]