

Activity Fields and the Dynamics of Crime

Advancing Knowledge About the Role of the Environment in Crime Causation

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Abstract Our current understanding of the role of the social environment in crime causation is at best rudimentary. Guided by the theoretical framework of Situational Action Theory, and using data from the ESRC financed Peterborough Adolescent and Young Adult Development Study (PADS+), this paper aims to propose how we can better theorise and study the role of the social environment, particularly the person and place interaction, in crime causation. We will introduce, and illustrate the usefulness of, a space–time budget methodology as a means of capturing people’s exposure to settings and describing their activity fields. We will suggest and demonstrate that, combined with a small area community survey and psychometric measures of individual characteristics, a space–time budget is a powerful tool for advancing our knowledge about the role of the social environment, and its interaction with people’s crime propensity, in crime causation. Our unique data allows us to study the convergence in time and space of crime propensity, criminogenic exposure and crime events. As far as we are aware, such an analysis has never before been carried out. The findings show that there are (a) clear associations between young people’s activity fields and their exposure to criminogenic settings, (b) clear associations between their exposure to criminogenic settings and their crime involvement, and, crucially, (c) that the influence of criminogenic exposure depends on a person’s crime propensity. Having a crime-averse morality and strong ability to exercise self-control appears to make young people practically situationally immune to the influences of criminogenic settings, while having a crime-prone morality

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and poor ability to exercise self-control appears to make young people situationally vulnerable to the influences of criminogenic settings.

Keywords Situational action theory · Peterborough adolescent and young Adult Development Study (PADS+) · Space–time budgets · Crime causation · People and place interactions

Our current understanding of the role of the social environment in crime causation is at best rudimentary (e.g., Elliott et al. 1996, pp. 389–390; Farrington 1993, pp. 30; Sampson et al. 1997, pp. 32; Sampson and Wikström 2008). This is partly a consequence of the lack of well-developed theoretical models for *how* social environments influence people's engagement in acts of crime. In addition, criminological research has generally lacked adequate methodologies to study and measure people's *exposure* to social environments and how it *interacts* with people's crime propensity. In this study we aim to contribute to the advancement of theory regarding the role of the social environment in crime causation and, on that basis, to the development of new methodologies that can better capture the role of the social environment, and its interaction with people's crime propensity, in the exploration of the causes of acts of crime.

Theoretically, we propose that *Situational Action Theory* (SAT) can help further the analysis of the role of the social environment in crime causation. We will compare and contrast SAT's explanation with that of Social Disorganisation and Routine Activity Theory. SAT is one of very few theories in criminology that take the person–environment interaction seriously, making specific predictions for how the interaction between a person's propensity and environmental exposure causes acts of crime and suggesting the causal process through which this happens.

Methodologically, we suggest and aim to demonstrate that, combined with econometric measures drawn from a small area community survey and psychometric measures of personal characteristics, a *space–time budget* is a powerful tool for advancing our knowledge about the role of the social environment, and its interaction with people's crime propensity, in crime causation.

Empirically, we will first present findings that show the importance of exploring people's exposure to different environmental settings, as their activity fields reach far beyond their neighborhood environments (the traditional unit of analysis in studies of environmental influences on crime). In this context, we will also show data that shines some light on what shapes young people's activity fields (i.e., why young people move around in space and time in particular configurations). We will then move on to investigate the relationship between some causally relevant aspects of young people's activity fields (their exposure to criminogenic settings) and their level of crime involvement, and the dependency of this relationship on their crime propensity. Finally, we will explore the *convergence in time and space* of a person's (a) crime propensity, (b) exposure to a setting conducive to crime, and (c) commission of an act of crime. As far as we know, this convergence *in time and space* has never before been empirically studied.

The data for the empirical analyses of this study is taken from the *Peterborough Adolescent and Young Adult Development Study* (PADS+), a longitudinal study financed by the UK Economic and Social Research Council (ESRC). This paper will present findings for the composite early to mid adolescent period (ages 13–17). Other publications from PADS+ deal with age-specific patterns and change (e.g., Wikström 2009).

Main Approaches to the Study of Environmental Effects in Criminology

There are two major traditions in criminology when it comes to exploring the role and influence of the social environment on crime, Social Disorganisation/Collective Efficacy Theory and Routine Activity Theory.¹ We will briefly discuss the major strands of these two traditions and highlight some of their shortcomings when it comes to analysing the person-environment interaction in crime causation. We will, particularly, compare and contrast Routine Activity Theory with the recently developed Situational Action Theory, as these two criminological theories most explicitly address, and provide a situational model for, the person-environment interaction in crime causation. We will suggest how Situational Action Theory may better deal with and in some cases overcome some of the problems which are undeveloped or unaddressed in the situational model of Routine Activity Theory.

Social Disorganisation/Collective Efficacy Theory

Social Disorganisation Theory (SD) is one of the most significant theoretical approaches within criminology. It emerged as part of the classic Chicago School and its study of crime and other social problems (e.g., Shaw and McKay 1969) and has evolved over many years into its present form (e.g., Kornhauser 1978; Bursik 1988; Sampson 2006a). An important aim of the SD tradition has been to analyse and understand the causes of residential segregation and its social and behavioural consequences (such as crime and related social problems).

A core idea in SD is that neighborhoods (communities), as a result of the social process of residential segregation, vary in their population composition and their related social organisation, that this affects the efficacy of processes of socialisation and social control amongst its residents (and social control of its visitors), and that this, in turn, influences the rate of crime and offenders in the neighborhood. The modern social disorganisation perspective has been further developed by Sampson and colleagues (e.g., Sampson 2006b) through their focus on advancing our understanding of neighborhood social processes, and in this context they have introduced the important concept of collective efficacy (Sampson et al. 1997).

Although the Social Disorganisation tradition has contributed substantially to our understanding of the role of the social environment and, particularly, drawn attention to aspects of the social environment which may be causally relevant in crime causation, it has some general shortcomings when it comes to explaining *why* acts of crime occur. Neighborhood structural characteristics and social processes are mainly analysed at the area level and therefore do not tell us that much about how (through what processes) environmental characteristics are linked to individual action. Wikström and Sampson (2003, pp. 127, our emphasis) suggest “what has been missing is a concept that directly *links* the community context to individual development and actions... behavior-setting is a concept that may provide such a linkage”. Moreover, SD does not provide any *situational model* that helps explain how the interaction between people and environments causes people to engage in acts of crime. The theory largely ignores the importance of *individual differences* in crime propensities and, particularly, *how* such propensities interact with environmental conditions in crime causation. We propose that Situational Action Theory

¹ Although Routine Activity Theory has become the established label, it should be noted that one of the originators of RAT (Marcus Felson) prefers to call it an approach rather than a theory (Felson 2006).

can help overcome these theoretical shortcomings in Social Disorganisation Theory when it comes to explaining the person-environment interaction in crime causation.

Research in the SD tradition has focused on residential environments (neighborhoods) and their effects on crime, particularly the relationship between neighborhood population characteristics (SES, population heterogeneity and instability and, more recently, level of family disruption) and residents' involvement in crime (and related social problems). Most early research was based on official aggregate statistics for rather large administrative areas and studied variation in neighborhood offender rates (particularly young offender rates) rather than crime rates. Only recently has it become possible (as a consequence of the introduction of large scale community surveys) to empirically study some key hypothesized mediating social processes such as neighborhood social cohesion and informal social control (see, for example, Sampson and Groves 1989; Sampson et al. 1997; Wikström and Dolmén 2001; Sampson and Wikström 2008).

A particular problem with a lot of the research in the SD tradition is the crude and undeveloped measures of the environment employed. Raudenbush and Sampson (1999, pp. 3) have rightly argued that “without comparable standards to evaluate ecological assessments, the search for individual and ecological effects may overemphasize the individual component simply because well-studied psychometric properties are likely to be superior to the unstudied ecometric ones”. Their seminal development of *ecometrics* (the quantitative assessment of ecological settings such as neighbourhoods and schools) is a great step forward in the study of the role of environments in crime causation (Raudenbush and Sampson 1999). However, this approach does not solve the fundamental problem of measuring the *dynamics* of the person-environment interaction. To fully understand the role of the social environment in crime causation we *also* need to better capture this dynamic by developing and using methodologies that can tap into it.

It can be argued that people's actions are only influenced by the part of the environment (settings) they experience with their senses (Wikström 2006). The *units of analysis* commonly used in SD research are generally *too large* to approximate settings² and often *too heterogeneous* to warrant the assumption that the neighborhood environment is homogeneous in causally relevant features (see further, Oberwittler and Wikström 2009). Moreover, and crucially, people move about in space and hence are exposed to and interact with a wide variety of different environments beyond their neighborhoods. Restricting the measurement of environmental influences to relevant features of a person's neighborhood is therefore problematic.

A particular problem that has haunted research in the SD tradition is whether one can adequately draw conclusions about individual-level relationships from associations at the aggregate level. As a rule, relationships at the aggregate-level are stronger than the corresponding relationship at the individual-level, and sometimes the direction of the relationships may even be different (e.g., Robinson 1950; Hammond 1973). There is an emerging body of research that investigates neighborhood effects at the individual-level and can therefore help overcome the potential problem of ecological fallacy (e.g., Reiss and Rhodes 1961; Braithwaite 1979, pp. 126–157; Simcha-Fagan and Schwartz 1986; Gottfredson et al. 1991; Jarjoura and Triplett 1997; Lynham et al. 2000; Wikström and Loeber 2000). However, with a few exceptions (Wikström 2009), this research does not go beyond the subjects' neighborhoods when exploring environmental influences on their crime involvement.

² It is not uncommon for studies to use areas encompassing 5,000–10,000 inhabitants as units of analysis.

To advance our understanding of the person–environment interaction in crime causation, we need to study this relationship at the individual-level, measuring environments by econometric methods applied to small area units of analysis that approximate *settings* (the part of the environment a person can access with his or her senses), and utilising methodologies that allow us to take into consideration people’s *activity fields* (the configuration of the different settings to which they are exposed during a given time period).

Routine Activity Theory

Routine Activity Theory (RAT) emerged as a key theoretical approach in criminology in the late 1970s (Cohen and Felson 1979). Routine activities refer to generalised patterns of social activities in a society (i.e., spatial and temporal patterns in family, work and leisure activities). Two key ideas of RAT are (a) that the structure of routine activities in a society influences what kinds of situations emerge and (b) that people commit acts of crime in response to situational conditions (opportunities). The situational model of RAT defines what constitutes an *opportunity*, that is, the convergence of a motivated offender and a suitable target in the absence of guardianship (supervision, control) (Cohen and Felson 1979; Felson and Cohen 1980). It is an interactional model that by its logic *requires all three elements to be present simultaneously* for a crime to occur. Felson tellingly talks about the chemistry of crime (Felson 2002). However, this dynamic aspect of the theory has never really been properly empirically tested (Bursik and Grasmick 1993). Moreover, and crucially, the theory does not specify *why* (through what causal process) this convergence brings about an act of crime. If this question is touched upon at all, proponents of Routine Activity Theory generally seem to allude to some version of Rational Choice Theory to explain why the convergence makes a person engage in an act of crime (Felson and Cohen 1980). However, this argument is not well developed and RAT and Rational Choice Theory have never been properly integrated (Clarke and Felson 1993, pp. 1–14).

The role of individual differences in crime propensity is particularly poorly treated in RAT, something that is perhaps understandable against the background of the following claim by Clarke and Felson (1993, pp. 2): “the routine activity approach offered a thought experiment: to see how far one could go in explaining crime trends without ever discussing any of the various theories about criminal motivation”. However, the concept of motivated offenders seems to acknowledge that people differ in their propensity to engage in acts of crime (see Felson 2002), although some scholars who work in this tradition seem to take the rather extreme position that all people are motivated offenders, that is, that acts of crime are solely a function of momentary influences on action by environmental conditions with no input of (differential) individual propensity (Wilcox et al. 2003).

On the surface, Routine Activity Theory (RAT) and Situational Action Theory (SAT) have some basic similarities. Both focus on the explanation of crime events. Both recognise that some environmental conditions are more criminogenic than others. Both recognise that people vary in their propensity to engage in acts of crime (with the above-mentioned exception of some more extreme applications of RAT). Both provide situational models that stress that acts of crime are an outcome of the convergence between people and settings. However, the two theories differ in what factors they assume are important in the person–environment interaction. Moreover, while SAT provides an action theory that aims to explain *how* the convergence of people and settings may bring about acts of crime, RAT does not. SAT focuses on how the intersection of people and settings (propensity and exposure) produces a causal process (a perception–choice process) that brings about acts of crime. RAT focuses on specifying the necessary conditions for a crime to occur (offender,

suitable target, lack of control) without really explaining how (by which process) this convergence causes a person to engage in an act of crime.

The two theories differ in clarity regarding what they aim to explain. While SAT clearly defines *what* is to be explained by the theory (i.e., breaches of moral rules), RAT is more ambiguous.³ Although some advances have recently been made regarding the role of individual factors in RAT (e.g., Felson 2002), the theory is still somewhat unclear about which (and particularly *how*) individual characteristics and experiences are relevant to crime causation. SAT, on the other hand, clearly states that a person's morality and ability to exercise self-control are the causally relevant personal characteristics in the explanation of acts of crime, and also specifies how these characteristics interact with setting features in crime causation. In contrast to RAT, SAT provides an explanation of the role played by the social environment in the development of people's differential crime propensities (see Wikström 2005; Wikström and Treiber 2009a, b), an aspect we will not, however, deal with further in this paper, which focuses on the explanation and study of crime events.

In its empirical applications, RAT has generally been studied at the aggregate level using crude indicators of routine activities (such as demographic characteristics). A meta-analysis by Pratt and Cullen (2005) reports that the empirical support for Routine Activity Theory is only moderate. However, Eck (1995) has argued that RAT really should be tested at the situational level (i.e., the convergence of the situational elements), something which has never been adequately done. In this study we will provide data on the convergence in time and space of a person's propensity, environmental exposure and acts of crime.

Situational Action Theory

Social (or human) ecology may be broadly defined as the analysis and study of the social and behavioural consequences of the interaction between human beings and their environments. Situational Action Theory (SAT) aims to provide a truly ecological perspective in the analysis and study of moral action and crime. It is a general theory that seeks to integrate personal and environmental explanatory perspectives within the framework of a situational action theory. The theory is specifically designed to address the role of the interaction between people and their social environments in crime causation (see Wikström 2004, 2005, 2006, 2007a, b, 2010; Wikström and Treiber 2007, 2009a, b).

According to SAT, crimes are moral actions and therefore should be analysed and explained as such. Acts of crime are breaches of moral rules of conduct (defined in law). Moral rules are rules that stipulate what it is right or wrong to do in a particular circumstance. What a theory of crime causation ultimately should explain is thus why people follow and breach moral rules. SAT argues that there is, in principle, no difference between explaining acts of crime and moral rule-breaking more generally because the situational process that determines any moral action is the same.

In brief, Situational Action Theory proposes that the *convergence* (in time and space) between a person's *propensity* (P) and *exposure* (E) initiates a *perception-choice process*

³ For example, in a recent work Felson (2006) defines crime as "any identifiable behavior that an appreciable number of governments has specifically prohibited and formally punished" (pp. 35); he goes on to say that "crime's comprehensive definition includes past and present crimes and leaves room for future crimes" (pp. 36). In our view this definition does not contribute much towards specifying what it is RAT aims to explain.

(→) whose outcome is an action (or inaction), for example, an act of crime (C). The situational model's explanation of acts of crime can be summarised as

$$P \times E \rightarrow C$$

Situational Action Theory does not propose a simple additive model of propensity and exposure but that propensity and exposure *interact* to determine a person's crime involvement. Specific combinations of propensity and exposure are likely to produce specific outcomes in terms of a person's engagement in acts of crime.

SAT suggests that the causally relevant personal characteristics that determine people's *crime propensity* are their morality (personal moral rules and related emotions such as shame and guilt) and ability to exercise self-control, while the causally relevant environmental features that determine *criminogenic exposure* are the moral rules of the settings in which a person takes part and their enforcement (through the process of deterrence). The relevant perception-choice process is one of moral perception and moral choice (see further, Wikström 2006). Actions (like acts of crime) are an outcome of how people *perceive their action alternatives* and (on that basis) *make choices* when confronted with the particularities of a setting. This process can be either predominantly *habitual* (automated) or *deliberate* (reasoned) depending on the person's familiarity with the setting and its circumstances. The more familiar the setting and the circumstances, the more likely it is the process will be predominantly habitual in nature.

The likelihood an act of crime will be committed by a particular person in a particular setting depends upon the extent to which that person's moral rules and the moral rules of that setting are consistent with the rules of conduct defined by law. If the person's moral rules and the moral rules of the setting encourage him or her to act *in opposition* to the rules of conduct defined by law, an act of crime is likely. If the person's moral rules and the moral rules of the setting encourage him or her to act *in accordance* with the rules of conduct defined by law, an act of crime is unlikely. This is referred to as the *principle of moral correspondence*.

When there is a discrepancy between a person's moral rules and the moral rules of the setting, the outcome will be determined by the efficacy of controls. SAT distinguishes between two main kinds of controls: a person's *ability to exercise self-control*,⁴ which comes into play when a person's moral rules discourage but the moral rules of the setting encourage an act of crime; and *deterrence*, which comes into play when a person's moral rules encourage but the moral rules of the setting discourage an act of crime. This is referred to as the *principle of the conditional relevance of controls* (see further Wikström and Treiber 2009a, b; Wikström 2010).

The role of the social environment is crucial within the explanatory framework of SAT. Two key concepts are *setting*,⁵ defined as the part of the environment which an individual can, at a particular moment in time, access with his or her senses, including any media present, and *activity field*, defined as the configuration of settings a person takes part in during a specific time period. SAT suggests that people's actions (and their development) are only influenced by the causally relevant environmental conditions of the settings in

⁴ Please note that we use the concept of self-control somewhat differently than Gottfredson and Hirschi (1990), as a situational concept rather than a personal trait (see Wikström and Treiber 2007).

⁵ The concept of behavior-setting was originally proposed by Barker (1968). The concept of setting as employed in SAT is inspired by but not identical to the concept of behavior-setting used by Barker. Taylor (1997) makes a strong theoretical argument for the use of behavior-settings as a unit of analysis when assessing environmental influences on crime and related outcomes.

which they take part, and that how people respond when exposed to a setting (its action relevant moral rules and controls) depends on their propensity (their action relevant moral rules and controls). For example, those who have strong moral rules consistent with the rules of conduct defined by law and a strong ability to exercise self-control (causing a weak crime propensity) are unlikely to engage in acts of crime regardless of the criminogenic features of the settings in which they take part.

In this study we will focus on the role of exposure in crime causation. We will use measures of particular settings thought to be criminogenic and study how exposure to such settings is linked to young people's crime involvement in early to mid adolescence. We will specifically test the hypothesis that only those with a higher crime propensity will be influenced by exposure to criminogenic settings, while those with a low crime propensity will be largely immune to criminogenic exposure.⁶

The Peterborough Adolescent and Young Adult Development Study (PADS+)

The data for this study is taken from the Peterborough Adolescent and Young Adult Development Study (PADS+), an ongoing ESRC financed longitudinal study of a randomly selected sample of young people who were 11 years old and living in the UK city of Peterborough and nearby villages in 2002 (see Fig. 1). Peterborough is a medium-sized city with considerable social diversity, encompassing some of the most highly advantaged and disadvantaged neighbourhoods in the East of England (see further Annex A).

PADS+ includes approximately one-third of the age cohort in the study area. The study acquired active written consent from participants' parents (or other legal guardians). In 716 cases (72% of the original random sample of 991), the parents agreed to take part in an initial interview and have their child take part in subsequent waves of data collection. The study has currently completed six annual waves of data collection with a highly satisfactory retention rate of 97%.

The first wave consisted of one-to-one interviews with each subject's main caregiver (parent) and collected data about the family and the subject's current situation, alongside retrospective information about the subject's life-history from birth. The subsequent five waves collected a wide range of data from the subjects themselves, using various methodologies including interviewer-led small-group questionnaires and one-to-one interviews comprising psychometric measures and space-time budgets (the overall design of the study is described in Annex A).

The Peterborough Community Survey

As part of PADS+, a community postal survey—the Peterborough Community Survey (PCS)—was carried out in 2005, targeting a random sample of the general population aged 18 years and older.⁷ The PCS used the smallest available administrative units called 'output areas' (OAs), which encompass on average 296 residents (ranging from 109 to 560) and together subdivide the study area, which includes the city of Peterborough and surrounding villages, into 518 areas (see Fig. 1 for geographic boundaries of the output areas).

⁶ However, from a developmental perspective, longer periods of exposure to criminogenic settings may enhance a person's crime propensity just as longer periods of exposure to non-criminogenic settings may reduce a person's crime propensity (see Wikström and Treiber 2009a, b, pp. 92–93; Wikström 2009).

⁷ A random sample of household addresses for each output area was drawn from the electoral register.

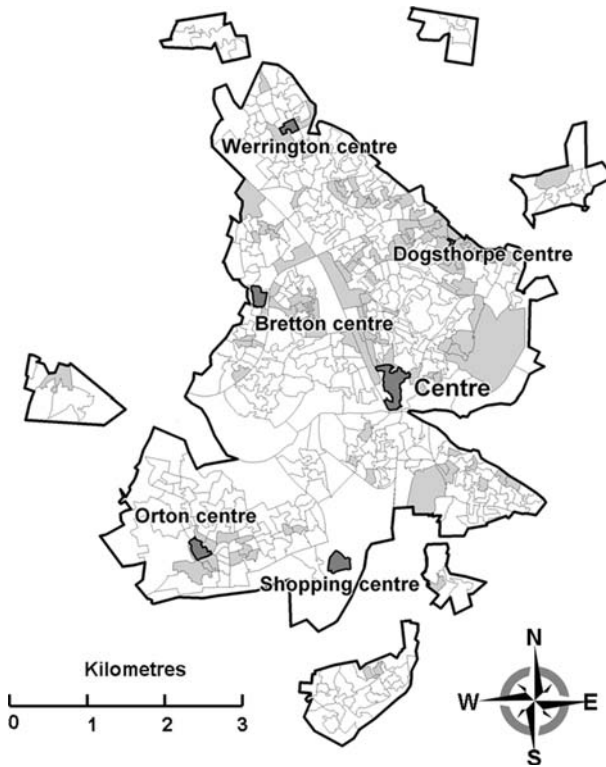


Fig. 1 The study area, output areas and location of city and local centres. Disadvantaged output areas shaded in grey (top 25th percentile)

The PCS included an average of 13 respondents per unit for a total sample of 6,615 respondents (for details see Oberwittler and Wikström 2009). To ensure that we measured small areas (approximating settings) as much as possible, and that the information provided was highly accurate,⁸ the survey asked respondents to report on

‘the area within a short walking distance (say a couple of minutes) from your home. That is the street you live in and the streets, houses, shops, parks and other areas close to your home’

Questions such as ‘Is there a fire station within a short walking distance?’ were used to test that respondents referred only to the area immediately surrounding their home; a comparison of respondents’ reports of the presence of particular services (e.g., fire and police stations) close to their home with the actual locations of such services supports the survey method’s efficacy (see further Oberwittler and Wikström 2009). The random

⁸ It is likely that residents have accurate knowledge about the social conditions of the area immediately surrounding their residence. The extent to which they have such knowledge about the typically much larger geographic areas commonly used in “neighborhood research” is more questionable. Moreover, the larger the area the more likely it is to be heterogeneous in relevant social conditions and therefore that residents’ reports on these conditions will be less uniform (reflecting residents’ differential exposure to parts of the area depending on the location of their residence within the area).

geographic spread of responses within each output area⁹ ensured that each output area was effectively covered by overlapping observations. Social environment variables were then created by amalgamating responses for each output area. Tests run to ensure inter-rater reliability amongst respondents in each output area demonstrated good convergence on the social environmental variables social cohesion and informal social control used in subsequent analyses (for details see Oberwittler and Wikström 2009).

The main purpose of the PCS was to use residents as social observers to collect data about social settings (e.g., small area levels of social cohesion and informal social control) which could then be linked to space–time budget data in order to measure PADS+ subjects' exposure to different social environments (their activity fields). The linkage between the small area community survey and the space–time budget data was made possible because both studies included the same geographic locator (i.e., output areas) by which the data could be geographically matched.

In addition to the PCS data, data from the *Census* and *Generalised Land Use Database* (ODPM 2001) (and some other official data sources) were collected for output areas which made it possible to also match these data (e.g., data on disadvantage, land use and public entertainment activities) with data from the space–time budget and the PCS.

The Space–Time Budget

Space–time budgets were initially developed to assist research on travel, tourism and urban planning (see, for example, Anderson 1971; Tomlinson et al. 1973; Forer and Kivell 1981; Janelle et al. 1988; Fenell 1996; Mey and Heide 1997). Space–time budget methodology built upon earlier time budgets (or time diaries), which are useful for analysing the timing, sequence and frequency of events (see Pentland et al. 1999) but fail to address the spatial dimensions of activity patterns (Hanson and Hanson 1980). Space–time budget methodology is relatively new even in fields like tourism research (e.g., Dietvorst 1994; Fenell 1996; Thornton et al. 1997) and urban ecology (e.g., Janelle et al. 1988). Despite its obvious potential for studying, and comparing, the activity patterns of different groups of individuals, we only know of one previous instance in which it has been used in criminological research, the *Peterborough Youth Study* (PYS). The PYS was a cross-sectional fore-runner of PADS+ conducted in 2000, in which, among other things, the space–time budget methodology was piloted (see Wikström and Butterworth 2006). We used experiences from the PYS to refine the space–time budget methodology used in PADS+. For example, while a 7 day recall period was used in the PYS, we opted for a 4 day recall period in PADS+, as we found that 4 days would provide sufficiently representative data to capture main differences in subjects' activity patterns while arguably providing more accurate data due to a more focused recall period.

PADS+ space–time budget data comprises detailed *hourly* information covering a *four-day period* (each year), including the subject's *geographic location* (output area), the *place* (e.g., home, school, street), *who the subject was with* (e.g., peers only, family), and his or her main *activity* (e.g., socializing, playing tennis). To minimize the possible influence of seasonal variation this data was collected during the first 4 months of each year. The coding is very detailed and includes hundreds of categories. Additional information was also collected regarding the time and location of any *acts of crimes* (and other events such as victimisation and alcohol and drug use) which took place during the 4 day period.

⁹ The fact that we have the exact geographic location of respondents' addresses makes it possible to map their location within output areas and hence confirm that they were generally well spread.

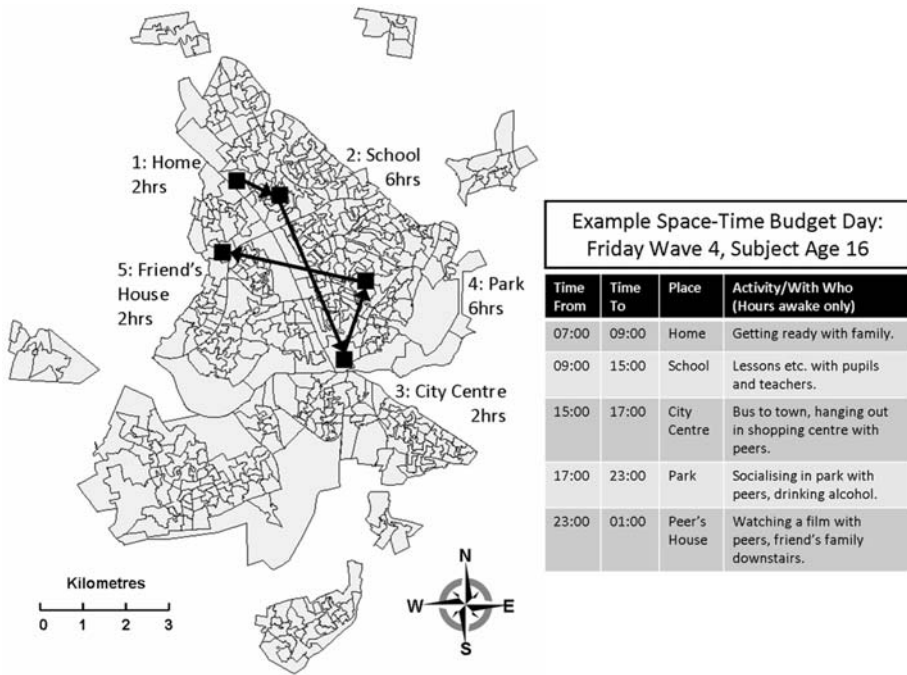


Fig. 2 Illustration of one person's activity field for one day (time awake only)

Space–time budget data thus makes it possible to describe and classify *settings* based on subjects' involvement with particular places, people and activities and, in combination with PCS and official data (census and land use data), describe the characteristics of the environments in which those events take place (e.g., in an area with poor collective efficacy or high pub and nightclub density).

An *activity field* represents a person's exposure to different settings during a specific time period as illustrated for one person for one day in Fig. 2. Settings are marked by black squares while the arrows represent the subject's movements between settings. Summing the hours a person has spent in a particular kind of setting (e.g., unsupervised with peers in an area with poor collective efficacy) during a specific time period provides a measure of his or her exposure to that particular setting during that particular time period.

Of particular importance is the fact that altogether the subjects (who lived in the study area¹⁰) spent 93% of their time awake in locations within the study area (as defined in Fig. 1) which means that PCS measures (e.g., output area collective efficacy) characterise all but 7% of the time which eligible subjects spent awake (see Table 1). However, setting characteristics based only on space–time budget data (e.g., being in a setting unsupervised with peers) do not have the same restrictions as they are not limited to time spent in the study area (as PCS data are).

¹⁰ Space–time budget data has been excluded for subjects who spent no time in the study area because they moved permanently, or temporarily, out of the area during the study period ($N = 35$). For some analyses, those who did not take part in all five waves ($N = 23$) are also excluded.

Table 1 Percent time spent awake by some key locations

| Location | No hours | Percent | No hours | Percent |
|---|----------|---------|----------|---------|
| Home OA | 94204 | 45.8 | – | – |
| School OA | 58231 | 28.3 | 58231 | 52.1 |
| Best friends OAs | 6360 | 3.1 | 6360 | 5.7 |
| City and local centres OAs | 8613 | 4.2 | 8613 | 7.7 |
| Elsewhere in study area | 23564 | 11.4 | 23564 | 21.1 |
| Elsewhere outside study area ^a | 14913 | 7.2 | 14913 | 13.4 |
| Total | 205885 | 100 | 11681 | 100 |

Data for subjects who spent no time in the study area during a particular wave because they moved outside the area are excluded for that wave

OA = Output area

^a Some subjects' home or school locations are outside the study area

Hours were chosen as the temporal unit of measurement because hours are a standard unit which can be easily quantified and are already used by the subjects to subdivide their days. This made it easier for subjects to recall what they were doing (etc.) at a given time. Smaller units (for example, minutes) would have dramatically extended the interview, placed greater (unrealistic) demands on subjects' attention and memory, and collected a considerable amount of irrelevant data (for example, on activities like making cups of tea). Hour units capture the diversity of subjects' settings and activities while focusing on the settings in which subjects spent the most time and which were most central to their activities. However, some precision is lost in using this larger temporal unit because we coded only a subject's *main activity* during that hour. Activities that are typically short in duration will therefore be underrepresented. However, it should be stressed that activities of particular interest to the study, such as acts of crime and drug use, were recorded separately regardless of their time duration.

The space–time budgets collected covered a 4 day period in the week prior to the interview. In each interview, subjects were asked to report on the previous Saturday, Friday and two other most recent weekdays (for example, a subject interviewed on Tuesday would report on the previous Monday, Saturday, Friday and Thursday). This assortment of days was selected to cover key times for structured (weekday) and unstructured (weekend) activities and provide representative data on how subjects generally spent their time. As often as possible (95% of the time), interviews were arranged following normal weeks (avoiding, for example, school and bank holidays) to maximise the comparability of the data. Our prime interest is to distinguish differences in young people's activity patterns so we can explore whether such differences are linked to their crime involvement.

Space–time budget data was collected via one-to-one interviews with our own specially trained and experienced researchers.¹¹ Generally, the subjects' recall of the past 4 days was very good and helped by the fact that young people's weekdays are well structured around the school day. Strategies employed to improve subjects' recall included working backwards or forwards from time periods subjects clearly remembered to periods they had more difficulty recalling in detail, and directing subjects' thinking based on movements and activities they reported on other days or external events such as memorable weather and

¹¹ We strongly believe that producing high quality data from the space–time budget methodology requires highly qualified and specially trained interviewers.

popular television programs. Researchers were equipped with a number of tools to help them identify geographical locations. For example, if a subject did not know the address of a friend's house he or she visited, researchers could use landmarks like local shops and parks to find it. Extensive lists of local shops, restaurants, leisure venues, schools, etc. and their geographic locations were developed to make space–time budget interviews more efficient and accurate. Subjects' own knowledge was critical in solving such problems and helped engage them in the process. Researchers generally found subjects willing to discuss their movements and activities, and often interested in the space–time budget method as a way of telling us about and portraying their social lives.

Data collected on incidents of substance use, offending, victimisation, risk experiences (for example, being in or witnessing an argument) and weapon possession were the most sensitive covered by the interview and researchers worked with subjects on an individual basis to ensure they were comfortable reporting these activities accurately. Methods for ensuring confidentiality were clearly disclosed; researchers ensured interviews were always conducted out of the hearing of others and subjects were allowed to point to their answers if they did not want to answer out loud. The one-to-one nature of the interview also allowed researchers to elicit additional information to ensure incidents were accurately coded. Researchers again found that subjects were generally willing to disclose their activities.

Four day interviews provide 96 h of data per subject per year. This amounted to a total of 335,136¹² hours over the five sweeps. For the analyses presented in this paper, we are concerned only with the hours which subjects spent awake, which amounted to 209016 h. For this study, we will use the total hours a subject spent awake in a setting over the five waves (in total 20 days) as a measure of his or her exposure to that particular setting in early to mid adolescence (ages 13–17). Other studies will explore age-specific patterns and changes in exposure and links to their crime involvement (e.g., Wikström 2009).

Based on Situational Action Theory, three key analytical concepts will be used in this study to explore the person–environment interaction in crime causation during early to mid adolescence: propensity, exposure and acts of crime. In the following sections we describe the data used to create measures of these concepts and how they have been operationalized.

Propensity

The concept of propensity refers to the likelihood someone will act in a specific way when exposed to particular environmental conditions. People vary in propensity, meaning that different people react differently to the same setting (environmental conditions). According to Situational Action Theory, the general propensity to breach moral rules defined by law (commit acts of crime) depends on a person's morality (relevant moral rules) and ability to exercise self-control, because these are the key personal factors influencing the perception and choice of crime as an action alternative. To assess crime propensity in this study we have therefore used a composite measure based on a morality scale and a scale measuring the generalised ability to exercise self-control. The rationale for combining morality and

¹² A small number of participants were unable to complete the spatial dimension of the space–time budget because they have moved outside the study area. For analyses which involve a spatial element (e.g., collective efficacy, entertainment settings) these subjects' hours are excluded, leaving a total of 329,952 h, and 205,885 h awake.

self-control is that when people act, they draw upon these personal factors in a *holistic* manner, rather than discretely.¹³

Data on morality and the ability to exercise self-control were collected through a questionnaire which, to enhance data quality, was administered in small groups of no more than four subjects. To make sure subjects understood the questions as intended (as much as possible), the questionnaire was divided into blocks of questions by topic (e.g., neighborhood, family bonds, moral values or self-control) and each block was introduced by a project researcher who explained definitions and invited subjects to raise any queries before writing their responses. At the end of each block, the researcher asked subjects to check they had answered all the questions in that block before moving on to the next one, keeping internal non-responses to a minimum.

The questions on moral values¹⁴ ask the subjects how wrong they think it is for someone their age to do 16 specific acts, ranging in seriousness from “Ride a bike through a red light” to “Use a weapon or force to get money or things from another young person” (see Annex B for the full list). The instruction given to subjects before they completed the scale read as follows:

Now I would like you to answer some questions about what things you think are wrong for a person your age to do. I would like you to tick ‘very wrong’ if it is something someone your age should never ever do, ‘wrong’ if it is something someone your age normally should not do, ‘a little wrong’ if it is something that is a little bad but not too bad to do, and ‘not wrong at all’ if it is something not bad at all that someone your age can always do. If you have problems understanding any of the questions please raise your hand and I will come over and help you.

The questions about the ability to exercise self-control form a modified scale based on Grasmick et al.’s (1993) self-control scale. The modified scale includes eight questions. Questions from the original Grasmick et al. scale have been excluded because they do not refer to self-control as defined by SAT; some, for example, are arguably more relevant to morality than self-control. Examples of questions that are included are “I often act on the spur of the moment without stopping to think” and “I lose my temper pretty easily” (see Annex B for the full list). This scale is best viewed as a scale of the *generalized* ability to exercise self-control since subjects report on their general tendency to be able to control themselves in unspecified circumstances.

The questions about self-control were introduced in the following manner:

Now I would like you to answer some questions about how you are as a person, for example, if you easily get upset, easily get angry, if you care about what others think of you, and if you think a lot about what is going to happen to you in the future. For each question I would like you to tick the box that best fits how you are as a person. If the statement is true about you, tick strongly agree, if it is mostly true about you tick mostly agree, if it is only a little bit true about you tick mostly disagree and if it is not at all true about you tick strongly disagree. If you have problems understanding any of the questions please raise your hand and I will come over and help you.

¹³ However, specific analysis of the relationship between propensity and crime shows there is an interaction effect in that self-control only becomes relevant when a person’s (crime-relevant) morality is weak (Wikström and Svensson 2009).

¹⁴ PADS+ includes several morality scales. This particular scale is inspired by a scale used by Rolf Loeber in the Pittsburgh Youth Study.

We created a composite crime propensity score for each subject for the study period (ages 13–17) which was standardized for all subjects' scores on both subscales (morality and self-control) across all waves.¹⁵ The crime propensity score is approximately normally distributed (skewness = 0.39, S.E. of skewness = 0.041, Mean = 0.00, STD = 1.73). For most analyses in this paper, we divide the scale into three groups: low, medium and high propensity, where low propensity is defined as one standard deviation or more below the mean and high propensity as one standard deviation or more above the mean.

Exposure

People not only vary in their crime propensity but also in their exposure to different kinds of settings, some of which are more criminogenic than others.¹⁶ People act in response to settings (environmental conditions they can experience through their senses); therefore their exposure to settings which encourage acts of crime is important for understanding their crime involvement. According to SAT, whether a setting is criminogenic depends on the moral context (relevant moral rules and their enforcement) in which a person encounters opportunities and frictions to which one possible response is an act of crime (see further Wikström 2006).

To measure criminogenic exposure we need to measure (a) criminogenic features of settings and (b) people's contact with such settings. *Exposure* is measured as *the number of hours a person has spent awake in settings with a specific characteristic, or combination of characteristics*, during the 20 days covered by the space–time budget over the five waves. For this study we have selected three kinds of settings believed to have criminogenic features: settings in which one is unsupervised with peers, settings with poor collective efficacy and settings characterised by public entertainment (pubs and nightclubs). We believe that these are kinds of settings in which young people with a higher crime propensity are more likely to see crime as an action alternative and choose to commit it. However, these aspects are by no means exhaustive and there are arguably many other kinds of settings that have criminogenic qualities. This paper introduces the methodology to study exposure and provides an initial analysis of the role of criminogenic exposure and its interaction with crime propensity. Subsequent studies will expand and refine the measure of exposure based on space–time budget, small area community survey (PCS) and official output area data (i.e., census and land use data).

Unsupervised with Peers

The first criminogenic aspect selected is whether or not the young person is in a setting where he or she is *unsupervised with peers*. A number of previous studies show there is an association between frequent informal socialising with peers outside the home and crime involvement (e.g., Mahoney and Stattin 2000; Osgood et al. 1996; Riley 1987; Sampson and Groves 1989; West and Farrington 1977; Wikström and Butterworth 2006). It is a well established fact that most young people commit crime with their peers (e.g., Reiss 1986; Sarnecki 1986; Warr 2002; Wikström and Butterworth 2006). Spending time unsupervised with peers does not in itself cause young people to commit crime. However, it does mean

¹⁵ See Wikström (2009) for details on how this measure was created.

¹⁶ The reason why people are differentially exposed to settings is due to processes of self and social selection, an aspect we will not deal with specifically in this paper but return to exploring in subsequent publications.

they are in a setting free from potential adult supervision.¹⁷ Such settings, if they also provide opportunities or frictions, may be particularly criminogenic for young people with higher levels of crime propensity.

Spending time in a setting unsupervised with peers is measured using space–time budget data on subject’s activities (doing anything other than sleeping) and their companions (being with peers and no adult guardian). Peers were defined as companions who were not the subjects’ family members and took part in activities not in a supervisory role. An adult guardian was defined as anyone over the age of 18 who took part in activities in a supervisory role. The measure of exposure to being unsupervised with peers is defined as the number of hours in the study period spent awake in a setting (output area) unsupervised with peers.

Poor Collective Efficacy

The second criminogenic aspect we have selected is spending time in settings with *poor collective efficacy*. Such settings have criminogenic potential because collective efficacy represents a lack of willingness by those living in the area to intervene when acts of crime and moral rule-breaking occur (Sampson et al. 1997). We believe that the level of collective efficacy in a setting can serve as a measure of a key aspect of the moral context (the level of enforcement of relevant moral rules). A number of studies have demonstrated that there is an association between an area’s level of poor collective efficacy and its level of crime (e.g., Sampson and Wikström 2008). Being in a setting with poor collective efficacy does not in itself cause a person to engage in acts of crime. However, it is reasonable to hypothesise that a setting with poor collective efficacy in which young people spend time unsupervised with peers has criminogenic qualities, particularly for those with a higher crime propensity.

Poor collective efficacy was measured using data from the PCS and combines information from two scales measuring small area informal social control and social cohesion (see Annex B). The scale of poor collective efficacy is an empirical Bayes estimate adjusted for individual-level socio-demographic composition¹⁸ as recommended by Sampson et al. (1997). The measure of exposure to poor collective efficacy is defined as the number of hours during the study period spent awake in settings (output areas) that fall into the top 25th percentile of the poor collective efficacy estimate.¹⁹ Of the output areas, 125 (24%) meet this criteria.

Public Entertainment Settings

A particularly interesting kind of urban setting is entertainment settings where pubs and nightclubs are concentrated. The social life in such settings (particularly at later hours on the weekends) is likely to include criminogenic influences due to the general informal and unstructured orientation of activities and the fact that many people are under the influence of alcohol and recreational drugs. This kind of setting tends to create high levels of friction

¹⁷ Generally, adults are assumed to uphold moral rules defined by law, but this is not always the case. There are even some (albeit rare) instances in which, for example, parents offend alongside their offspring.

¹⁸ For details see Oberwittler and Wikström (2009).

¹⁹ It should be noted that cut-off points are important, as a more liberal operationalization would lead to more acts of crime being defined as having taken place in settings with poor collective efficacy. The cut-off point chosen for this dichotomization is somewhat arbitrary.

between people. It is also not unreasonable to hypothesize that the level of adherence to conventional moral rules and sensitivity to deterrence is generally lower in these contexts. It is well known from research into violence and vandalism that areas of public entertainment tend to encompass spatial and temporal concentrations for these kinds of crime (e.g., Wikström 1991). Entertainment settings are likely to be particularly criminogenic for young people who spend time in such settings unsupervised with their peers, particularly if they also have a higher level of crime propensity.²⁰

Public entertainment settings were identified using *pub and nightclub density*, a measure derived from data on the number of valid license applications (acquired from the Peterborough City Council's licensing team) per output area, taking into account the balance of residential and non-residential land use via data acquired from the Generalised Land Use Database (ODPM 2001). The measure of exposure to public entertainment settings is defined as the number of hours during the study period spent awake in a setting (output area) with a pub and nightclub density in the upper half of the density range. Of the output areas, 38 (7%) met this criteria.

Acts of Crime

In this study we use two measures of subjects' crime involvement in early to mid adolescence: (a) their annual self-reported crime frequency (during the previous year), collected via questionnaire; and (b) the crimes they reported having committed during the 4 days collected annually in the space–time budget. These data will be presented for the five waves combined.

Self-Reported Crime (Questionnaire)

Questions in the study about self-reported criminality refer to ten different types of crime: shoplifting, theft from a person, residential burglary, non-residential burglary, theft from a car, theft of a car, vandalism, arson, assault and robbery from a person. Subjects were asked whether they had committed the crime in question during the last year and, if so, how many times they had done so. Although these questions cover most of the kinds of crime young people tend to engage in, it should be noted that fraudulent or sexual crimes were not included (nor were traffic crimes).

The questions about self-reported criminality were introduced by the project staff member supervising the questionnaire using the following instructions (the text is from the 2005 questionnaire):

Now I would like you to answer some questions about things you may or may not have done. The questions will ask about things that happened in 2005, that is, in the second and third term of year 9, the summer break and the first term of year 10.

When you answer these questions do not include anything that happened after New Years Eve. [Here the supervisor stopped and asked the subjects if this was all clear

²⁰ It should be noted that our subjects are in the age range of 13–17 so they are not legally allowed to visit pubs and nightclubs (which may not, however, prevent the oldest from being able to frequent such establishments). However, the criminogenic features of settings characterized by public entertainment are not restricted to pub and nightclub venues but may also characterize the surrounding environment, in which young people may take part.

and if they had any questions. When he or she was convinced that they all understood the time frame he or she would continue the introduction.] *The questions follow the same format. First they ask you to answer yes or no whether you have done something. If you answer yes, you need to say how many times you did it in 2005. If you answer no, you need to go onto the next question. Please remember that nobody, not your family, not your teachers, not the police nor anybody else will be told what you have told us. You can be sure that what you tell us will remain secret.*

The crime data is, as expected, highly skewed (skewness = 7.42, S.E. of skewness = 0.093, Mean = 23.0, STD = 67.7).

Self-Reported Crime (Space–Time Budget)

For each of the 4 days covered in the space–time budget each year, subjects were asked if they had been involved in any act/s of crime.²¹ If so, they were asked to indicate the time, location and the circumstances. Over all five waves (covering 13,964 days), 74 subjects reported 141 acts of crime. These crimes are dominated by acts of violence (51%) and vandalism (31%), although subjects also reported acts of theft (14%) and some driving offences (4%). Most thefts involved shoplifting but some involved theft from another person and even burglary. Most violence occurred between people who were acquainted or knew each other by appearance; in less than one-fifth of the cases (17%), subjects reported that the victim was a total stranger. Here it is important to bear in mind that we are dealing with violence by offenders aged 13–17 in a medium sized city; we would expect that such violence would often occur between young people who know each other at least by appearance. Most cases of vandalism included (in rank order) damaging vehicles, buildings and street-lights and spraying graffiti.

The fact that subjects had to discuss the circumstances of their crimes (including time and location) makes it unlikely they would be able to fabricate incidents. This assumption is corroborated by the fact that when we compared the locations by output area of police recorded crimes by the same age groups ($n = 3,649$) with those reported by our subjects in space–time budgets ($n = 132$),²² we found, as shown in Fig. 3, that the locations of the subjects' reported crimes to a large extent coincided with concentrations of police recorded crimes by young people of the same ages ($r = 0.57$, $p = 0.000$, $n = 518$).

Moreover, there is a significant individual-level correlation between the subjects' total number of police recorded crimes (as recorded in the police national computer) and the total number of self-reported crimes in their space–time budget ($r = 0.23$, $p = 0.000$, $n = 657$) for the studied age period (early to mid adolescence).²³ All this gives us confidence that the crimes reported in the space–time budget are accurate representations of young people's crime and their settings.

²¹ There were less restrictions as to specific types of crime than in the questionnaire. However, all reported crimes, apart from six driving offences, fit into crime categories covered by those included in the questionnaire.

²² Please note that nine crimes reported were committed outside the study area and hence are not included here.

²³ Please note that these are totally independent sources of data on the young people's crime involvement and further that the space–time budget only covers a short period each year, which makes it even more remarkable that these data correlate significantly with police recorded crimes.

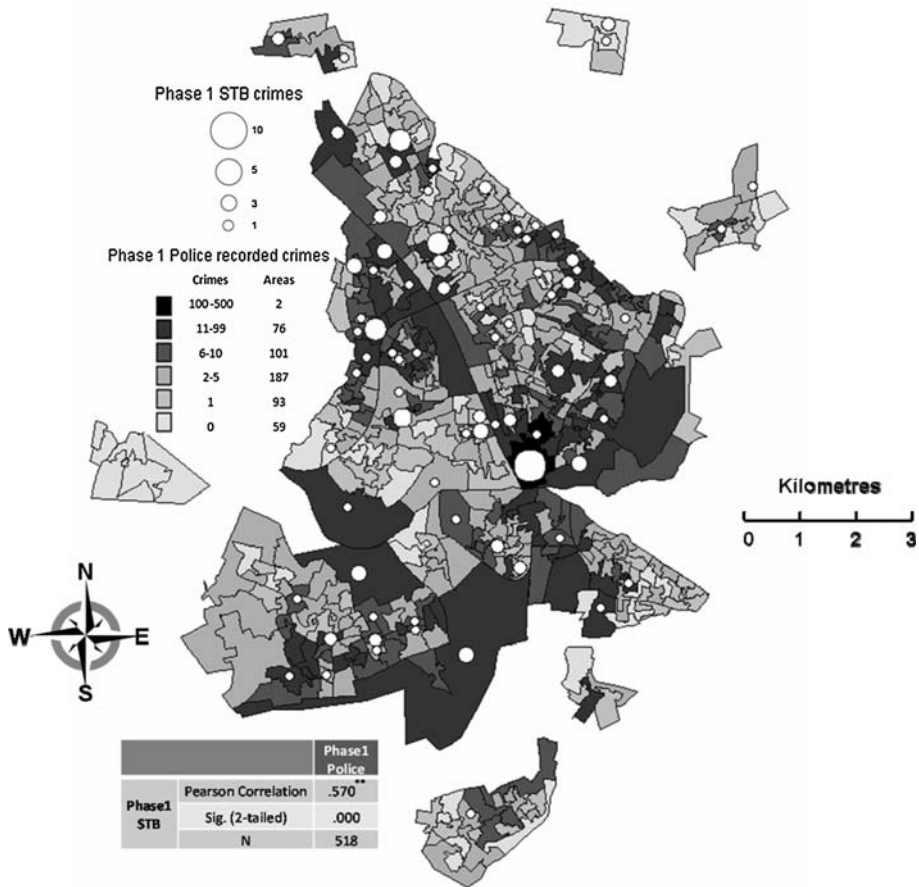


Fig. 3 Locations of police recorded crimes by young people and STB reported crimes (ages 13–17, years 2004–2008)

Findings

Young People’s Activity Fields and Their Sources

Young people move around a lot in urban space, some more than others. Their activity fields generally stretch far beyond their neighborhoods and involve exposure to a range of different settings (environments), as a plotting of all subjects’ activity fields for one of the waves (age 14) clearly illustrates²⁴ (Fig. 4).

Young people’s movement patterns are far from random. A closer investigation of the kind of locations they spend time at and move between indicate that their activity fields are largely determined by locations central to their routine activities. As part of the space–time budget we have coded each subject’s home, school and three best friends’ locations (output

²⁴ Lines that leave the map indicate movements to settings outside the study area. Recall that subjects spent only 7% of their time awake in settings outside the study area (see Table 1).

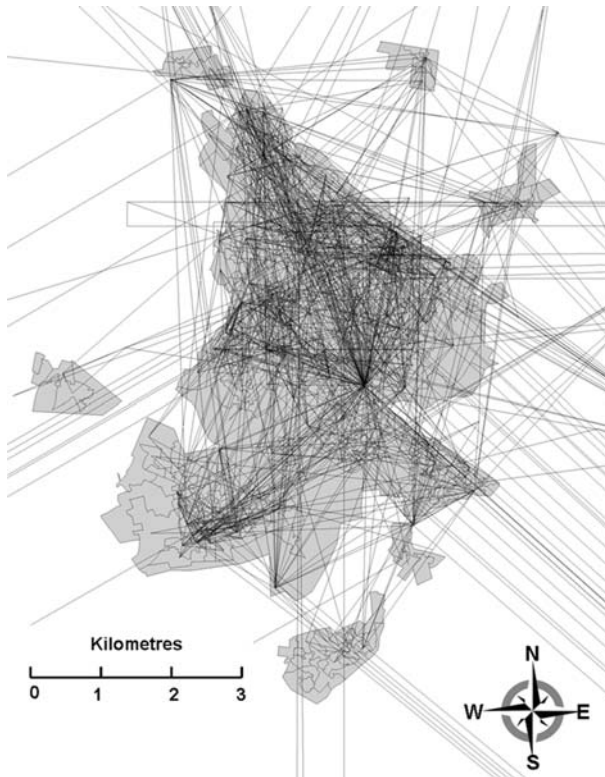


Fig. 4 Young people's activity fields for one year (age 14, year 2005)

areas) and the location (output areas) of the city and local centres.²⁵ This enables us to study how important these locations are in young people's daily life. The findings show that subjects spend 81% of their time awake at any of these four key locations, with the majority of their time being spent at home and school locations²⁶ (Table 1). Disregarding time spent at the home location, the data show that about half their time awake is spent at the school location (in the school or its immediate area).

In this context it should be noted that the unspecified category of "elsewhere in the study area" for many subjects is likely to include key locations particular to their individual routine activities such as places of structured activities like sports practice or music lessons or unstructured activities such as places they regularly hang out and socialise with peers (e.g., streets, parks, clubs and leisure centres and shops not in the city or local centres). Many subjects are also likely to have more than three friends they may recurrently

²⁵ Since home, school, best friends and centre settings may occasionally overlap we have prioritised these in the following order: home, school, best friend and centre setting. Thus, for example, if a subject's home setting and his or her school setting are in the same output area, any hour spent in this output area will appear in the table as an hour spent at the home setting.

²⁶ Although we are not particularly concerned with environmental influences on young people's social and moral development in this paper (we address this in other studies), it is worthwhile to note how much of their time young people spend in home and school locations, and the relevance of this for the potential role of parents and teachers as key influences on young people's social and moral development.

Table 2 Percent time spent awake by some key locations by crime propensity

| Location | Crime propensity | | |
|------------------------------|------------------|--------|-------|
| | Low | Medium | High |
| Home OA | 47.7 | 45.7 | 44.2 |
| School OA | 31.1 | 28.9 | 22.4 |
| Best friends OAs | 1.6 | 2.9 | 5.6 |
| City and local centres OAs | 3.2 | 4.2 | 5.3 |
| Elsewhere in study area | 7.7 | 11.3 | 16.0 |
| Elsewhere outside study area | 8.7 | 7.0 | 6.6 |
| Total | 100 | 100 | 100 |
| Hours | 30732 | 137990 | 31385 |

Data for subjects who spent no time in the study area during a particular wave because they moved outside the area are excluded for that wave

OA = Output area

visit (see Annex C for more details regarding what is included in the category “elsewhere in the study area”).

Differences in Activity Fields by Subjects’ Crime Propensity

Young people with different crime propensities exhibit some interesting differences in their activity fields. Those with a high crime propensity tend to spend much more of their time awake at locations other than their home and school (output) areas (Table 2). Those with the lowest crime propensity spend 21% of their time in locations outside their home and school areas, while the corresponding figure for those with the highest crime propensity is considerably higher (33%). Spending time outside one’s home and school areas is likely to involve a higher risk of being exposed to criminogenic settings, as we will subsequently demonstrate.

Activity Fields and the Location of Crimes

Research into crime and distance has taught us that people do commit acts of crime outside their neighborhoods and there generally is a distance-decay relationship between a person’s home and the place of crime commission (e.g., Phillips 1980; Wikström 1991, pp. 213–223). However, these studies only take into account the relationship between two geographic locations (the home and the crime scene). Space–time budget data allows us to study in more detail the location of young people’s crime in relation to their activity fields (e.g., in relation to the locations in which they take part).

The findings show that more than half of subjects’ crimes are committed at locations central to their routine activities (i.e., at home, school, best friends and city and local centres locations) which is consistent with other research (Weisburd et al. 2010). Recall that many locations which fall in the class “elsewhere in the study area” are also likely to be central to subjects’ individual routine activities (see Annex C). However, only a minor portion of subjects’ crimes are committed at home or school (or their immediate surroundings) and the rate of crimes per 1,000 h by location is highest for locations outside the home and school (output) areas (Table 3). For example, the rate of young people’s acts of crime when in city and local centres is 20 times higher than their rate of crime in the

Table 3 Crimes by main locations (% and by 1,000 h spent awake at location)

| Location | No crimes | Percent | Crimes per 1,000 h |
|------------------------------|-----------|---------|--------------------|
| Home OA | 14 | 9.9 | 0.1 |
| School OA | 26 | 18.4 | 0.4 |
| Best friends OAs | 13 | 9.2 | 2.0 |
| City and local centre OAs | 17 | 12.1 | 2.0 |
| Elsewhere in study area | 62 | 44.0 | 2.6 |
| Elsewhere outside study area | 9 | 6.4 | 1.1 |
| Total | 141 | 100 | 0.6 |

Crimes reported in the space–time budget

OA = Output area

home area (in the home or its immediate surrounding) and five times higher than their crime rate in the school area (in the school or its immediate surrounding). This probably reflects the fact that the risk of encountering criminogenic settings is generally higher outside one's home and school and their immediate surroundings (see further below).

Incidentally, these findings generally support Brantingham and Brantingham's (1993) Crime Pattern Theory, which aims to explain why crimes occur at certain places. The theory holds that people's movement patterns are determined by their individual routine activities (represented by key geographical locations) and that people offend in relation to their activity fields.²⁷ "Crime is not randomly distributed in time and space. It is clustered, but the shape of the clustering is greatly influenced by where people live within a city, how and why they travel or move about a city, and how networks of people who know each other spend their time" (Brantingham and Brantingham 2008, pp. 91). As far as we are aware, these key assumptions of Crime Pattern Theory have never before been adequately tested.

Key Locations and Criminogenic Settings

As expected, subjects spend much more time in criminogenic settings when they are awake outside their home and school areas (Table 4). For example, while the young people only spent 5.6% of their time awake unsupervised with peers in the home area, they spent 46.8% of their time awake in the city and local centres unsupervised with peers.

Crime Propensity and Exposure to Criminogenic Settings

Young people with higher crime propensity spend more time in criminogenic settings (Table 5). For example, young people with a high crime propensity spend four times as much time awake unsupervised with peers in areas with poor collective efficacy than those with a low crime propensity (8.3 versus 2.1 percent). There is clearly a relationship between crime propensity and exposure to criminogenic settings,²⁸ which is evident from the zero-order correlations between subjects' crime propensity and (a) their time spent

²⁷ Brantingham and Brantingham use the concept of 'activity space', but it is essentially the same.

²⁸ This is developmentally very interesting and indicates the value of exploring the relationship between being exposed to criminogenic settings and the development of crime propensity. However, this is not a topic for this paper.

Table 4 Percent time spent awake in selected criminogenic settings by key locations

| Location | Criminogenic settings | | |
|------------------------------|-------------------------|--|--|
| | Unsupervised with peers | Unsupervised with peers in areas with poor collective efficacy | Unsupervised with peers in areas of public entertainment |
| Home OA | 5.6 | 1.5 | 0.2 |
| School OA | 18.2 | 2.8 | 0.0 |
| Best friends OAs | 32.7 | 11.7 | 1.4 |
| City and local centres OAs | 46.8 | 37.0 | 40.2 |
| Elsewhere in study area | 28.4 | 7.3 | 3.4 |
| Elsewhere outside study area | 9.9 | – | – |

No data on poor collective efficacy or pub and club density (public entertainment) was collected for areas outside the study area

OA = Output area

Table 5 Percent time spent awake in selected criminogenic settings by crime propensity

| Location | Crime propensity | | | |
|--|------------------|--------|------|--------------------|
| | Low | Medium | High | Prob. ^a |
| Unsupervised with peers | 9.8 | 14.4 | 20.9 | 0.000 |
| Unsupervised with peers in areas of poor collective efficacy | 2.1 | 4.3 | 8.3 | 0.000 |
| Unsupervised with peers in areas with public entertainment | 1.2 | 2.4 | 3.9 | 0.000 |

^a Chi-square test of difference between groups of young people defined by their level of crime propensity

awake unsupervised with peers ($r = 0.48, p = 0.000, n = 650$), (b) their time spent awake unsupervised with peers in an area of poor collective efficacy ($r = 0.39, p = 0.000, n = 650$), and (c) their time spent awake unsupervised with peers in an area of public entertainment ($r = 0.34, p = 0.000, n = 650$).²⁹

Exposure to Criminogenic Settings and Crime Involvement

Young people who spend more time in criminogenic settings report offending more often, both in the space–time budget and self-report questionnaires (Table 6). This is not surprising since 65% of the crimes reported in the space–time budget were committed when young people were unsupervised with their peers.

However, and crucially, this general relationship does not hold for all young people. The extent to which exposure directly influences a young person’s crime involvement depends on his or her crime propensity; a regression analysis shows that exposure (measured as time spent awake unsupervised with peers) is only significant when interacting with propensity (Table 7). This finding holds equally well regardless of whether the outcome variable refers to crimes reported in the space–time budget or the annual questionnaire. A plot of the interaction (with space–time budget crimes as the outcome) clearly illustrates the nature of this interaction: young people with a low crime propensity

²⁹ Criminogenic setting exposure variables (2) and (3) are logged because they are highly skewed.

Table 6 Zero-order correlations (Pearson and Spearman). Exposure to criminogenic settings and crime involvement. Crimes reported in the space–time budget and crimes reported in the annual questionnaire. Ages 13–17, years 2004–2008

| Exposure (No hours awake) | STB crimes | | Self-reported crimes (annual quest.) | | |
|---|------------|------|--------------------------------------|----------------|------|
| | r. | Rank | r. | r. (log crime) | Rank |
| 1. Unsupervised with peers | 0.19 | 0.23 | 0.24 | 0.43 | 0.41 |
| 2. Unsupervised with peers in areas of poor collective efficacy | 0.16 | 0.17 | 0.18 | 0.30 | 0.31 |
| 3. Unsupervised with peers in areas with public entertainment | 0.12 | 0.14 | 0.14 | 0.25 | 0.26 |

Criminogenic setting exposure variables 2 and 3 are logged because they are highly skewed. All coefficients are significant at the 0.01 level or better

Table 7 Multiple regression. Propensity, exposure and their interaction predicting crime involvement. Crimes reported in the space–time budget and crimes reported in the annual questionnaire. Ages 13–17, years 2004–2008

| Exposure | STB crimes | | Self-reported crimes (annual quest.) | |
|---|------------|-------|--------------------------------------|-------|
| | Beta | Prob. | Beta | Prob. |
| Crime propensity (morality and self-control) | 0.32 | 0.000 | 0.43 | 0.000 |
| Criminogenic exposure (unsupervised with peers) | −0.01 | n.s. | −0.02 | n.s. |
| Interaction term (Exposure × Propensity) | 0.11 | 0.008 | 0.14 | 0.000 |
| Multiple $R^2 \times 100$ | 12.5 | | 21.8 | |

Model does not include any logged variables. Variables centred and multiplied when calculating the interaction term

commit virtually no acts of crime regardless of their exposure, while the crime involvement of those with a high crime propensity is clearly affected by their exposure (Fig. 5).

The Convergence of Propensity, Exposure and Acts of Crime

We have demonstrated that young people who have a higher crime propensity and who spend more time in criminogenic settings tend to commit more crime. This supports the basic proposition of Situational Action Theory that acts of crime are an outcome of the interaction between crime propensity and exposure to criminogenic settings. However, such analysis does not establish that those who have a higher crime propensity actually tend to commit their crimes *when* exposed to criminogenic settings. This is an assumption one has to make in these kinds of analyses (an assumption which is rarely highlighted or discussed). PADS+ data (which includes data from space–time budgets, a small area community survey, and psychometric measures) makes it uniquely possible to take this analysis a step forward and begin to explore to what extent people who have a higher crime propensity tend to commit acts of crime *when* exposed to criminogenic settings.

To further test the situational model of SAT (the propensity-exposure interaction), we have calculated the rate of crime per 1,000 h spent awake in criminogenic and other

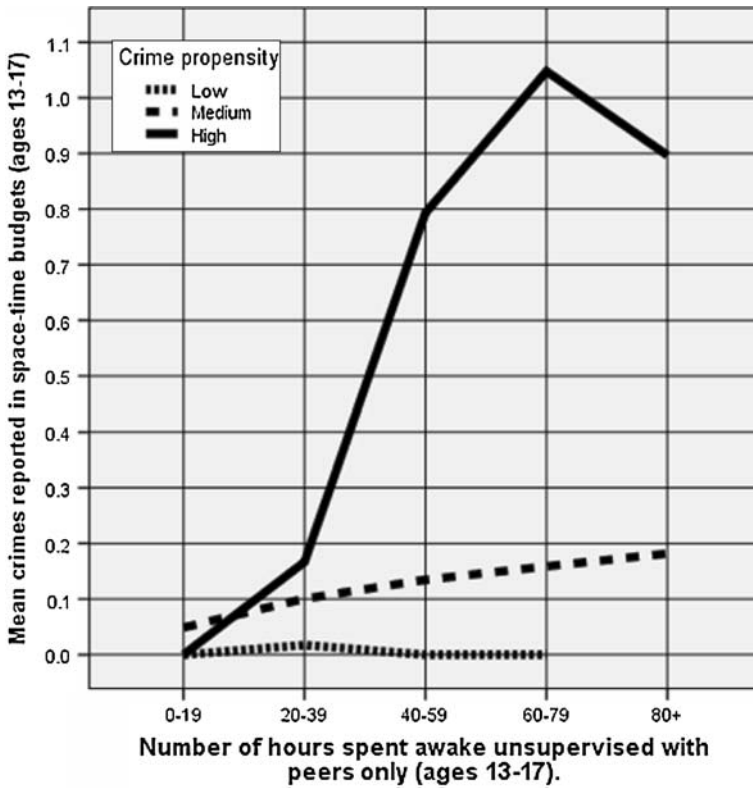


Fig. 5 The interaction between crime propensity and criminogenic exposure predicting crime involvement illustrated (space–time budget crime data)

settings and compared this across groups of young people with different levels of crime propensity. As far as we are aware, this is the first time the convergence *in time and space* of people’s crime propensity, criminogenic exposure and acts of crime has been empirically studied.

The findings show that young people only occasionally commit acts of crime (on average 0.7 acts of crime per 1,000 h, which amounts to an average of one crime every 95th day³⁰ or four acts of crimes a year³¹) and that the rate of crime in selected criminogenic settings is rather infrequent (the highest being 4.4 per 1,000 h). However, the findings also, and crucially, show that *the rate of acts of crime is by far the highest when young people with a higher crime propensity take part in criminogenic settings*. The findings clearly demonstrate that spending time unsupervised with peers (8.4 crimes per 1,000 h), particularly if one is in an area with poor collective efficacy (9.0 per 1,000 h) or

³⁰ This calculation is based on space–time budget data showing that young people were awake, on average, 15 h a day.

³¹ Those with a high crime propensity, on average, commit a crime every 27th day or 13 crimes per year. In this context it is interesting to note that the average annual number of crimes reported over the five studied years in the self-report questionnaire is similar; five per year for all subjects, and 18 for those with a high crime propensity.

Table 8 Crimes per 1,000 h exposure to selected criminogenic settings by crime propensity of subject

| Propensity | Exposure | | | Prob. ^a |
|--|----------|------|-------|--------------------|
| | No | YES | Total | |
| <i>A. Exposure = Unsupervised with Peers</i> | | | | |
| Low | 0.0 | 0.0 | 0.0 | n.s. |
| Medium | 0.2 | 1.7 | 0.4 | 0.042 |
| Strong | 0.9 | 8.4 | 2.5 | 0.000 |
| Total | 0.3 | 3.0 | 0.7 | |
| <i>B. Exposure = Unsupervised with Peers in Area with Poor Collective Efficacy</i> | | | | |
| Low | 0.0 | 0.0 | 0.0 | n.s. |
| Medium | 0.4 | 1.3 | 0.4 | n.s. |
| Strong | 1.9 | 9.0 | 2.5 | 0.000 |
| Total | 0.6 | 3.4 | 0.7 | |
| <i>C. Exposure = Unsupervised with Peers in area with High Public Entertainment.</i> | | | | |
| Low | 0.0 | 0.0 | 0.0 | n.s. |
| Medium | 0.4 | 2.3 | 0.4 | 0.003 |
| Strong | 2.2 | 11.3 | 2.5 | 0.000 |
| Total | 0.6 | 4.4 | 0.7 | |

^a Chi-square test of difference between exposure and non-exposure for the particular level of crime propensity

an area with a high level of public entertainment (11.3 crimes per 1,000 h), has a criminogenic influence on crime-prone young people (Table 8).

However, just as important as the finding that crime-prone young people tend to offend in response to criminogenic settings is the finding that *young people with a low crime propensity appear (situationally³²) to be largely immune to the criminogenic features of a setting*. Regardless of whether they are in a criminogenic setting or not they practically never offend.³³

When interpreting these findings one has to bear in mind that the selected characteristics used in this study to define a criminogenic setting are still rather general. More specific descriptions of setting features and, particularly, their circumstances, will most likely identify settings which will prove even more criminogenic to crime-prone people. We see this study as only an initial step on the way to identifying what makes settings criminogenic for crime-prone people.

Conclusion

To advance our understanding of the role of the environment in crime causation we submit that we need to employ new theory and methodology which can better address the person-environment interaction analytically and empirically. Guided analytically by Situational

³² The important question of whether repeated exposure to criminogenic settings increases a person's crime propensity has not been addressed in this paper. This topic will be dealt with in other publications.

³³ During the studied 20 days of the five waves (ages 13–17) only one young person with a low crime propensity committed an act of crime.

Action Theory, we have empirically explored the interaction between young people's crime propensity and their exposure to (selected) criminogenic settings, utilising a new innovative methodology which combines space–time budgets with a small area community survey and individual measures of young people's crime propensity collected through an interviewer-led questionnaire.

Our analyses show that young people move around extensively in urban space and that their activity fields normally stretch far beyond their neighborhood environments and expose them to a range of different settings (environments). Their activity fields are largely determined by movements between locations central to their routine activities (such as the home, school, friends' homes and city and local centres). Young people with higher crime propensity (based on a crime-prone morality and ability to exercise self-control) spend more of their time awake outside their home and school locations and therefore are more frequently exposed to criminogenic settings (which are encountered more often by young people when spending time in settings outside the home and school areas). Those who spend more time in criminogenic settings (e.g., being unsupervised with peers in areas with a poor collective efficacy) tend to be more frequently involved in acts of crime. However, and importantly, this relationship depends on the young person's crime propensity. Having a crime-averse morality and strong ability to exercise self-control appears to make young people practically *situationally immune* to influences from criminogenic settings, while having a crime-prone morality and poor ability to exercise self-control appears to make young people *situationally vulnerable* to influences from criminogenic settings.

Annex A: Study Design

The City

Peterborough is a medium sized UK city, with a population of approximately 160,000. It has been a centre of commerce and industry since medieval times, although most of the city's present-day character has been established since World War II, when it joined the 'New Towns' movement, a programme of urban renewal aimed at providing planned, practical townships which would 'break down the barriers' between rich and poor. Peterborough's population is roughly representative of that of the UK, with a slight overrepresentation of minority ethnic groups, particularly Asian, African Caribbean and Chinese.

Geographically, the Peterborough district covers approximately 350 square kilometres, encompassing a thriving city centre, a number of townships, and several outlying villages. Areas in the district differ widely in relevant social characteristics, with some ranking amongst the most and least deprived in England (Indices of Deprivation 2004³⁴).

The Sample

The sampling base comprised the cohort of 2349 young people living in Peterborough (postcodes PE1 to PE7) poised to start year 7 in school in 2002. This cohort was identified by combining data from the Local Education Authority, independent schools and

³⁴ Based on income, employment, health, education, skills and training, living environment and health deprivation, disability, barriers to housing and services, and crime.

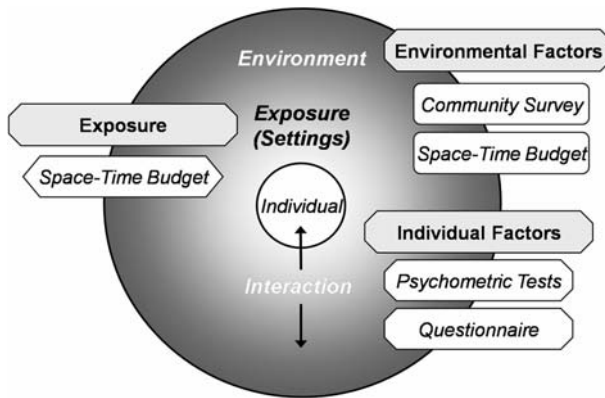


Fig. 6 An overview of the study methodology

Peterborough's Youth Offending Service (the latter to make sure young people in special education were included in the sampling frame). Of these young people, 991 were randomly selected. Active consent was sought from their parents, and in 716 of the cases such consent was given. Comparative analyses show that the demographics of the PADS+ sample match those of the city Peterborough and do not differ substantially from those of England and Wales. As of 2008, 693 (96.8%) of the original sample were still taking part.

Study Design

PADS+ is an ongoing longitudinal study funded by the Economic and Social Research Council (ESRC). The first wave of data collection took place in 2003 and involved structured interviews with the subjects' parents. The subjects have since been interviewed annually from 2004 to 2008. The interviews take place during the first quarter of the year and involve a 45 min, researcher-led questionnaire and a 45 min one-to-one interview. The questionnaire covers many individual-level variables, including morality and self-control. The one-to-one interviews include varying psychometric measures, generally aimed at decision making, and the space–time budget, which collects information on social settings and subjects' exposure to different settings. Further data on the subjects' environments is collected through the Peterborough Community Survey (PCS), a postal survey of over 6000 households in Peterborough (and surrounding villages) which collects detailed data at the 'output area' level (the smallest UK census unit). PCS data can be linked to data from the space–time budget to measure the subjects' exposure (time spent) in different kinds of social environments (for further details see PADS+ website, www.pads.ac.uk) Fig. 6.

Annex B: Measurement Scales

Generalized Ability to Exercise Self-Control

Do you agree or disagree with the following statements about yourself?

(Likert scale: Strongly agree; Mostly agree; Mostly disagree; Strongly disagree)

- When I am really angry, other people better stay away from me
- I often act on the spur of the moment without stopping to think
- I sometimes find it exciting to do things that may be dangerous
- I don't devote much thought and effort preparing for the future
- Sometimes I will take a risk just for the fun of it
- I often try to avoid things that I know will be difficult
- I never think about what will happen to me in the future
- I lose my temper pretty easily

Moral Rules

We would now like to ask you about a number of things that a young person your age might get up to. I would like you to tell me how serious you think it is for someone of your age to do the following:

Do you think it is very wrong, wrong, a little wrong or not wrong at all to....

- Ride a bike through a red light
- Skip doing homework for school
- Skip school or work without an excuse
- Lie, disobey or talk back to teachers
- Go skateboarding in a place where skateboarding is not allowed
- Tease a classmate because of the way he or she dresses
- Smoke cigarettes
- Get drunk with friends on a Friday evening
- Hit another young person who makes a rude comment
- Steal a pencil from a classmate
- Paint graffiti on a house wall
- Smash a street light for fun
- Smoke cannabis
- Steal a CD from a shop
- Break into or try to break into a building to steal something
- Use a weapon or force to get money or things from another young person

Collective Efficacy

Informal Social Control

For each of the following, please state if it is very likely, likely, unlikely, or very unlikely that people in your neighbourhood would act in the following manner.

- If a group of neighbourhood children were skipping school and hanging out on a street corner, how likely is it that your neighbours would do something about it?
- If some children were spray-painting graffiti on a local building, how likely is it that you or your neighbours would do something about it?
- If there was a fight in front of your house and someone was being beaten or threatened, how likely is it that your neighbours would break it up?
- If a child was showing disrespect to an adult, how likely is it that people in your neighbourhood would tell off or scold that child?

Social Cohesion

For each of these statements about your neighbourhood, please state whether you strongly agree, agree, disagree, or strongly disagree.

- People around here are willing to help their neighbours.
- This is a close-knit neighbourhood.
- People in this neighbourhood can be trusted.
- People in this neighbourhood generally don't get along with each other.
- People in this neighbourhood do not share the same values.

Annex C: Time Spent 'Elsewhere' in the Study Area

Table 9 Elsewhere in the study area

| Location | No hours | Percent |
|--|--------------|--------------|
| Indoor private | <i>13715</i> | <i>47.5</i> |
| Other's homes | 10018 | 34.7 |
| Second homes | 3697 | 12.8 |
| Indoor public | <i>6131</i> | <i>21.3</i> |
| Other shopping locales | 1246 | 4.3 |
| Indoor sports and leisure centres ^a | 1107 | 3.8 |
| Other school settings ^b | 777 | 2.7 |
| Youth clubs, community centres | 574 | 2.0 |
| Entertainment settings ^c | 504 | 1.7 |
| Restaurants, eateries | 455 | 1.6 |
| Pubs, nightclubs, discos | 452 | 1.6 |
| Religious centres | 437 | 1.5 |
| Other ^d | 579 | 2.0 |
| Outdoor public | <i>5748</i> | <i>19.9</i> |
| Parks, outdoor areas | 2250 | 7.8 |
| Streets | 1318 | 4.6 |
| Moving around | 1193 | 4.1 |
| Outdoor sports areas ^e | 937 | 3.2 |
| Other ^f | 50 | 0.2 |
| Workplace | <i>2453</i> | <i>8.5</i> |
| Other | <i>803</i> | <i>2.8</i> |
| Total | 28850 | 100.0 |

^a e.g., ice rink, snooker club, bowling alley, laser quest, indoor pool, indoor skate park

^b Time spent at schools other than the subject's main school (for example, regional college)

^c e.g., cinema, arcade

^d e.g., GP, dentist, hair salon, police station, library

^e e.g., sports grounds, outdoor swimming pool, BMX tracks

^f e.g., petrol station, car park, industrial estate, bus stop

References

- Anderson J (1971) Space-time budgets and activity studies in urban geography and planning. *Environ Plan A* 3:353–368
- Barker RG (1968) *Ecological psychology: concepts and methods for studying the environment of human behavior*. Stanford University Press, Stanford
- Braithwaite J (1979) *Inequality, crime and public policy*. Routledge, London
- Brantingham PL, Brantingham PJ (1993) Environment, routine, and situation: Toward a pattern theory of crime. In: Clarke RV, Felson M (eds) *Routine activity and rational choice, advances in criminological theory*, vol 5. Transaction Publishers, New Brunswick
- Brantingham P, Brantingham P (2008) Crime pattern theory. In: Wortley R, Mazzerole L (eds) *Environmental criminology and crime analysis*. Willan Publishing, Cullompton
- Bursik RJ Jr (1988) Social disorganization and theories of crime and delinquency: problems and prospects. *Criminology* 26:519–551
- Bursik RJ, Grasmick HG (1993) *Neighborhoods and crime: the dimensions of effective community control*. Lexington Books, New York
- Clarke RV, Felson M (1993) Introduction: criminology, routine activity, and rational choice. In: Clarke RV, Felson M (eds) *Routine activity and rational choice, advances in criminological theory*, vol 5. Transaction Publishers, New Brunswick
- Cohen LE, Felson M (1979) Social change and crime rate trends: a routine activities approach. *Am Sociol Rev* 44:588–608
- Dietvorst A (1994) Cultural tourism and time-space behaviour. In: Ashworth G, Larkham P (eds) *Building a new heritage: tourism, culture and identity in the New Europe*. Routledge, London, pp 69–89
- Eck JE (1995) Examining routine activity theory: a review of two books. *Justice Q* 12:783–797
- Elliott DS, Wilson WJ, Huizinga D, Sampson RJ, Elliott A, Rankin B (1996) The effects of neighborhood disadvantage on adolescent development. *J Res Crime Delinq* 33:389–426
- Farrington DP (1993) Have any individual, family or neighbourhood influences on offending been demonstrated conclusively? In: Farrington DP, Sampson RJ, Wikström P-OH (eds) *Integrating individual and ecological aspects of crime*. National Council for Crime Prevention, Stockholm
- Felson M (2002) *Crime and everyday life*, 3rd edn. SAGE publications, Thousand Oaks
- Felson M (2006) *Crime and nature*. SAGE publications, Thousand Oaks
- Felson M, Cohen LE (1980) Human ecology and crime: a routine activity approach. *Hum Ecol* 8:389–406
- Fenell DA (1996) A tourist space-time budget in the Shetland Islands. *Ann Tourism Res* 23:811–829
- Forer PC, Kivell H (1981) Space-time budgets, public transport, and spatial choice. *Environ Plan A* 13: 497–509
- Gottfredson M, Hirschi T (1990) *A general theory of crime*. Stanford University Press, Stanford
- Gottfredson DC, McNeil RJ III, Gottfredson GD (1991) Social area influences on delinquency: a multi-level analysis. *J Res Crime Delinq* 28:197–226
- Grasmick H, Tittle C, Bursik R Jr, Arneklev B (1993) Testing the core implications of Gottfredson and Hirschi's general theory of crime. *J Res Crime Delinq* 30:5–29
- Hammond JL (1973) Two sources of error in ecological correlation. *Am Sociol Rev* 38:764–777
- Hanson S, Hanson P (1980) Gender and urban activity patterns in Uppsala, Sweden. *Geogr Rev* 70:291–299
- Janelle DG, Goodchild MF, Klinkenberg B (1988) Space-time diaries and travel characteristics for different levels of respondent aggregation. *Environ Plan A* 20:891–906
- Jarjoura GR, Triplett R (1997) The effects of social area characteristics on the relationship between social class and delinquency. *J Crim Justice* 25:125–139
- Kornhauser RR (1978) *The social sources of delinquency: an appraisal of analytic models*. University of Chicago Press, Chicago, IL
- Lynham DR, Caspi A, Moffitt TE, Wikström P-OH, Loeber R, Novak SP (2000) The interaction between impulsivity and neighborhood context on offending: The effects of impulsivity are stronger in poor neighborhoods. *J Abnorm Psychol* 109:563–574
- Mahoney JL, Stattin H (2000) Leisure time activities and adolescent anti-social behavior: the role of structure and social context. *J Adolesc* 23:113–127
- Mey MG, Heide H (1997) Towards spatiotemporal planning: practicable analysis of the day-to-day paths through space and time. *Environ Plan B: Plan Des* 24:709–723
- Oberwittler D, Wikström P-OH (2009) Why small is better. Advancing the study of the role of behavioral contexts in crime causation. In: Weisburd D, Bernasco W, Bruinsma G (eds) *Putting crime in its place: units of analysis in spatial crime research*. Springer, New York
- Osgood DW, Wilson JK, O'Malley PM, Bachman JG, Johnston LD (1996) Routine activities and individual deviant behavior. *Am Sociol Rev* 61:635–655

- Pentland WE, Harvey AS, Lawton MP, McMoll MA (1999) Time use research in the social sciences. Kluwer Academic/Plenum, New York
- Phillips PD (1980) Characteristics and typology of the journey of crime. In: Georges-Abeyie DE, Harries KD (eds) Crime: a spatial perspective. Columbia University Press, New York
- Pratt TC, Cullen FT (2005) Assessing macro-level predictors and theories of crime: a meta-analysis, crime and justice, vol 32. University of Chicago Press, Chicago
- Raudenbush SW, Sampson RJ (1999) Ecometrics: toward a science of assessing ecological settings, with application to the systematic social observation of neighborhoods. *Sociol Methodol* 29:1–41
- Reiss AJ Jr (1986) Why are communities important in understanding crime? In: Reiss AJ Jr, Tonry M (eds) Communities and crime. University of Chicago Press, Chicago
- Reiss AJ, Rhodes AL (1961) The distribution of juvenile delinquency in the social class structure. *Am Sociol Rev* 26:720–732
- Riley D (1987) Time and crime: the link between teenager lifestyle and delinquency. *J Quant Criminol* 3:339–354
- Robinson WS (1950) Ecological correlations and the behavior of individuals. *Am Sociol Rev* 15:351–357
- Sampson RJ (2006a) How does community context matter? Social mechanisms and the explanation of crime. In: Wikström P-OH, Sampson RJ (eds) The explanation of crime: context, mechanisms, and development. Cambridge University Press, Cambridge, pp 31–60
- Sampson RJ (2006b) Collective efficacy theory: Lessons learned and directions for future inquiry. In: Cullen FT, Wright JP, Blevins K (eds) Taking stock: the status of criminological theory, advances in criminological theory, vol 15. Transaction, New Brunswick, pp 149–167
- Sampson RJ, Groves WB (1989) Community structure and crime: testing social disorganization theory. *Am J Sociol* 94:774–802
- Sampson RJ, Wikström P-OH (2008) The social order of violence in Chicago and Stockholm neighborhoods: a comparative inquiry. In: Shapiro I, Kalyvas S, Masoud T (eds) Order, conflict, and violence. Cambridge University Press, Cambridge, pp 97–119
- Sampson RJ, Raudenbush SW, Earls F (1997) Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science* 277:918–924
- Sarnecki J (1986) Delinquent networks. Report 1986, No 1, Stockholm, National Council for Crime Prevention
- Shaw CR, McKay HD (1969[1942]) Juvenile delinquency and urban areas, University of Chicago Press, Chicago
- Simcha-Fagan O, Schwartz JE (1986) Neighborhood and delinquency: an assessment of contextual effects. *Criminology* 24:667–703
- Taylor RB (1997) Social order and disorder of street blocks and neighborhoods: ecology, microecology, and the systemic model of social disorganization. *J Res Crime Delinq* 34:113–155
- Thornton PR, Shaw G, Williams AM (1997) Tourist group holiday decision making and behaviour: the influence of children. *Tourism Manage* 18:287–297
- Tomlinson J, Bullock N, Dickens P, Steadman P, Taylor E (1973) A model of student's daily activity patterns. *Environ Plan* 5:231–266
- Warr M (2002) Companions in crime: the social aspects of criminal conduct. Cambridge University Press, Cambridge
- Weisburd D, Morris N, Groff E (2010) Hot spots of juvenile crime: a longitudinal study of arrest incidents at street segments in Seattle, Washington. *J Quant Criminol* 26(1):443–467
- West DJ, Farrington DP (1977) The delinquent way of life. Heinemann, London
- Wikström P-OH (1991) Urban crime, criminals and victims. Springer, New York
- Wikström P-OH (2004) Crime as alternative: towards a cross-level situational action theory of crime causation. In: McCord J (ed) Beyond empiricism: institutions and intentions in the study of crime, advances in criminological theory. Transaction, New Brunswick
- Wikström P-OH (2005) The social origins of pathways in crime: towards a developmental ecological action theory of crime involvement and its changes. In: Farrington DP (ed) Integrated developmental and life-course theories of offending, advances in criminological theory, vol 14. Transaction, New Brunswick
- Wikström P-OH (2006) Individuals, settings and acts of crime: situational mechanisms and the explanation of crime. In: Wikström P-OH, Sampson RJ (eds) The explanation of crime: context, mechanisms and development. Cambridge University Press, Cambridge
- Wikström P-OH (2007a) Deterrence and deterrence experiences: preventing crime through the threat of punishment. In: Shoham SG, Beck O, Kett M (eds) International handbook of penology and criminal justice. CRC Press, London
- Wikström P-OH (2007b) The social ecology of crime: the role of the environment in crime causation. In: Schneider HJ (ed) Internationales Handbuch der Kriminologie, vol 1. de Gruyter, Berlin, New York

- Wikström P-OH (2009) Crime propensity, criminogenic exposure and crime involvement in early to mid adolescence. *Monatschrift für Kriminalwissenschaft* 92:253–266
- Wikström P-OH (2010) Situational action theory. In: Cullen F, Wilcox P (eds) *Encyclopaedia of criminological theory*. SAGE Publications, Beverly Hills
- Wikström P-OH, Butterworth DA (2006) *Adolescent crime: individual differences and lifestyles*. Willan Publishing, Cullumpton
- Wikström P-OH, Dolmén L (2001) Urbanisation, neighbourhood social integration, informal social control, minor social disorder, victimisation and fear of crime. *Int Rev Victimology* 8:163–182
- Wikström P-OH, Loeber R (2000) Do disadvantaged neighborhoods cause well-adjusted children to become adolescent delinquents? *Criminology* 38:1109–1142
- Wikström P-OH, Svensson R (2009) When does self-control matter? A study of the interaction between morality and self-control in crime causation. (mimeo) (forthcoming)
- Wikström P-OH, Sampson RJ (2003) Social mechanisms of community influences on crime and pathways in criminality. In: Lahey BB, Moffitt TE, Caspi A (eds) *Causes of conduct disorder and juvenile delinquency*. Guilford Press, New York
- Wikström P-OH, Treiber K (2007) The role of self-control in crime causation: beyond Gottfredson and Hirschi's general theory of crime. *Eur J Criminol* 4:237–264
- Wikström P-OH, Treiber K (2009a) What drives persistent offending? The neglected and unexplored role of the social environment. In: Savage J (ed) *The development of persistent offending*. Oxford University Press, Oxford, pp 389–420
- Wikström P-OH, Treiber K (2009b) Violence as situational action. *Int J Confl Violence* 3:75–96
- Wilcox P, Land KC, Hunt SA (2003) *Criminal circumstance: a dynamic multicontextual criminal opportunity theory*. Aldine de Gruyter, New York