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# Inequality in Exposure to Crime, Social Disorganization and Collective Efficacy: Evidence from Greater Manchester, United Kingdom

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This paper assesses the relevance of social disorganization and collective efficacy in accounting for neighbourhood inequalities in the exposure to crime. Specifically, it questions the potential of community and voluntary organizations to enhance informal social control and reduce exposure to crime. It utilizes calls-for-service (incident) data for Greater Manchester (UK) and a Bayesian spatio-temporal modelling approach. Contrary to expectations, the research finds that measures of social disorganization (concentrated disadvantage aside) and collective efficacy hold a limited effect on neighbourhood exposure to crime. We discuss the implications of these findings for criminological inquiry and theoretical development, highlighting the necessity of such endeavour to account for the national political-economy and welfare regime of research settings.

**Key Words:** violent and nuisance crime, inequalities, concentrated disadvantage, social disorganization, collective efficacy, calls-for-service

## INTRODUCTION

Concentrated disadvantage (poverty), social disorganization and its inverse, collective efficacy, have long been proposed to account for substantial proportion of inequality in the exposure to crime at the neighbourhood level. Following the ground breaking research of Shaw and McKay (1942), Sampson and colleagues reaffirmed that concentrated disadvantage interwoven with ethnic heterogeneity, residential mobility and family disruption (dimensions of social disorganization), served to lessen social ties and weaken informal social control, leading to neighbourhoods facing increased exposure to crime (Sampson 1987; Sampson and Groves 1989; Sampson *et al.* 1997). In contrast, they found that aspects of community organization relating to civic participation served to enhance social ties and strengthen informal social control (or collective efficacy), leading to neighbourhoods facing decreased exposure to crime (Sampson and Groves 1989; Sampson 2006). Whilst supported by a plethora of studies undertaken in settings

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across the United States, the explanatory potency of (dimensions of) social disorganization and collective efficacy has been questioned in European settings (Pauwels *et al.* 2018). Like crime itself, the study of crime is necessarily place and time specific. The theoretical and empirical evolution of criminological enquiry has been conditioned by the historical context of the polities, as well as the characteristics of the urban environments, in which it has taken place (Bannister and O'Sullivan 2020). In these terms, the relevance of social disorganization and collective efficacy (inclusive of their specified dimensions) in accounting for inequality in the exposure to crime at the neighbourhood level, requires being considered with reference to the prevailing context of cities and the polities in which they reside.

A key proposition of social disorganization theory is that voluntary and community organizations, via the provision of services and the enhancement of social ties, serve to strengthen informal social control and consequently decrease exposure to crime at the neighbourhood level (Sampson and Groves 1989; Peterson *et al.* 2000). In this vein, Sampson (2012) proposed that collective civic action holds a stronger association with the presence of community organizations than with individual social ties or civic group membership, following discovery that neighbourhoods with a higher density of voluntary and community organizations exhibited lower crime rates in Chicago (US). Subsequent studies, also undertaken in the United States, have found the effects of voluntary and community organizations on crime to vary according to the characteristics of the organizations themselves (e.g., type of service, length of operation), as well as the context of the neighbourhoods in which they operate (Slocum *et al.* 2013; Wo *et al.* 2016).

Evidence of the effect of neighbourhood organization infrastructure on crime outside the United States is sparse. In light of this, and in recognition of the distinct socio-political contexts of the United States and the United Kingdom, this research seeks to re-examine social disorganization and collective efficacy, and in particular in the role of neighbourhood organization infrastructure in shaping inequalities in the exposure to crime. We explore whether neighbourhoods with a higher density of community and voluntary organizations are exposed to lower crime rates. Further, we assess whether such an effect is conditional on the characteristics of these organizations and of the neighbourhoods in which they operate. We utilize calls-for-service to the Police to examine both violent crime and nuisance crime, enabling an assessment of whether the influence of community infrastructure varies according to the severity of crime.

In contrast to previous studies, most of which are restricted to cross-sectional analyses, we deploy a Bayesian spatio-temporal modelling approach, which uses Integrated Nested Laplace Approximation (INLA), enabling the research to account for the spatial and temporal dependence structures of crime rates. The remainder of the paper is structured as follows. In the next section we assess existing understanding of how concentrated disadvantage, social disorganization and its inverse, collective efficacy, serve to shape inequality in the exposure to crime at the neighbourhood level. Thereafter, we present our data, methodology and results. In the final section, we discuss the implications of our findings for criminological inquiry, as well as, future research directions.

## Social disorganization

Crime does not vary randomly across space (Block and Block 1995). Ecological studies have accounted for the uneven patterning of crime at the neighbourhood level through reference to structural characteristics, particularly the concentration of poverty (Sharkey *et al.* 2016). Social disorganization theory, initially developed by Shaw and McKay (1942) in Chicago, proposes that concentrated poverty, high levels of residential mobility and ethnic diversity, serve to weaken the social networks, norm and value systems required to exercise informal control, leading to higher rates of crime. More recently, family disruption, the nature of local friendship

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networks, the presence of unsupervised groups and low organizational participation, have been identified as further important neighbourhood level processes underlying social disorganization (Sampson 1987; Sampson and Groves 1989). Finally, higher levels of urbanization are expected to weaken the capacity to establish local kinship and friendship networks and lower organizational participation (Sampson and Groves 1989:782).

Whether neighbourhood-level processes mediate the association between poverty and crime (Sharkey *et al.* 2016:625) or not, they tend to be inexorably linked. In other words, neighbourhoods with higher levels of poverty tend also to exhibit higher levels of residential turnover, ethnic heterogeneity and family disruption, and so forth. US-based studies have shown, for example, that high residential turnover is often a symptom of neighbourhood racial transition and White flight, acting as a trigger to neighbourhood decline (Fong and Sibuya 2003). Similarly, low socio-economic status neighbourhoods are also those with the highest concentrations of Black African Americans, who typically exhibit significantly higher rates of poverty and family disruption compared to White groups (Sampson 1987). Finally, neighbourhoods with the highest levels of ethnic diversity also exhibit the lowest levels of social cohesion (Alesina and Ferrara 2000; Putnam 2007) and collective efficacy (Sampson 2012; Hipp and Wo 2015).

These findings, however, are not necessarily generalizable to European contexts. In the United Kingdom, for example, neighbourhoods with the highest levels of concentrated disadvantage are neither inherently residentially unstable (Bailey and Livingston 2007) nor necessarily the most ethnically diverse (Garner 2011). Moreover, studies have generally shown that it is concentrated disadvantage and not ethnic diversity that erodes social cohesion (Letki 2008; Becares *et al.* 2011; Sturgis *et al.* 2011). The significance of race and of racism in delineating and accounting for inequalities in the exposure to crime in the United Kingdom should not be understated (Bowling and Phillips 2002), yet it does not hold the pre-eminent position that it does as an explanation for inequalities in exposure to crime in the United States (see *inter alia* Sampson 2012). Moreover, whilst the spatial concentration of poverty in both the United States and the United Kingdom might have been shaped by similar drivers (e.g., economic restructuring, the rise of insecure low-income work, and increasing immigration (Glasmeier *et al.* 2008)), the policy response to these issues have differed markedly. In particular, the social and political attitudes towards welfare in the United States have led to anti-poverty policies placing greater emphasis on neighbourhood infrastructure creation than in the United Kingdom, which has traditionally adopted state level approaches to poverty amelioration (Glasmeier *et al.* 2008).

### Neighbourhood organization infrastructure

Sampson (2006:153) defines collective efficacy as 'shared beliefs in a neighbourhood's capability for action to achieve an intended effect, coupled with an active sense of engagement'. As such, collective efficacy is associated with the presence of strong primary networks, such as kinship and local voluntary organizations (ibid), understood to inculcate shared beliefs and nurture engagement. Sampson (1997) found collective efficacy to moderate the effect of concentrated disadvantage on exposure to violence in neighbourhoods in Chicago. Whilst a plethora of studies have offered support for the role of collective efficacy in moderating crime in US cities, there have been mixed findings of its effect in European cities (see Pauwels *et al.* (2018) for a review).

In a recent study, Bruinsma *et al.* (2013) evaluated Shaw and McKay's classic social disorganization model alongside Sampson's collective efficacy models in a study of the Hague (Netherlands). They found characteristics of neighbourhood social disorganization and not of collective efficacy to explain variations in crime. In contrast, however, and in a comparative study in Chicago and Stockholm (Sweden), Sampson and Wikström (2008) found neighbourhood social inequality and characteristics of collective efficacy to be the strongest predictors of

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social order and violent crime in both cities. In a study of Peterborough (UK), Wikström *et al.* (2012) found that poor collective efficacy served to explain violent crime, serious theft and vandalism. Finally, Sutherland *et al.* (2013) found characteristics of collective efficacy to be weakly associated with neighbourhood levels of violent crime in London after controlling for characteristics of social disorganization.

Such divergent findings are, of course, partly reflective of the different measures (dimensions) of collective efficacy utilized in these studies, and not necessarily of the diverse contexts in which they took place. Some have drawn directly on survey measures in which respondents were asked about their likelihood of engaging in activities to maintain social control (Sampson 2006; Hipp 2016). However, others have questioned the use of surveys to capture ecological processes, such as informal control and disorder, as they run the risk of producing artificial and conflicting findings (Pauwels *et al.* 2018). More recently, studies have drawn on measures relating to the nature and density of social ties within neighbourhoods, including the membership and presence of voluntary, community and non-profit organizations (Sampson and Groves 1989; Vermeulen *et al.* 2012; Wo *et al.* 2016).

Voluntary and community organizations are understood as being able to enhance informal social control through structuring social ties and promoting shared expectations via role models and exposure to mainstream values (Slocum *et al.* 2013). Sampson (2012:183) argues that the 'capacity for sustained collective action is conditioned mainly by the presence of established institutions and organizations that can be appropriated in the service of collective action goals', having found that the presence of community-based organizations predicted collective efficacy and collective civic action in the neighbourhoods of Chicago. Existing research in the United States has shown that a broad range of neighbourhood organization infrastructure (i.e., schools, churches, libraries, learning services, recreational activities, family and employment support services) to hold protective effects on crime (Sampson 2006; Slocum *et al.* 2013; Wo *et al.* 2016; Corcoran *et al.* 2017).

The causal link between neighbourhood organization infrastructure and crime has remained elusive, however, given that the presence of such infrastructure may itself be conditional on the socio-economic context (and/ or social organization) of the neighbourhood. In a study of the South Bronx (New York, US), Slocum *et al.* (2013) found that neighbourhood disadvantage moderated the effect of neighbourhood organization infrastructure, with some types of charities (i.e., educational and employment) being associated with an increase in violent crime in the most deprived neighbourhoods and a decrease in violent crime in the least deprived neighbourhoods. Finally, Wo *et al.* (2016), using longitudinal data on charities and crime across 10 US cities, found that the age of the voluntary and community organization influenced its protective effect, with beneficial outcomes taking several years to manifest.

The presence of neighbourhood organization infrastructure may also be conditional upon the political and cultural context, and welfare regime, of the setting. In the United Kingdom, successive recent governments have sought to increase the involvement of voluntary and community organizations in welfare provision, with a commensurate move to decrease the involvement of the state in this area (Mythen *et al.* 2013; Labao *et al.* 2018; McAreavey and Brown 2019). In these terms, voluntary organizations in the United Kingdom have filled the vacuum created by a shrinking state and their spatial manifestation is reflective, at least in part, of pre-existing public service infrastructure. In contrast, community development may be more bottom-up, grassroots-driven in the United States (Kerlin 2006; Haugh and Kitson 2007), where its liberal non-profit regime, is less reliant on government funding for its existence (Clifford *et al.* 2010). Thus, and in this context, community organizational infrastructure organizations may more closely reflect the civic capacity of the local communities in which they operate and, vitally, of the collective action required to enact informal social control (Warren 2001; Sampson 2012).

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As a final consideration, existing research has found that the association between the characteristics of social disorganization and crime differs according to the measure of crime utilized (Klinger and Bridges 1997; Slocum *et al.* 2013). Survey-based measures of crime, in contrast to police recorded crime, have more consistently shown that the structural characteristics of communities correlate with crime rates (Danielsson 2019). The reliance of ecological studies on recorded crime has been criticized for some time, as not all crime is reported to, or recorded by, the police, cumulatively serving to underestimate the burden of crime on communities (Skogan 1984; Warner and Pierce 1993; Sampson and Groves 1989). Calls-for-service (incident data) to the police serve to overcome any bias arising from crime recording, serving as a better measure of neighbourhood crime (Warner and Pierce 1993). As such, and particularly in the United States, calls-for-service data are increasingly being deployed in studies of crime (Warner and Pierce 1993; Sherman 1995; Weisburd *et al.* 2006; Roh and Choo, 2008; Lum 2011). We discuss measures of crime more fully in the data section, below.

## DATA AND METHODOLOGY

### Study area and units of analysis

In this study, we present an analysis of calls-for-service to the Police, as measured across Lower Super Output Areas (LSOAs), in Greater Manchester (GM), United Kingdom (UK). GM is the second largest metropolitan region in the United Kingdom, located in the North-West of England. The metropolitan region comprises of ten local authorities with a population of 2.8 million (ONS 2019). There are 1,673 LSOAs in GM. LSOAs are Census geographies, defined on the basis of homogenous population size (approximately 1,500 people) and household characteristics, and tend to be framed by natural geographical boundaries. LSOAs have been argued to match both experts' and residents' perceptions of neighbourhoods (Brunton-Smith *et al.*, 2014). As the interest of this study is on community level processes, non-residential neighbourhoods with a workplace population greater than the residential population (9 per cent) were excluded from the analysis.

### Measures of crime

In the United Kingdom, the two main sources of information on crime are offences recorded by the Police and experiences of victimization drawn from the Crime Survey for England and Wales. Both measures hold limitations (see ONS 2019). The Crime Survey for England and Wales (CSEW) is considered to be the most accurate measure of the experience of crime but it based on a small survey sample and for this reason, cannot produce reliable crime estimates at the neighbourhood level. The survey is also subject to sources of bias arising from survey measurement error, response error, and questionnaire error (Pauwels *et al.* 2018). Police recorded crime records are the main source of information on crime levels and trends in small areas but are an imperfect measure of crime as they are estimated from the number of notifiable crimes reported to, and subsequently recorded by, the Police. One of the main sources of bias in Police recorded crime records is the under-counting of offences, which has led to the declassification of police recorded crime data as national statistics (ONS 2019). The under-recording of crime results from rules governing the recording of data and operational decisions in respect to the allocation of resources (ONS 2019).

An alternative measure of crime that is increasingly finding use in ecological studies of crime (see *inter alia* Sherman 1995; Weisburd *et al.* 2006; Weisburd 2015), and specifically in the assessment of social disorganization in neighbourhoods in the United States (see *inter alia* Warner and Pierce 1993; Roh and Choo 2008), is reported crime (incidents) from calls-for-service to the Police. Calls-for-service data are considered to be free from some of the bias inherent in of-

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ficial crime records introduced during the process of recording a crime incident (Warner and Pierce 1993). Incidents are reported to the Police by the public in a number of ways, for example, through 999 calls for assistance at a Police station, or to a police officer on patrol (ONS 2019). Although calls-for-service are still subject to the public's willingness to report an incident, they are considered to be closer to the 'lived experience of crime' since they are not subject to changes in counting rules, definitions, or Police responses to crime, but rather on citizen reports of crime to the police (Warner and Pierce 1993).

The calls-for-service data span the period 2012–16. The analysis considers both violent and nuisance crimes. Violent crime has been the subject of previous studies of social disorganization in both United States and European cities (Peterson *et al.* 2000; Wikström and Svensson 2008; Wikström *et al.* 2012; Sampson 1997; Sutherland *et al.* 2013; Danielsson 2019) and thus, its assessment here, enables benchmarking with this body of work. We also assess nuisance crime as we expect socially organized neighbourhoods (those with greater collective efficacy capabilities) to be able to exert greater informal control over less severe offences (Warner and Clubb 2013).

Violent crime covers incidents wherein the victim is intentionally stabbed, punched, kicked, pushed, jostled, etc., or threatened with violence whether or not there is any injury (Home Office 2010). Nuisance crime typically relates to incidents involving 'trouble, annoyance, irritation, inconvenience, offence or suffering to the local community in general, rather than to individual victims' (ONS 2019). It is important to note that recorded crime counts capture only a small subset of nuisance incidents reported to the Police. In 2016, for example, only around 20 per cent of nuisance incidents reported to the Police were subsequently recorded as crimes in GM. Nevertheless, whilst the majority of nuisance incidents (e.g., Anti-Social Behaviour) might not meet the standards required to be recorded as a crime, they have been argued to hold a detrimental impact upon neighbourhood social cohesion (Innes, 2014). In these terms, it is plausible that nuisance incidents serve as a useful measure of collective, rather than individual-based, social control. Similarly, in 2016 only around 40 per cent of violent incidents reported to the police in GM were recorded as crimes, with around 15 per cent of these recorded under a different crime category. Cumulatively, these insights highlight the advantage of using calls-for-service data to more fully capture neighbourhood experiences of crime.

## Social disorganization variables

In line with previous research, we use a range of measures to capture neighbourhood social disorganization processes including concentrated disadvantage, residential mobility, ethnic heterogeneity, family disruption and urbanization (Shaw and McKay 1942; Sampson 1987; Sampson and Groves 1989). In addition, we use a measure of the density of charities to capture neighbourhood organization structures that have previously, and in US-based studies, been associated with enhancing social cohesion and collective efficacy (Sampson 2012). Specifically, the research employs the following measures:

### *Concentrated Disadvantage:*

We measure concentrated disadvantage using the 2015 Index of Multiple Deprivation. It is a relative measure of deprivation calculated at the neighbourhood level and comprising of a range of indicators. We calculate the 2015 IMD based on six dimensions of deprivation[1]: income, employment, health, education, barriers to housing and services, and the living environment.

### *Residential turnover:*

We measure residential turnover with reference to the 2011 Census, which calculates the inflows and outflows of people to and from an LSOA in the year prior to the Census. This is expressed as percentage of the 2011 LSOA resident population.

1 The published IMD scores also include a crime domain which has been excluded from the IMD used in this study.

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*Ethnic diversity:*

We use the 2011 Census ethnicity variable to calculate diversity using Simpson's (1949) diversity index which captures the probability of two randomly chosen individuals within one neighbourhood being members of different ethnic categories.

*Family disruption:*

This is measured by the percentage of lone parents in each LSOA and is drawn from the 2011 Census.

*Urbanization:*

The degree of urbanization is a measure of the number of persons per hectare in an LSOA and is drawn from the 2011 Census.

### Neighbourhood organization infrastructure variables

*Voluntary and community organizations:*

We calculate the density of charitable organizations (per 1,000 population) via utilization of the UK charities register. A charity in the United Kingdom is defined as an organization that has an exclusively charitable purpose and exists for the public benefit. In line with previous US studies, we assess the influence of charities by type on the assumption that they do not necessarily hold a uniform influence on crime. On the basis of available UK charities register data, we grouped charities by type of operation and the intended beneficiary group under four categories: economic, employment and community development; amateur sports; children and young people; and, human rights, religious and racial harmony. We follow Wo *et al* (2016) and estimate the number of charities within a 0.5 mile radius from the charity's registered postcode because the reach of community organizations operating within a neighbourhood is likely to extend in surrounding neighbourhoods. Further, and also in line with previous US studies (Slocum *et al.* 2013; Wo *et al.* 2016), we examine the effect of the density of well-established charities, defined here as those that have been operating for more than 5 years.

The descriptive statistics of the variables deployed in the research are presented in Table 1.

### Analytical strategy

The analytical strategy entailed estimation of Bayesian models using Integrated Nested Laplace Approximation (INLA). Bayesian modelling approaches have increasingly been applied in the analysis of crime data (Luan, *et al.* 2016; Tabb *et al.* 2016; Mahfoud *et al.* 2020) because of their capacity to integrate the analysis of spatial and temporal associations in given data. This is important as events (i.e., incidents) drawn from geographically and temporally close units tend to be more similar than events drawn from units further apart. This is known as spatial and temporal autocorrelation. The analytical complexity of such a task is beyond traditional statistical approaches. INLA is a deterministic analytical approach for Bayesian inference, which draws on Latent Gaussian Models (LGM) and uses a three-step process involving Laplace Approximation (LA) and numerical integration to derive posterior distributions for the parameters of interest (see Mahfoud *et al.* 2020 for a detailed explanation of the estimation process). In essence, Bayesian inference seeks to probe the likelihood of associations in data through an assessment of uncertainty, described by suitable probability distributions, so that there is no distinction between observable data or unobservable parameters (considered as random quantities) (Blangiardo and Cameletti 2015). Unlike typical regression models, the model specification includes random effects that help account for spatial and temporal autocorrelation enabling fixed and random effects to be taken into account when examining crime patterns (Ross *et al.* 2012).

**Table 1** *Descriptive statistics*

| | Mean | SD | Min | Max |
|---|---|---|---|---|
| Calls-For-Service-Violence_Y12 | 23.8 | 19.5 | 0.0 | 216.2 |
| Calls-For-Service-Violence_Y13 | 24.7 | 18.5 | 0.0 | 123.9 |
| Calls-For-Service-Violence_Y14 | 22.5 | 16.7 | 0.6 | 120.2 |
| Calls-For-Service-Violence_Y15 | 24.5 | 18.4 | 0.7 | 140.1 |
| Calls-For-Service-Violence_Y16 | 25.4 | 18.8 | 0.0 | 123.1 |
| Calls-For-Service-Nuisance_Y12 | 40.3 | 25.6 | 3.2 | 191.9 |
| Calls-For-Service-Nuisance_Y13 | 40.4 | 25.7 | 3.2 | 216.7 |
| Calls-For-Service-Nuisance_Y14 | 37.1 | 24.3 | 2.2 | 189.7 |
| Calls-For-Service-Nuisance_Y15 | 34.4 | 21.9 | 2.6 | 164.2 |
| Calls-For-Service-Nuisance_Y16 | 35.2 | 23.9 | 1.3 | 153.8 |
| Charities: Young people | 7.3 | 7.3 | 0.0 | 84.2 |
| Charities: Sports | 2.2 | 1.8 | 0.0 | 14.0 |
| Charities: Human rights | 0.4 | 0.7 | 0.0 | 6.6 |
| Charities: Com. development | 1.7 | 1.9 | 0.0 | 15.9 |
| Urbanization | 44.6 | 27.6 | 0.6 | 249.1 |
| Concentrated disadvantage | 25.1 | 17.1 | 1.3 | 73.1 |
| Residential turnover | 20.6 | 13.1 | 6.3 | 150.1 |
| Ethnic diversity | 0.3 | 0.2 | 0.0 | 0.9 |
| Lone parents | 12.6 | 5.5 | 0.1 | 34.0 |

There are three key advantages of the INLA approach. Firstly, previous research has tended to utilize frequentist approaches, which model spatial and temporal data on the assumption of independence. In contrast, INLA models adequately account for spatial and temporal dependence allowing random spatio-temporal effects to be included in the models. This enables less biased and more efficient parameter estimates to be obtained. Secondly, is its ability to take into account uncertainty in the model estimates and prediction results. In the Bayesian regression models probability distributions rather than point estimates are used to determine the posterior probability parameters of the probability distribution which allows quantification of the uncertainty in the models. Thirdly, because it uses numerical integration, and thus holds a computational advantage over other Bayesian methods (such as Markov Chain Monte Carlo), which enables nested models to be easily fitted and compared using the Deviance Information Criterion (DIC) (Luan *et al.* 2016; Tabb *et al.* 2016). The model can be specified as follows:

Equation 1 includes observed crime counts for neighbourhood i (1 … 1642) at time point t (2012, … , 2016), modelled as counts drawn from a Poisson distribution

$$O_{it} \sim poisson(\mu_{it}) \tag{1}$$

$$\log(\mu_{it}) = log(E_{it}) + \alpha + \beta x_i + s_i + u_i + \varphi_t + \gamma_t + w_{it} \tag{2}$$

and offset by the population rate per 1,000 population in neighbourhood *i* at time *t*.

Equation 2 includes a vector of covariates *X* and spatial effects, a structured component $S_i$, which accounts for local variability and correlation between neighbouring areas, and an unstructured part $u_i$, which captures remaining information as well as temporal effects ($y$t $+ \varphi$t), which captures the time trend across the study area. The model also includes a space-time interaction ($w_{it}$) to take into account departures from main spatial and main temporal effects (Luan

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*et al.* 2016). We used an intrinsic conditional autoregressive (ICAR) prior distribution for both spatial and temporal structured parts of INLA, which assumes spatial and temporal adjacency and its influence on a given area or time point. We chose weakly informative priors to build the models. To ensure that the choice of prior does not affect the results, these were then compared with more informative priors, which showed no significant difference.

## RESULTS

This section reports (see Table 2) the assessment of the association between (dimensions of) social disorganization and collective efficacy and both violent and nuisance incidents reported to the police in GM in the period 2012–16. Model 1 is the model of social disorganization, incorporating measures of concentrated disadvantage, ethnic diversity, residential turnover, family disruption and urbanization. Model 2 is the model of collective efficacy, extending Model 1 through the incorporation of a measures of neighbourhood organization infrastructure (i.e., the density of charitable organizations by type).

Model 1 suggests that for every unit increase in concentrated disadvantage there is a 3 per cent increase in violent incidents and a 2 per cent increase in nuisance incidents.[2] To place this finding in context, the most deprived neighbourhoods in GM possess a level of concentrated disadvantage 20 points higher than the average. Thus, these neighbourhoods are exposed to violent and nuisance incident rates 60 per cent and 40 per cent above the average, respectively. Turning to examine the other dimensions of social disorganization, the following can be discerned: ethnic diversity is associated with an increase in violent incidents, but not in nuisance incidents; residential turnover is associated with an increase in both violent and nuisance incidents; family disruption is associated with an increase in nuisance but not in violent incidents; and, the degree of urbanization is weakly associated with both violent and nuisance incidents. In order to assess the relative importance of the different dimensions of social disorganization in accounting for calls-for-service we compared nested models using the change in the deviance information criterion (DIC). The results showed that the inclusion of concentrated disadvantage improved the fit of the models significantly, whereas the inclusion of the other social disorganization variables led to little improvement in the model fit.

Model 2 (see Table 2) indicates that the density of neighbourhood organization infrastructure holds little or no effect on either violent or nuisance incidents in GM, given that the credible intervals include zero for three out of four charity variables. Only the density of human rights, religious and racial harmony charities can be seen to hold a protective effect on violent and nuisance incidents. Overall, however, there is little improvement in the model fit as indicated by the deviance information criterion (DIC)[3] following the inclusion of the neighbourhood organization infrastructure variables. Voluntary and community organizations seemingly hold limited influence in accounting for variation in neighbourhood exposure to (reported) crime. We carried out additional analyses in order to assess whether this finding was a consequence of the measure of neighbourhood organization infrastructure deployed or of the data used to generate it. Firstly, and in a similar vein to the approach adopted by Sampson (2012), we assessed the influence of the total number of charities upon violent and nuisance incidents. Once more, however, no substantive association was found. Secondly, the measure of neighbourhood organization infrastructure was calculated with reference to an alternate data resource, Ordinance Survey Points of Interest (POI) data (Ordnance Survey, 2015). Doing so, however, yielded similar results to those generated by utilizing the UK Charities register and did not serve to improve the model fit.

2 The association between each of the social disorganization/collective efficacy measures and reported crime can be interpreted more easily through exponentiating the model coefficients. We follow this approach here.

3 Lower DIC values generally indicate a better model fit.

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Model 3, also presented in Table 2, considered the potential existence and influence of interaction effects between concentrated disadvantage and neighbourhood organization infrastructure by type, upon violent and nuisance incidents. Whilst the findings serve to identify the existence of interaction effects, specifically between concentrated disadvantage and both economic/community development and young people/children charities, they do not serve to improve the model fit. There is only a modest change in the DIC in comparison to the previous model. In other words, the influence of neighbourhood organization infrastructure upon reported crime does not differ substantially according to the level of concentrated disadvantage. Given that, across all models, the magnitude of the effect of concentrated disadvantage upon reported violent and nuisance crime remains unchanged, neighbourhood organization infrastructure does not serve to mediate the association between deprivation and crime.

The posterior summaries of the precision of the random (spatial and temporal) effects are shown at the bottom of Table 2. The precision of an effect is given by the inverse of its variance, meaning that larger precision terms indicate smaller variance of the effect. The unstructured and structured spatial precision terms are relatively small for both violence and nuisance incidents, indicating large spatial variability in the occurrence of these incidents after adjusting for social disorganization characteristics. In contrast, the unstructured and structured temporal precision terms are relatively large for both violence and nuisance incidents, indicating temporal stability in the occurrence of these incidents. The space-time precision term which accounts for residual spatial variation not accounted for by the main time and space effects is also larger than the space precision terms. Taken together, these results suggest that the spatial effects dominate the spatio-temporal variation of violence and nuisance incidents in Greater Manchester. We observe little change in the size of the spatial and temporal precision terms across the three models suggesting the contribution of each random effect to the total variance does not change much after the inclusion of social disorganization characteristics.

To date, the presentation of the results has centred on the assessment of the capacity of specific measures of concentrated disadvantage, social disorganization and collective efficacy to account for inequality in the exposure to crime at the neighbourhood level. Figure 1, using the posterior probabilities drawn from model 2, depicts neighbourhoods where the residual risk of violent and nuisance incidents is higher than the average risk in GM after all social disorganization and neighbourhood organization infrastructure characteristics (Model 2) are taken into account. It is evident that there is significant residual geographic variability remaining. In other words, the maps serve to indicate the limitation of the variables utilized by this study in accounting for the variance in violent and nuisance incidents in GM. There are a number of observations that can be drawn from the patterning evident in the maps. Firstly, clusters of neighbourhoods with higher than expected violent and nuisance rates are situated in the central GM districts, particularly Manchester and Salford. These districts encompass 40 per cent and 30 per cent respectively of the most deprived neighbourhoods in England according to the 2015 IMD. Moreover, the majority of neighbourhoods in these districts can be defined as being in close proximity to Manchester city centre. There are also clusters of neighbourhoods with higher than expected violence and nuisance rates situated towards the periphery of the study area. These clusters typically comprise more affluent neighbourhoods. Secondly, it is in the neighbourhoods closest to town and city centres that the highest density of charities can be found, finding presence in neighbourhoods with both lower and higher than expected violence and nuisance rates. In summary, these results provide little support for the proposition that community and voluntary organizations exert influence on community capacity to control crime.

**Table 2** *Results of spatio-temporal model of calls-for-service to the Police in Greater Manchester, 2012–16*

| | Violence | | | Nuisance | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) |
| Intercept | 1.89 (1.78,1.99) | 1.86 (1.76,1.97) | 1.83 (1.72,1.96) | 2.52 (2.43,2.61) | 2.48 (2.39,2.58) | 2.50 (2.40,2.59) |
| Concentrated disadvantage | 0.03 (0.03,0.03) | 0.03 (0.03,0.03) | 0.03 (0.03,0.03) | 0.02 (0.02,0.03) | 0.02 (0.02,0.03) | 0.03 (0.02,0.03) |
| Ethnic diversity | 0.39 (0.20,0.59) | 0.38 (0.19,0.58) | 0.31 (0.11,0.52) | 0.10 (−0.07,0.27) | 0.08 (−0.10,0.26) | 0.08 (−0.09,0.26) |
| Residential turnover | 0.01 (0.01,0.02) | 0.01 (0.01,0.02) | 0.01 (0.01,0.02) | 0.01 (0.01,0.02) | 0.01 (0.01,0.02) | 0.01 (0.01,0.02) |
| Lone parents | 0.00 (−0.00,0.01) | 0.00 (−0.00,0.01) | 0.00 (−0.00,0.01) | 0.01 (0.00,0.01) | 0.01 (0.00,0.02) | 0.01 (0.00,0.02) |
| Urbanization | −0.00 (−0.00,−0.00) | −0.00 (−0.00,−0.00) | −0.00 (−0.00,−0.00) | −0.00 (−0.00,−0.00) | 0.00 (−0.00,−0.01) | −0.00 (−0.00,−0.00) |
| Charities: Young people & children | | 0.00 (−0.00,0.01) | −0.01 (−0.01,0.01) | | 0.00 (−0.00,0.01) | −0.00 (−0.01,0.00) |
| Charities: Amateur sports | | 0.02 (−0.00, 0.04) | 0.01 (−0.03,0.05) | | 0.01 (−0.00,0.03) | 0.01 (−0.03, 0.04) |
| Charities: Human rights/ religious/racial harmony | | −0.07 (−0.12,−0.01) | −0.01 (−0.11, 0.10) | | −0.07 (−0.12,−0.03) | 0.00 (−0.09, 0.10) |
| Charities: Economic & community development | | 0.02 (−0.00,0.05) | 0.07 (0.03,0.11) | | 0.02 (−0.01,0.04) | 0.05 (0.01,0.09) |
| Charities: Young people & children × deprivation | | | 0.00 (−0.00,0.00) | | | 0.00 (0.00,0.00) |
| Charities: Amateur sports × deprivation | | | 0.00 (−0.00,0.00) | | | 0.00 (−0.00,0.00) |
| Charities: Human rights/ religious/racial harmony × deprivation | | | −0.00 (−0.00,0.00) | | | −0.00 (−0.00,0.00) |
| Charities: Economic & community development × deprivation | | | −0.00 (−0.00,−0.00) | | | −0.00 (−0.00,0.00) |
| Random effects (precision, $\tau = 1/\sigma^2$) | | | | | | |
| Time structured | 1407.05 (69.95, 5480.86) | 1411.47 (70.66, 5496.57) | 1252.98 (87.16, 5261.02) | 455.67 (69.25, 1517.69) | 410.52 (69.32, 1292.67) | 411.3 (69.21, 1299.59) |
| Time unstructured | 850.73 (138.15, 2817.55) | 853.1 (138.68, 2822.42) | 973.74 (133.19, 3509.61) | 1506.53 (118.78, 5839.15) | 1691.2 (107.09, 6032.38) | 1685.05 (108.91, 6017.05) |
| Space structured | 11.16 (6.66, 19.96) | 10.73 (6.52, 19.21) | 11.81 (7.05, 18.7) | 15.99 (9.26, 25.58) | 16.66 (9.66, 27.39) | 19.18 (10.07, 33.07) |
| Space unstructured | 7.37 (6, 8.54) | 7.47 (6.28, 8.56) | 7.3 (6.38, 8.34) | 9.41 (8.22, 10.81) | 9.44 (8.22, 10.81) | 9.44 (8.19, 10.82) |
| Space-time interaction | 41.9 (38.93, 45.54) | 42.14 (39.02, 45.53) | 43.91 (40.82, 46.66) | 22.08 (20.626, 23.27) | 21.45 (18.71, 23.26) | 22.61 (21.55, 23.54) |
| DIC | 51853.56 | 51852.32 | 51855.29 | 57109.3 | 57105.76 | 57110.07 |
| DIC change | −32.35 | −1.24 | 2.97 | −23.82 | −3.54 | 0.26 |

Note: 95% Credible Intervals are shown in parentheses. Deviance Information Criterion (DIC) change compares the DIC obtained from each preceding model. For model 1 the comparison is with the (empty) model.

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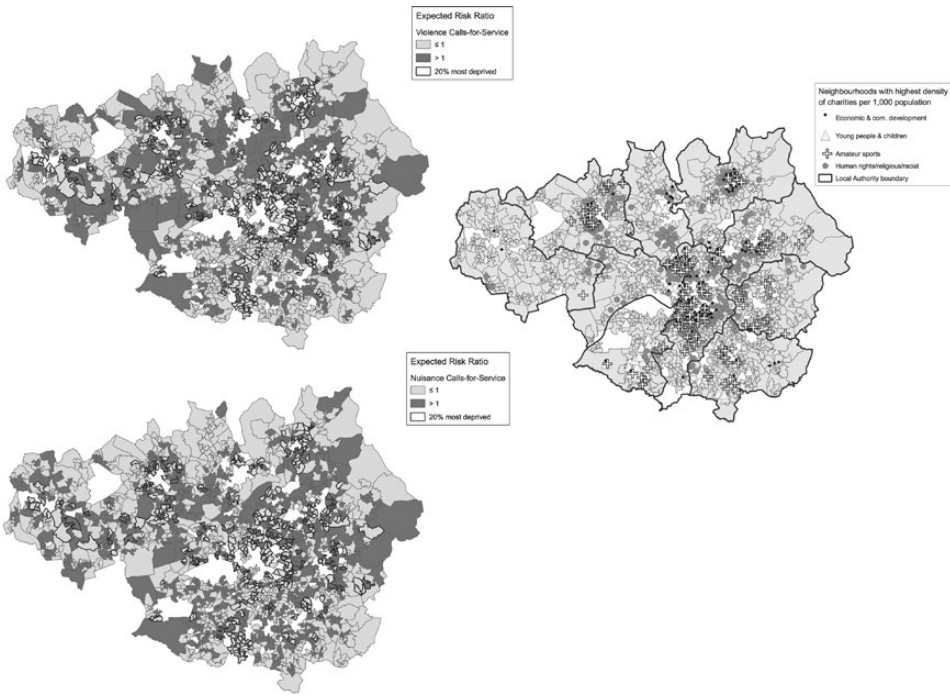


**Fig. 1** Expected risk of violent and nuisance calls-for-service incidents (left) and highest density of charities per 1,000 population (right) in Greater Manchester, 2012–16

Notes: 1. LSOAs shown in white have been excluded from the analysis as they are predominantly non-residential. 2. Dark shaded LSOAs are those with higher than the overall risk for Greater Manchester. 3. Neighbourhoods with the highest density of charities are those in the top decile of the charities distribution.

## DISCUSSION

Utilizing calls-for-service (incident data) to the Police, a measure considered to be closer to the 'lived experience of crime' (Warner and Pierce 1993) and one increasingly deployed in US-based ecological studies of crime (Sherman 1995; Weisburd *et al.* 2006; Weisburd 2015), this paper has sought to examine the relevance of concentrated disadvantage, as well as measures of social disorganization and collective efficacy in accounting for inequality in the exposure to violent and nuisance incidents at the neighbourhood level in Greater Manchester (UK). The research was provoked by recent studies querying of the relevance of social disorganization and collective efficacy, or at least of the measures typically deployed as representative of them in US studies, to European settings (Pauwels *et al.* 2018). It was also stimulated by the sparsity of research examining the role of neighbourhood organization infrastructure, as a measure of collective efficacy, in reducing exposure to crime at the neighbourhood level in particular.

The research found concentrated disadvantage to hold a strong association with neighbourhood exposure to both violent and nuisance crime though perhaps not to the same extent as in the United States where concentrated disadvantage (intensity and spatial patterning) varies more markedly. It found limited evidence, however, of typical measures of social disorganization serving to further exacerbate such exposure. In contrast to US studies, ethnic heterogeneity, residential turnover and family disruption accounted for limited variation in calls-for-service. Moreover, the research found these results to be consistent across the five years of calls-for-service data

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incorporated in the analyses. Our results show small temporal variability in the occurrence of violence and nuisance incidents in Greater Manchester after adjusting for social disorganization characteristics.

In interpreting these findings, it seems plausible to surmise that concentrated disadvantage and its associated or consequential markers of social disorganization emerge from an interplay between the political-economy of nation states and their respective welfare expenditure (inclusive of delivery format), i.e., they are temporally and spatially context specific. While both the United States and United Kingdom have liberal welfare states, in the United States welfare programmes are designed by individual states and funded, in part, by expenditure resourced with local taxes and fees. This results in substantive variation in the existence and nature of such services across states and cities in the United States. In contrast, the United Kingdom holds a centralized welfare system that tends towards assuring more geographic equality. In the US access to resources and institutions is also restricted to residents of those communities unlike European countries where access to resources is not determined by where people live (Howell 2019).

Distinctions between the political-economies of the United States and United Kingdom and their respective welfare regimes, therefore, likely account for the differing relevance and significance of certain measures of social disorganization. This helps explain why neighbourhoods with the highest levels of concentrated disadvantage in the United Kingdom, in contrast to the United States, are neither inherently residentially unstable (Bailey and Livingston 2007) nor necessarily the most ethnically diverse (Garner 2011) and consequently why these measures hold more limited relevance in accounting for inequalities in neighbourhood exposure to crime. More generally, this helps explain why the neighbourhood context in the United States may have a greater effect on generating inequalities in the exposure to crime.

The finding that concentrated disadvantage, the core dimension of social disorganization in this study, held greater relevance in accounting for inequality in the exposure to violent, as opposed to, nuisance, crime merits further consideration. Whilst it is to be expected that a breakdown of informal social control increases the likelihood of neighbourhood residents making calls-for-service to the police (Warner and Pierce 1993; Hirschfield and Bower 1997), it is also known that the propensity of reporting crime varies according to the socio-economic status of neighbourhoods and by crime type (Black 1976; Baumer 2002; Tarling and Morris 2010). Nuisance (less serious) crimes tend to be less frequently reported, particularly in deprived neighbourhoods (Hope *et al.* 2001). The weaker association between concentrated disadvantage and the reporting of nuisance crimes may arise due to a heightened tolerance of such crimes in the most deprived neighbourhoods (Foster 1995) or, given the extent of violent crimes in these neighbourhoods, it may reflect a low level of confidence in the police to address less serious crimes (Jackson *et al.* 2009).

Contrary to expectations founded on the existing US research base (Sampson, 2012; Slocum *et al.* 2013; Wo *et al.* 2016; Corcoran *et al.* 2017), the research found limited evidence to support the proposition that the presence of neighbourhood organizational infrastructure, understood as a dimension of collective efficacy, served to lower exposure to crime in neighbourhoods. We found, at best, a weak association between the density of charitable organizations (by type) and both violent and nuisance incidents. We also found no evidence to suggest that the effect of community and voluntary organizations on crime rests upon the level of concentrated disadvantage. The limited protective effect on neighbourhood exposure to both violent and nuisance incidents associated with the presence of human rights/racial and religious harmony charities is noteworthy. Yet, if this type of charitable organization acts to enhance the development of bridging ties, fostering social cohesion (Putnam 2007) and laying the foundation for civic en-

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gagement and collection action (Sampson 2006; 2012), the larger question is why other types of neighbourhood organizational infrastructure do not.

Once more, it is necessary to reflect on the differing political-economies and welfare regimes of the United States and the United Kingdom. Specifically, upon how these have informed the development of the charitable sectors in these polities. In the United Kingdom, as previously noted, successive governments have sought to increase the involvement of voluntary and community organizations in welfare provision, matched by a commensurate move to decrease the involvement of the state in this area (McAreavey and Brown 2019). In these terms, voluntary organizations have filled the vacuum created by a shrinking state. Their existence and spatial manifestation, at least in part, is reflective of the pre-existing public service infrastructure (and expenditure) and of its pre-existing endeavour to address the consequences of concentrated disadvantage. This is in contrast to the United States wherein community organizations are more bottom-up, grassroots-driven (Kerlin 2006; Haugh and Kitson 2007) and less reliant on government funding for its existence (Clifford *et al.* 2010). Thus, and in the United States, neighbourhood organization infrastructure is more likely to develop in socially organized neighbourhoods (Slocum *et al.* 2013), and to be reflective of the civic capacity of neighbourhoods, and of the collective action required to enact informal social control (Warren 2001; Sampson 2012).

If not a consequence of collective efficacy, it is understandable that neighbourhood organization infrastructure in the United Kingdom holds limited influence in reducing exposure to crime. Yet, and in this context, it is also important to recognize that (post 2010) government spending cuts have disproportionally hit the voluntary sector, with those organizations located in the most deprived local authorities being the most severely affected by these cuts (Clifford *et al.* 2010; Hastings *et al.* 2017; Clifford 2017). Thus, many voluntary sector organizations, have been forced to close or contract their services (Jones *et al.* 2016; Clifford 2017), with voluntary sector organizations involved in the delivery of offender management, rehabilitation and treatment services being severely affected (Mythen *et al.* 2013). Viewed in this light, it is possible that the limited influence of neighbourhood organization infrastructure on crime might also be in part consequence of the time period examined in this research. Having said this, it is important to note that the measures of charitable organizations deployed in this study were crude. It was not possible to assess whether the registered location of charities served as an accurate marker of their areas of operation, nor was it possible to assess whether the duration of a charitable organization's operation served to account for its influence as has been found in US-based studies (Sampson 2006; Corcoran *et al.* 2017).

Re-examining the relevance of social disorganization and collective efficacy, this research has served to highlight the importance of concentrated disadvantage (whilst also delineating its limitations) in accounting for neighbourhood inequalities in the exposure to crime in the United Kingdom. On the other hand, it has also found that typical dimensions of social disorganization and collective efficacy (or at least the measures of which that were deployed in this study) to hold more limited relevance in accounting neighbourhood inequalities in the exposure to crime. To be clear, this does not detract from the potential value of these concepts in helping explain crime. Rather, it serves to illustrate that criminological inquiry and theoretical development requires recognizing that it is strongly conditioned by the national political economy and welfare regime in which study settings are positioned.

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