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Desistance: A postcode lottery? An exploratory study of the geographical and socioeconomic factors that impact reoffending

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Abstract

This study aims to address a significant gap in desistance research by exploring the existence of any systemic barriers to desistance that offenders might face on a local level. It will then determine if there is a relationship between austerity and reoffending that could contribute to the explanation of the disparity in local reoffending rates, before exploring the impact of austerity on the systemic barriers to desistance identified.

It uses multiple regression analysis on a dataset of reoffending data for 149 local authorities over eight years, with 28 potential independent variables. It identified that there are systemic, structural barriers to desistance that face offenders on a local level. It then demonstrated a relationship between the impacts of austerity on local services and reoffending rates. Finally, it showed that the impacts of austerity have potentially exacerbated the systemic barriers facing would-be desisters in already disadvantaged areas.

This has three major implications.. First, it shows that reducing reoffending cannot be the responsibility of the Ministry of Justice alone, with the barriers facing would-be desisters coming from all aspects of socioeconomics. Second, it provides an example of the impacts of austerity disproportionately targeting the most disadvantaged. Finally, it demonstrates that this approach works and can significantly improve our understanding of desistance with relatively little work.

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Introduction

Despite increased public and political attention on reducing reoffending, with criminal justice reforms and rhetoric focusing on this issue for more than two decades (see, for example, The Social Exclusion Unit 2002; Solomon et al. 2007; Ministry of Justice 2016), UK reoffending rates remain stubbornly high (Ministry of Justice 2019b; Prison Reform Trust 2018). Theories of desistance - of the process of moving away from a pattern of criminal behaviour into the long-term abstinence from crime (McNeill et al. 2012) - attempt to explain this in various ways. There is also a significant geographical disparity in the UK's reoffending data, with rates ranging from 19.2% to 42.1% in the most recent available data (Ministry of Justice 2019b). Little attention has been paid to this, and no research has sought to understand these differences, although desistance literature may provide some insights.

Government policy to reduce reoffending has been based in some form around 'what works' principles – short-term interventions and programmes aiming to 'reform' offenders (Maruna and Mann 2019) – since the 1990s (Solomon et al. 2007). As well as expanding the scope of probation and introducing the National Probation Service in 2001, the 1997-2010 Labour government increased spending on these interventionist programmes in prison and probation (Solomon et al. 2007). This interventionist approach was designed to tackle reoffending by engaging offenders in an unwritten contract, offering programmes and incentives, as well as sanctions, to encourage prisoners to 'go straight' (The Social Exclusion Unit 2002). Throughout this period the government was unable to demonstrate a significant decrease in reoffending with this approach, and modified or dropped every one of their targets (Solomon et al. 2007). This approach has been criticised for allowing the broader economic and social issues surrounding crime and reoffending to fall off the agenda in favour of a focus on individual responsibility and personal change (Grover 2013).

Since 2010, under seven different Secretaries of State for Justice and six different Under-Secretaries with responsibility for prisons and probation, the Conservative government's focus and approach has been inconsistent. Different Secretaries of State have focused on different priorities, including reversing significant policies proposed by their predecessors (see, for example, Doward 2016 and Webster 2018). The rhetoric of reducing reoffending, however, has remained constant albeit with varying levels of prominence, and the interventionist approach has continued. The most significant change brought to the system has been the overhaul of rehabilitation services in 2013, in the form of outsourcing the delivery of interventionist programmes to reduce reoffending (Ministry of Justice 2013). This has since been reversed and the contracts will come to an end in 2020, but this is primarily cited as being due to the way the reform was implemented, rather than a change in approach (Webster 2018). No significant change in reducing reoffending rates has been brought about during this timeframe (Ministry of Justice 2019b). This ongoing lack of success at reducing reoffending raises challenging questions about the fundamental assumptions behind this interventionist approach.

Among the biggest factors influencing change within the criminal justice system this decade has been the austerity agenda brought in by the Conservative-Liberal Democrat coalition government in 2010, and continuing up to the present day (The Law Society 2019). Commonly cited as the inevitable outcome of the Conservative party's 'responsible government' rhetoric while in opposition during and after the global financial crisis of 2007/2008, when implemented the policy then became a fundamental and defining aspect of the coalition government and their 'Big Society' approach (Morgan 2012). The focus of 'Big Society' was on the role of the private and third sectors in plugging the gaps created by spending cuts that were, it was argued, necessary to reduce the UK's national debt (MacLeavy 2011). Some argue, however, that austerity was more about shrinking the size of the state by dismantling social programs than about reducing debt, and was in fact a ‘government failure’ (Krugman 2012). A government failure is an inefficiency, or series of inefficiencies, created by a government which could have solved a problem more effectively (Winston 2006).

The prison and probation systems were significantly affected. They experienced cuts to both prison and probation staff, lower quality education and ‘purposeful activity’ provision in prisons, overstretched support services in the community, and the dismantling and outsourcing of rehabilitation services, as mentioned above (Clinks 2014; Prison Reform Trust 2018). The biggest impacts of austerity, however, have been felt on a local government level. Central government grants, on which local governments depended for between thirty-six and eighty-two percent of their funding in 2009-2010 (Gray and Barford 2018), have since been significantly reduced. Local government has responded by restructuring and becoming more efficient (Local Government Association 2018) but impacts on services have been unavoidable. The worst impacts have been felt in ‘non-mandatory’ services including housing and transport (Gray and Barford 2018). Other services, such as children’s services and adult social care, have seen a significant reduction in the quality of delivery, or an increase in eligibility thresholds to meet demand, meaning that people are less likely to receive support until they reach a crisis point (Bramley and Besemer 2016).

Evidence suggests that the impacts of austerity have not been evenly felt. Because central government grants are needs-based, but were cut uniformly across the country, disadvantaged areas who were the most dependent on the grants were the worst hit (Gray and Barford 2018). Actual cuts in service spending between 2009-2010 and 2016-2017 ranged from 1.6% to 46% (Smith et al. 2016). There are basic parallels between the geographical disparities in reoffending rates and the impacts of austerity. A better understanding of these issues could have significant implications for our knowledge of the process of desistance, and for potentially overcoming some of the inequalities noted above.

The current interventionist approach to reducing reoffending is not achieving its aims, and this is undermining the core priorities of the criminal justice system to maintain public safety and reform offenders (Ministry of Justice 2014). Research that demonstrates wider societal desistance factors would provide evidence that interventions alone are not sufficient and a new approach must be considered. Reoffending is expensive; the exact amount is difficult to calculate, but the most commonly cited figure is £9.3-£13bn per year (National Audit Office 2010). If local spending cuts as a result of national austerity policy have negatively impacted offenders' attempts to desist from crime, this could be seen as a government failure, with any savings made on a local level being negated by increased spending in the prison and probation services.

As well as the financial benefits, there is a moral element to this. According to Article 25 of the UN Declaration of Human Rights, of which the UK is a signatory, "everyone has the right to...food, clothing, housing and medical care and necessary social services" (United Nations 1948). While ex-offenders are not alone in sometimes being deprived of these rights, evidence shows that a prison sentence can cause offenders to lose their housing and employment, and 41% of homeless people have spent some time in prison (Crisis 2019b), suggesting that offenders are being deprived of these rights to a greater extent than average . By better understanding the relationship between structural factors and desistance, and in particular any geographical structural inequality in this system, ex-offenders' rights can be better advocated for.

In terms of theory, an improved understanding of this issue would be an important contribution to desistance theory, expanding its reach beyond understanding of individuals' immediate environments into the context of wider societal structures and systems (Owers et al. 2011). To a lesser extent, this could also contribute to existing macroeconomic theories - theories which deal with the structures and behaviours of an economy on a regional, national, or global scale (O'Sullivan and Sheffrin 2003), for example by providing further empirical evidence for or against fiscal austerity policy.

There is limited research in this area, with desistance literature focusing more on the individual process of those who successfully desist, and little on the systematic structures affecting them. This study will address this gap by inferring structural factors from existing qualitative research and testing them quantitatively against reoffending data. There is also very little research on the geographical disparity in reoffending rates, and its potential link to the uneven impacts of austerity measures. The research will therefore test the identified structural factors on subsets of the data to explore the potential impacts of austerity on the desistance process.

In this thesis, the literature related to desistance and austerity is reviewed, and their potential connections highlighted. The limitations of previous research are discussed, and three research aims intended to address these limitations are presented. The methodology to achieve these aims is laid out, using multiple regression analysis on a dataset of reoffending data for 149 local authorities over eight years, with 28 potential independent variables. The results of these analyses are presented, and interpreted in relation to previous research on desistance and austerity. Finally, the thesis concludes with a note on the implications of the findings and suggestions for future research.

Literature Review

While policymakers frequently refer to the concept of ‘reducing reoffending’, research instead focuses on ‘desistance’. Reoffending is essentially a measuring tool - a reoffence is defined as an offence committed by an individual within a set time period after receiving a sanction for a previous offence (Ministry of Justice 2011). Desistance is more than this: there is no one definition but it is generally recognised as the process of moving away from a pattern of criminal behaviour into the long-term abstinence from crime (McNeill et al. 2012).

This literature review begins with an introduction to early theories of desistance, and then outlines the key modern theories. These view the process of desistance as one of change driven by human agency, or as a complex interaction between an individual and their social structures (Farrall et al. 2010). It discusses the limitations of these approaches, and highlights the gaps in our knowledge, focusing on what are defined as systemic barriers.

It then moves on to introduce the concept of austerity policy. It discusses the impacts of austerity measures in the UK since their implementation in 2010, with a focus on the uneven distribution of these effects. Then it draws links between the impacts of austerity measures and the systemic barriers that are identified in desistance literature.

Finally, it identifies how this study will aim to address the limited research on systemic barriers to desistance, and how austerity may have impacted this.

There are a large number of theories and empirical research on both desistance and austerity policy. The focus of this research is on their interaction, so judgements have been made and only those studies deemed most relevant to understanding how systemic changes as a result of austerity measures may have impacted the the processes of desistance have been included. In austerity literature in particular, there was such consistency in the findings that a small sample was deemed representative of the literature as a whole.

Desistance

Studies of desistance from crime in its own right, as opposed to as the reverse process of the onset of crime, began in the 1930s but did not gain traction until the 1980s (Farrall and Calverley 2006; McNeill et al. 2012). Some early theories, including age or maturation as the key factor in desistance (Glueck and Glueck 1943), desistance as a rational choice (Shover 1983; Clarke and Cornish 1985; Cusson and Pinsonneault 1986), and desistance due to the eventual erosion of criminal tendencies through socialisation (Gottfredson and Hirschi 1990), have been superseded by more recent empirical research (Ezell and Cohen 2004; Farrall and Calverley 2006).

Theories of structure and agency

The most widely accepted and influential theories focus to varying degrees on the roles of human agency and social structures on desistance. They look at offenders' desires and decision-making, and how these interact with the opportunities and obstacles created by social structure (Farrall et al. 2010). Many of these theories draw from, or have strong similarities to, Giddens' (Giddens 1984) theory of structuration. Structuration theory is based on the 'duality of structure': the idea that structure is created and reproduced by interaction with human agency, and that structures cannot exist without being acknowledged and reproduced by actors (Giddens 1984). Despite attracting notable criticism (see, for example, Mouzelis 2008; Vaughan 2001), the influence of the central idea of duality of structure can be seen throughout desistance literature, offering a framework with which many theories present the process of desistance. Some of these key theories are discussed below. As mentioned, the limitations of structuration theory are widely discussed. Most relevant for this research are criticisms regarding how the theory deals with systemic structures as opposed to social structures. Systemic structures are the ‘macro’ structures, those that are further removed from everyday social structures and which are slower to respond and change (Vaughan 2001). Giddens argues that change on the social level will instigate change on the systemic level, but evidence of power structures and hierarchy in modern institutions mean that this systemic level is often far removed from actors at the social level (Boschken 2003), which Giddens’ structuration theory overlooks (Mouzelis 2008). In other words, systemic change cannot easily be brought about by everyday actors in a highly unequal or hierarchical society.

Some theories attach more importance to the role of agency within this duality than others. Maruna’s (Maruna 2001) contribution, for example, centres on the idea that offenders desist when they are able to develop a pro-social identity. They come to see themselves as a ‘good’ person who has committed ‘bad’ acts, but who has something valuable to contribute to society. Interaction with external social factors is recognised, but only to the extent that it enables an individual to go through a psychological process and find meaning in their lives (Maruna 2001). While influential, Maruna’s work is criticised for its lack of duality between structure and agency (Farrall and Calverley 2006), and for ignoring the role of structure in the context of an individual’s social environment (Gadd 2003).

Another influential theory based heavily on the role of agency is cognitive-behavioural theory, which is centred around the premise that offenders lack certain cognitive abilities such as decision-making and problem-solving (Hollin 1996; McGuire and Priestley 1985). Most current practice in the prison and probation services is based on these principles. Reviews of the effectiveness of a range of interventions have found mixed results (Netto et al. 2014; Schmucker and Lösel 2017; Koehler et al. 2013), and they are widely criticised for a lack of evidence about the longevity of any observed effects (Mair 2004). There are also concerns that they raise hopes of reform without doing anything about the social, economic, and cultural circumstances that, it is argued, can effect change more than intervention by the criminal justice system (Downes 1997).

At the other end of the structure-agency spectrum is Sampson and Laub's (Sampson and Laub 1993) societal bonds theory, in which desistance is encouraged by an individual's relationships with society, particularly through engagement with social institutions. The key strength of this approach is its contribution to understanding of desistance theory as a process which occurs over an extended period of time, in contrast to earlier theories, which focused around a short-term period or a one-off event (Farrall and Calverley 2006). However, a potential weakness is the overemphasis of structure over individual agency: the desister is not choosing to desist, but rather is being informally controlled by social factors (Sampson and Laub 1993).

One example that is seen to more successfully address the interaction between structure and agency (Farrall and Calverley 2006) is Giordano et al's (2002) four-part model of cognitive transformation, which theorizes the need for both an individual's willingness to change and the right external opportunities to do so. Giordano et al argue that a potential desister must be willing to change, be exposed to some opportunity to change, be able to imagine that a new way of life is possible and realistic, and then complete the process by no longer seeing old behaviours as desirable or needed (Giordano et al. 2002). While this theory does effectively discuss the interaction between individuals and their social structures, its concept of 'structures' are limited in a similar way to structuration theory (Giddens 1984). Structures, according to Giordano et al (2002), are intrinsically linked with the individual and are primarily created and reproduced by human actors. This is common within desistance theory - when the idea of the role of 'structure' in many theories is further explored it most commonly resembles the limited level of social structures proposed by Giddens, and does not reach beyond that to explore the impact of systemic structures (for further discussion, see Farrall 1999).

Owers et al (Owers et al. 2011), in their review of the Northern Irish prison system, argue the importance of these systemic structures in the process of desistance. They argue for a whole-society approach to desistance, and for equalling the focus and efforts in interventions with focus on societal change including reducing barriers to employment, and investment from across government in services to support offenders. The key, they argue, is not to simply focus on what desisters are desisting from, but the life and circumstances they are desisting into (Owers et al. 2011). This encompasses social structural issues of identity and self-efficacy that are recognised elsewhere in the literature, but is unique in that it addresses the very fundamental and practical issue that if an ex-offender leaves prison with nowhere to live and no prospect of earning money, their chances of desistance are diminished, regardless of the effect of any intervention or support they may have received (Owers et al. 2011). It is the 'macro' factors affecting these things, like large scale unemployment or a shortage of housing, that can be defined as the systemic structures that affect desistance from afar.

Barriers to desistance

A common but underdeveloped finding in desistance literature is that successful desisters have in some way been able to overcome barriers to reform, including problems finding work, overcoming a substance misuse or mental health issue, and accessing relevant social or family support (Farrall and Calverley 2006). These barriers, though common, are often discussed as secondary findings in research that is based on studies of successful desisters. This approach of learning from what a successful desister looks like, as opposed to what challenges faced an unsuccessful desister, is common in desistance literature (Maruna and Mann 2019). Because of this, desistance literature does not provide a clear and complete picture of these challenges, either on the social or systemic structural level; the only barriers that are commonly discussed are those that have been overcome.

Another challenge with desistance literature is that most studies into desistance are qualitative and longitudinal, basing their findings on the results of interviews and observation (see, for example, Maruna 2001; Farrall, Bottoms, et al. 2010). This raises a potential concern over their validity, because studies that intend to understand the interaction between an individual and their social or systemic structures by talking primarily to the individual will have a skewed or biased perspective, viewing structures solely through the lens of the individual's experience. As Farrall and Bowling (Farrall 1999) state:

> *"the main problem with the evidence concerning human agency is that while people may make decisions, the circumstances in which they do so may not enable them to live up to these decisions...their decisions may be constrained in ways of which the subjects themselves are unaware."*

As well as being skewed, this perspective is inevitably limited. While an individual may have a good understanding of the barriers they face on the social-structural level, such as the processes of getting a job or finding accommodation, they are less likely to have dedicated time to analysing the systemic structures that are one step removed (Farrall 1999). These might include the health of the local job market and availability of jobs in general, or systemic issues with a lack of affordable accommodation. Even by compiling findings hundreds of cases, the findings will still reflect the individual perspective, with at best a limited view of the systemic structures and the associated barriers that are impacting the process. This case study approach is very useful in improving our understanding of the individual experience, which could be vital in helping more people through the process of desistance. However, it does not provide any evidence that could lead to the sort of large-scale systemic change required to have a substantial impact on desistance (Maruna 2001).

This is a large gap in knowledge that could be significant if addressed. Limitations in desistance literature demonstrate that there are "unaccounted for elements of structure which cannot be explained by the notion of social practices" (Vaughan 2001), and perhaps this is what Farrall and Calverley (2006) were referring to when they said that most desisters overcame barriers to desistance not through interventions or support but through circumstance. To be able to identify the most important systemic barriers to desistance could significantly add to our understanding of the process.

This is not to dismiss the importance of the role of human agency and the individual process of desistance: it is to enhance it. As Farrall et al (2010) say, “episodes of structural change are important because they may present new possibilities for human agency”.

There is limited research into the systemic structural barriers facing desisters, but some can be inferred based on success factors (for example a lack of available housing as a barrier, based on findings that successful desisters more often have somewhere to live). The potential systemic barriers identified by the desistance literature are: unemployment (Uggen and Kruttschnitt 1998; Shover 1983), accommodation (Owers et al. 2011), mental health (Brunton-Smith and Hopkins 2013), substance misuse (Brunton-Smith and Hopkins 2013), and income (Bottoms and Shapland 2010).

Austerity Policy

Austerity measures are a set of economic policies implemented by a government with the aim of reducing national deficit through spending cuts and tax increases (Financial Times 2013). Austerity is often a very political and contentious policy position, and debate regarding its implementation in the UK and elsewhere in Europe as a reaction to the financial crisis of 2007/2008 is hotly debated (Matsaganis and Leventi 2014; Davidson and Ward 2014).

A large amount of research exists exploring the negative impacts of austerity policy, and the resultant spending cuts and public sector restructuring. Lambie-Mumford et al (2016), for example, examine changes in living costs, and conclude that as a result of austerity low-income households are struggling to afford both food and heating. Beatty and

Fothergill (2016) looked at the impacts of austerity on the UK manufacturing industry, particularly in the north of England. They found that the most significant effect was of large scale job losses, and the related extra pressure put on the welfare system from increased dependency on work-related benefits. Finally, Bramley and Besemer (2016) focused on the impacts to local public services. They found that there were significant reductions in the level of service provision in support services such as social care and mental health services. They concluded that because cities and urban areas were the worst hit, this disproportionately affected poor and disadvantaged groups.

Central to much of this research is the finding that the majority of the impact is felt on a local level. Many of the impacts are on services or spending that are linked to the systemic barriers to desistance discussed above. 'Non-mandatory' spending, including on housing and preventative services, is the worst affected (Gray and Barford 2018). Mandatory services, which include children's services, adult social care, healthcare, and mental health and substance misuse support, were not immune to the cuts either. In order to provide mandatory services with reduced budgets, many local authorities had to restructure or redefine services. This resulted in changes such as higher minimum eligibility thresholds, which increases the number of vulnerable people who need support but do not qualify until they reach a crisis (Gray and Barford 2018). Many local authorities were only able to provide the most basic functions, dropping most preventative and early intervention services (Gray and Barford 2018), which it has been shown can be significantly more effective in tackling issues such as substance use than later support (Stockings et al. 2016).

Research consistently finds that these impacts are not equally felt, with structural inequalities resulting in the most disadvantaged groups and areas being the worst affected (Gray and Barford 2018; Hastings et al. 2017; Slay and Penny 2013). Hastings et al. (2017) and Bramley and Besemer (2016) found that cities were impacted more than rural areas by austerity, which led to further targeting the poor and disadvantaged. There are also disparities in the impacts on local authorities across the country: Gray and Barford (2018) found that real-terms cuts to service spending by local authority between 2009-2010 and 2016-2017 varied between 1.5% and 42%. The more deprived an area, the bigger the real-terms spending cuts, as a result of reductions in needs-based grants on which more deprived areas were more reliant (Gray and Barford 2018). At the same time, individuals in these disadvantaged areas were disproportionately affected by welfare cuts (Beatty and Fothergill 2016), which compounds the impact in the worst-hit areas (Gray and Barford 2018).

From this literature, this study has identified three further factors to contribute to an exploratory approach to researching the relationship between austerity and desistance. These are region (Beatty and Fothergill 2016), rurality or urbanicity (Hastings et al. 2017; Bramley and Besemer 2016), and deprivation (Bramley and Besemer 2016; Lambie-Mumford et al. 2016; Gray and Barford 2018).

Aims of this research

This research will attempt to improve our understanding of desistance by addressing the limited research on the local systemic barriers to desistance and the potential impacts of austerity on these barriers.

In doing so, it has three aims:

First, to explore the existence of any systemic barriers to desistance that offenders might face on a local level. It uses a large dataset and a quantitative approach to develop a truly structural-based model that demonstrates the relative importance of the barriers impacting desistance.

Second, to determine if there is a relationship between austerity and reoffending that could contribute to the explanation of the disparity in local reoffending rates. It uses local public spending as a basic indicator of the impacts of austerity to test for a relationship between austerity measures and reoffending.

Finally, to explore the impact of austerity on the systemic barriers to desistance identified. It tests the prepared model on small subsets of the dataset representing areas more or less affected by austerity measures and compares the relative importance of the factors.

Methods

As no quantitative study has attempted to explore the systemic factors affecting desistance on a large scale, this study aims to use as large a dataset as possible, led by existing evidence, to reduce the risk of low statistical power or significance, and the resulting under- or over-estimation that can result (Weisburd and Britt 2014).

This section states the study's research questions and hypotheses, and provides a brief overview of the methodological approach. The data sources and the chosen variables are discussed, and the processes and decisions taken relating to data that led to the final dataset are explained. Finally, the detailed analytical procedure is laid out, including a discussion of challenges and limitations.

Research questions

This study aims to improve understanding of the impact of local systemic factors on offenders' ability to desist from crime, and to explore whether these impacts have been affected by austerity measures, by addressing the following research questions:

1. Are there systemic geographical or socioeconomic disadvantages in ex-offenders' attempts to desist from crime?
2. If so, has austerity had any impact on that disadvantage?

To address these questions, the research tested several hypotheses using simple linear regression analysis and multiple regression analysis.

To explore the possible existence of geographical or socioeconomic disadvantage in offenders' attempts to desist from crime, the relationship between the geographical and socioeconomic factors that define or describe a local area and its reoffending rate was explored. This was done through the testing of the following hypotheses:

Hypothesis 1: *There is a relationship between a local area's geographical factors and its reoffending rate.*

Hypothesis 2: *There is a relationship between a local area's socioeconomic factors and its reoffending rate.*

Hypothesis 3: *There is a relationship between a local area's geographical and socioeconomic factors and its reoffending rate.*

Before exploring the possible impact of austerity on these relationships, it was necessary to establish a basic relationship between reoffending and spending cuts as a result of austerity measures. To demonstrate this link, the relationship between local government spending cuts since 2010 and reoffending was explored, and the following hypothesis was tested:

Hypothesis 4: *There is a relationship between the annual change in a local area's spending on services (as a result of austerity) and its reoffending rate*

Finally, to further explore the impact of austerity on the potential systemic disadvantage that offenders face, the explanatory model was tested on selective samples of data representing the areas most and least strongly affected by austerity, and the resultant regression models were compared. The following hypothesis was tested:

Hypothesis 5: *The relationship between a local area's geographical and socioeconomic factors and its reoffending rate is affected by local government spending cuts*

Regression analysis

The dependent variable when testing all five hypotheses was reoffending rate. Multiple regression analysis was used to test hypotheses one, two, and three, which involved multiple independent variables representing the various defining characteristics of a local area. Simple linear regression analysis was then used to test hypothesis four, which involved a single independent variable (the change in a local area's spending on services). Finally, the dataset was split using a selective sampling method and the explanatory multiple regression model developed to test hypothesis three was tested on three different subsets of the data, and the resulting models were compared. The analytical procedure is outlined in detail below.

The aims of the research could have been approached using either qualitative or quantitative methods, both of which can be used to deductively test theoretical claims (Paternoster and Bushway 2011). A quantitative approach was chosen to address these research questions because by creating a numerical model, it can provide a clearer and more precise explanation or theory than a qualitative approach (Paternoster and Bushway 2011). A quantitative approach was also vital to achieving the specific aim of determining the relative importance of different independent variables under different circumstances (Henry et al. 1977). Additionally, as noted above there is a lack of quantitative research in desistance literature, and therefore it was decided that a quantitative model initially led by previous qualitative research was the most valuable contribution this research could make within logistical restrictions.

Use of secondary data

Analysis of secondary data is an established methodological approach in quantitative research, with demonstrable validity limited only by the limitations of the data itself (Johnston 2014). It is particularly well suited to research with limited resources due to being more cost-effective and convenient than collecting primary data. It also increases the potential scope of the research by providing data that the researcher could not collect directly (Johnston 2014).

Its limitations are tied to the nature of the data and how it was collected. The researcher is reliant on the original collector for the robustness and reliability of the data collection method (Bachman and Schutt 2013). All source datasets were compiled by a government department or other government body. Although the method and aims of data collection vary, all datasets are accompanied by thorough guidance notes and demonstrate robust methodological practices, often supported by the Government Statistical Service. To manage this limitation, all data sources were thoroughly researched to ensure as strong an understanding of the data collection, analysis, and reporting processes as possible. This highlighted any issues with the data's reliability, which were considered throughout the analysis and interpretation stages (Bachman and Schutt 2013). While the limitations of using secondary data cannot be entirely mitigated, it is believed after thorough study that these datasets are of high quality and reliability.

The data sources identified from existing literature and proposed exploratory approaches are detailed below.

Data sources

Due to its broad aims, and the limited amount of quantitative research in this area, this study includes a wide range of potential variables. The selection of these variables is heavily led by existing literature, but also includes some basic descriptive characteristics that may offer new insights, or provide further evidence for existing theories.

The selected data sources were all in the public domain, and were originally collected by different government bodies. They were collected with different objectives, and none were primarily collected for research purposes. This created challenges for data handling and analysis, and data had to be carefully managed and checked to ensure its validity. After being downloaded from various sources, the datasets were stored individually. They were then combined into the final dataset following the necessary adjustments and checks (Smith 2008). The final data was comprehensively compared with the source data, with more than 500 spot checks to mitigate the risk of human error (Smith 2008). This process is detailed below, following the introduction of the data sources.

Eight sources of data were used:

1. The Ministry of Justice's 'Proven Reoffending Statistics - Geographical Data Tool' (Ministry of Justice 2019b).
2. The Office for National Statistics' 'Annual Population Survey/Labour Force Survey' (The Office for National Statistics 2019).
3. The Department for Environment, Food and Rural Affairs' '2011 Rural-Urban Classification of Local Authorities and other geographies' (Department for Environment, Food & Rural Affairs 2011).
4. The Ministry of Housing, Communities and Local Government's 'English indices of deprivation 2015' (Ministry of Housing, Communities & Local Government 2015).
5. The Ministry of Housing, Communities and Local Government's 'Local authority revenue expenditure and financing' data collection (Ministry of Housing, Communities, and Local Government 2018).
6. The Office for National Statistics' 'Labour Market Profile' (Office for National Statistics 2018b).
7. The Ministry for Housing, Communities, and Local Government's 'Homelessness statistics' (Ministry for Housing, Communities, and Local Government 2019).
8. The Ministry for Housing, Communities, and Local Government's 'Rough Sleeping in England' (Ministry of Housing, Communities & Local Government 2018)

The Ministry of Justice's 'Proven Reoffending Statistics - Geographical Data Tool'

This dataset provides reoffending statistics measured quarterly and by local authority (Ministry of Justice 2019b), which formed the dependent variable for the regression analyses conducted to test each of the five hypotheses.

The data reports on the percentage of offenders who are convicted or given a caution within 18 months (a 12 month measurement period followed by a six-month buffer to allow for the court process) of being released from custody, or receiving a non-custodial conviction or caution. This data is measured using the Police National Computer (Ministry of Justice 2019a).

The data is the most reliable that is currently available, as the Ministry of Justice is the only central body with the resources and access to be able to measure this. However, it is limited by several factors. The data only captures proven offences, meaning that any offence which does not come into contact with the criminal justice system is not measured. The offence also has to be successfully prosecuted within the one-year timeframe or the following six months (Ministry of Justice 2019a). Recent data demonstrates that the median time between an offence being recorded and the offender being charged is 147 days, which is close to five months (Sturge 2018). Cases below this median, therefore, would all comfortably be completed within the 18-month measuring period. Any cases that take longer than the average, especially those committed towards the end of the one year measurement period, may not be captured. There are also some offences that are not prosecuted by the police, such as benefit fraud which is prosecuted by the Department for Work and Pensions, and would therefore not be recorded on the Police National Computer (Ministry of Justice 2011). These factors suggest that the actual reoffending rate is much higher than is reported.

There are also some known issues with the process of collecting the data. A proportion of offences are not matched with the related prison discharge, and therefore not successfully recorded as a reoffence. This is due to limitations or inaccuracies with the available data, and means that actual reoffending rates are higher than can be reported (Ministry of Justice 2019a).

However, it can reasonably be assumed that these inaccuracies would affect the data for each local authority to a similar degree, so therefore not causing major issues when looking at the local factors that impact reoffending rate.

The Office for National Statistics' 'Annual Population Survey'

This dataset provides unemployment rates and population statistics for each local authority (The Office for National Statistics 2019). Unemployment rates are measured quarterly, and population statistics annually. These formed the independent variables 'Population' and 'Unemployment Rate', which are classed as a geographical factor and a socioeconomic factor respectively.

The data is collected through a large-scale study involving interviews with around 35,000 households in Great Britain every quarter (Office for National Statistics 2019b). The sampling is robust, using a systematic sample based on geography, and with a rotating sampling design aimed at including each household, once sampled, for one year, to increase the precision of data that shows change over time.

To ensure a relatively proportional distribution of successful respondents, each local area has a target of economically active interviewees. Extra interviews are conducted in any area that does not meet this target. This ensures that the interpretation and extrapolation of answers are as accurate as possible. The interviewers are trained and experienced, and the study design is robust (Office for National Statistics 2019b).

The Department for Environment, Food and Rural Affairs' '2011 Rural-Urban Classification of Local Authorities and other geographies'

This dataset provides rural-urban classifications for each local authority based on 2011 Census data (the most recent data available) (Department for Environment, Food & Rural Affairs 2011). This formed the independent variable 'Rural-urban classification', which is classed as a geographical factor.

The rural-urban classification is a calculated value of the percentage of residents in each local authority living in rural areas or 'hub towns' (Government Statistical Service 2017). The measure is on a 6 point scale ranging from 'Mainly Rural' (1) to 'Urban With Major Conurbation' (6). There are many potential ways to define rurality and urbanicity, including physical structures, landscape, or business presence. This chosen definition and calculation is suitable and potentially valuable for this study, as it demonstrates a number of factors, including the accessibility of, or isolation from, potential support services or networks. Within the limitations of this definition, the data collection is robust and internally valid.

The Ministry of Housing, Communities and Local Government's 'English indices of deprivation 2015'

This dataset provides measures of deprivation including income, employment, education, public health, barriers to housing and services, crime, and living environment. These were measured in 2015 (the most recent data available), by local authority (Ministry of Housing, Communities & Local Government 2015). These formed the following independent variables, which are all classed as socioeconomic factors: ‘Income Deprivation’, ‘Employment Deprivation’, ‘Education Deprivation, ‘Health Deprivation’, ‘Barriers to Housing and Services Deprivation’, ‘Crime Deprivation’, ‘Living Environment Deprivation’, and ‘Multiple Deprivation’.

Each of the deprivation measures represents a ‘ranking’ for that characteristic, with 32,844 small areas ranked from 1 (most deprived) to 32,844 (least deprived). These small areas are subsequently used to calculate the deprivation rankings for local authorities. Each of the deprivation measures is made up of several indicators, based on the complex and multidimensional nature of deprivation. A total of 37 indicators make up the seven individual measures of deprivation, and these seven are then weighted and combined to create the multiple deprivation measure.

The values for the 37 indicators is derived from a range of secondary data sources, each of which is itself checked and assessed for reliability and validity (Smith et al. 2015). As secondary data, this data is limited by the same issues outlined previously (see *Use of Secondary Data*). However, the researchers argue that such a large volume of data from a diverse range of sources actually increases the reliability of the indices by minimising the potential impact of any one biased indicator, increasing the robustness of the final measures (Smith et al. 2015).

The measures are complex, and each one captures a range of different factors. This raises some issues of validity in this study, as it is not possible to determine which factors are the cause of any associations discovered with the dependent variable. They do, however, cover a range of relevant factors and enough detail is provided regarding the indicators that this risk can be managed with careful consideration of the validity of each measure.

The Ministry of Housing, Communities and Local Government's 'Local authority revenue expenditure and financing'

This provides spending data by local authority, measured annually (Ministry of Housing, Communities, and Local Government 2018). These are broken down into spending on services and other spending, such as staffing and overheads. Total spending on services was used to calculate the independent variable 'Average annual percentage change in spending on services per capita since 2010'. This was used as an indicator of changes to local government spending during the former government's period of austerity measures. This variable was calculated as total spending on services divided by the total population for each year, which was then cumulatively averaged each year from 2010-2016.

The data is self-reported by each local authority, which could lead to potential inconsistencies in methodology. However, there are strict regulations and guidance around the collection and reporting of the information (Ministry of Housing, Communities, and Local Government 2018) and as it is reporting on public finances a reasonable degree of reliability can be assumed (Mayston 1992).

The Office for National Statistics' 'Labour Market Profile'

This dataset provides two measures of average weekly pay by local authority, measured annually (Office for National Statistics 2018b). These formed two independent variables, 'Income (Mean)' and 'Income (Median)', which were categorised as socioeconomic factors.

The data is calculated based on a simple random sample of 180,000 jobs (a 1% sample) taken from HM Revenue and Customs' PAYE system (Office for National Statistics 2018a)).

The Ministry for Housing, Communities, and Local Government's 'Homelessness statistics'

This dataset provides a measure of statutory homelessness by local authority, measured annually (Ministry for Housing, Communities, and Local Government 2019). This formed the independent variable 'Statutory Homelessness', which was categorised as a socioeconomic factor.

Statutory homelessness is the rate, per 1,000 households, of households who are legally accepted as homeless by their local housing authority (Office for National Statistics 2011). The data is self-reported each quarter from each local housing authority. When a value is not reported an estimate is created based on the mean of the recent values (Office for National Statistics 2011). This creates a potential validity problem, but the data source does not state how frequently this occurs so its impact is hard to judge.

A second potential issue is with the inconsistency in how the measure will play out. To be counted, a household must apply to the local housing authority as homeless, and be accepted. There are strict criteria that applicants must meet to be accepted, and there is some evidence that these criteria are not always consistently applied across different authorities (Crisis 2019a). This raises issues with the validity of the data, but it is the best available.

The Ministry for Housing, Communities, and Local Government's 'Rough Sleeping in England'

This dataset provides a measure of rough sleeping by local authority, measured annually (Ministry of Housing, Communities & Local Government 2018). This formed the independent variable 'Rough Sleeping', which was categorised as a socioeconomic factor.

The rough sleeping data is collected in an annual count that takes place on the same day in each local authority. Groups of government employees walk around the area and manually count the rough sleepers (Ministry of Housing, Communities & Local Government 2018). The measure is criticised for its inaccuracy, although critics recognise that it is a difficult thing to accurately measure (Crisis 2019a).

Decisions related to data

The eight different datasets were from different sources, and varied widely in format, frequency, and geographical granularity. Some decisions regarding data had to be made in relation to data prior to analysis:

Limiting research to England only

The final dataset covers England only. Scotland and Northern Ireland use different measuring criteria for reoffending, so were not considered within the scope of this research. Welsh data was also excluded because although reoffending data does cover England and Wales, many other data sources either did not provide data for Welsh authorities or used different measurements or reporting mechanisms between England and Wales.

Adjusting time measurement periods

The data sources varied in their reporting frequency, including monthly, quarterly, and annual values. Annual values was therefore the most granular measurement available across all variables. As a result, all variables were adjusted to match, either by adding or averaging values depending on the measurement type (total or rate). Data for all variables was available from 2009-2016. While a longer period might have been ideal, some datasets were only available for this period. Therefore the period of 2009-2016 was selected to ensure integrity across all data sources.

Exclusion of two local authorities

During the preliminary examination of the data source, two local authorities (The City of London and the Isles of Scilly) were identified as having limited or inconsistent data, and some data sources highlighted issues with measurement in these two authorities. They were therefore removed prior to any testing.

Creation of adjusted reoffending rate

The Ministry of Justice made a change to the methodology for calculating reoffending rates in October 2015. This change in methodology led to an apparent 4-5% increase in reoffending for each period, which they believe is more accurate than the previous method (Ministry of Justice 2017). To correct for this, all reoffending data up to this point was therefore increased by 4.5%, and this became the adjusted reoffending measure. This creates a potential inaccuracy in the data, but is unavoidable within the context of this research. The adjusted variable is limited to being as accurate as the Ministry of Justice's judgement and understanding of the change in calculating.

Creation of 'dummy' region variable

All variables in the source data were numeric except for the region. Regression analysis requires variables to be numeric, and therefore a nominal variable such as region (meaning they have no natural or intrinsic order) must be represented by a 'dummy' variable in numeric form. This involved assigning each region a numeric value, creating an artificial order as closely as is possible, moving from North to South based on the location of the geographical centre of each region. The assigned numeric values can be found in Appendix A. The constructed nature of this variable does add some limitations to its validity, but it was deemed a reasonable concession to gauge some understanding of the role of geography within the models.

Creation of variables to demonstrate delayed impacts

For all socioeconomic variables that were broken down by year, two new variables were created to represent the value the previous year, and two years previous, to allow for the exploration of any socioeconomic relationships with a delayed effect. For example, it would allow a relationship to be tested between the unemployment rate one or two years prior to the measurement period to see if there are delayed effects of these variables. Throughout this study these are referred to as ‘time delay variables’.

Creation of average change spending variable

A variable was required to represent spending cuts as a result of austerity. While the impacts of austerity are complex and deep, it is considered that local spending per capita provides a good basic indicator of the very localised effects across the country (Gray and Barford 2018). The beginning of the period of austerity was defined as 2010, when the coalition government formally announced the programme of austerity (HM Treasury 2010). This variable was therefore calculated, using spending data from The Ministry of Housing, Communities and Local Government’s ‘Local authority revenue expenditure and financing’ data collection (Ministry of Housing, Communities, and Local Government 2018) and population data from The Office for National Statistics’ ‘Annual Population Survey’ (The Office for National Statistics 2019).

Final dataset

The data was collated into a final dataset using the government’s two unique identifiers for each local authority; every data source used at least one of these, and the public spending data used both, so this was used as the master list to match everything else up. This resulted in a final dataset consisting of 1192 cases, where a case is defined as an instance of a local authority in a year. Each case was given a unique case number. This was made up of 149 local authorities over eight years. There was a total of 36 variables, including six identifier variables, 28 independent variables, one dependent variable, and one variable used to split the data (see analytical procedure, below). A full list of variables can be found in Appendix B.

Ethics

There are very few ethical issues to the secondary use of this data for research purposes. All data sources are in the public domain, and contain no individual-level data so there are no risks related to anonymity or identification.

Analytical procedure

An iterative process of multiple regression analyses was conducted to test hypotheses one, two, and three, testing different combinations of independent variables to produce a regression model that best explains the variance in reoffending. A simple linear regression analysis was conducted to test hypothesis four. Finally, to test hypothesis five, the dataset was split into subsets and multiple regression analyses were run on each subset using the independent variables in the best fit model identified when testing hypothesis three.

Regression analysis

The relationship between each independent variable and the dependent variable, reoffending rate, could be determined using simple linear regression or correlation. Both would demonstrate the strength and direction of the relationship, while regression analysis also allows the prediction of the dependent variable based on the value of the independent variable (Berk 2004). When only one independent variable is involved, such as in testing hypothesis four, simple linear regression provides the most powerful option. However, when multiple independent variables are relevant, multiple regression analysis is notably more powerful than running many simple linear regressions because it can take into account the potential interactions between independent variables. Multiple regression analysis is used to determine how much of the variance in a single dependent variable can be explained by two or more independent variables are considered together, and their relationships accounted for (Aiken et al. 1991), (Berk 2004; Aiken et al. 1991). It is therefore ideally suited to testing complex issues with many interacting variables, such as this one.

Multiple regression also determines the relative contribution of each independent variable to the total variance explained by the model (Berk 2004). This allows for an exploratory process whereby variables are tested, added, removed, or replaced, which is ideal for this research which is led by existing literature but also with an exploratory approach to see what we can learn about the interaction between variables as well.

Calculating the relative contribution of each variable also allows for comparison of the importance of independent variables when tested against different datasets, such as on local authorities that suffered the largest and smallest average cuts to spending as a result of austerity.

Ultimately, multiple regression is most appropriate to address these research questions as it allows for the development of one theory that can help predict reoffending across multiple cases and under different circumstances, better enabling practitioners or policymakers to make changes to improve outcomes in the future (Paternoster and Bushway 2011).

Analytical process

Once the variables were defined, the independent variables were categorised as either geographical or socioeconomic characteristics.

To test hypotheses one and two, a series of iterative multiple regression analyses were conducted for each. The first series of iterations, to test hypothesis one, involved only the independent variables categorised as geographical characteristics. A total of six iterations were conducted, involving four variables. The second series, to test hypothesis two, involved only the independent variables categorised as socioeconomic characteristics. A total of 31 iterations were conducted, involving 23 independent variables.

In each iteration, the dependent variable was reoffending, and a different combination of independent variables was included. At each iteration, the model was examined to determine whether it had violated any data assumptions (which are outlined in detail below) and to assess its strength. If a model violated any data assumptions, it was rejected. The variable, or variables, causing the assumption violation were either removed or replaced with an alternative, such as replacing multiple deprivation with an alternative deprivation measure. If a model did not violate any assumptions, its strength was assessed based on how much of the variance in reoffending the model can explain, known as 'adjusted R^2, and its statistical significance, indicated by its value of p.

Independent variables were then added, removed, or replaced based on the impact they had on the model. As a 'bank' of models developed, they were compared for overall strength, as well as the relative contribution of different independent variables. In many models, statistical interaction effects were observed. These are effects caused by the interaction between independent variables that cause the relationships with the dependent variable to be obscured, rendering the model inaccurate (Aiken et al. 1991). Correctly understanding these effects, can strengthen understanding of the model. An explanation follows at the end of this section.

To test hypothesis three, a similar process was repeated. The first iteration included the independent variables from each of the final models from hypotheses one and two. The following iterations involved removing each of these variables to judge the impact on the other independent variables, and retesting the small number of independent variables that were previously dismissed for reasons other than assumption violations. Additionally, some analyses were conducted to test for suspected statistical effects. This involved repeating the regression analysis process for a suspected model, removing one variable each time and assessing the impact this has.

To test hypothesis four, a simple linear regression analysis was conducted to determine the relationship between the independent variable, the average annual change in spending on services per capita, and the dependent variable, reoffending.

Before testing hypothesis five, four subsets of data were created. The data was to be split based on the level of average annual change in spending on services per capita since 2010, to allow for comparisons in the explanation of reoffending between areas that faced different levels of spending cuts. It was also split to include only 2015 and 2016 cases, to focus on the most recent data, and therefore the cases that have been affected by austerity for the longest. This would also account for any potential statistical interaction between the year and the reoffending rate which may obscure the associations. 2015 and 2016 were selected to ensure a large enough sample size, as 2016 data alone did not return a statistically significant model. The subsets were: all cases from 2015 and 2016; cases from 2015 and 2016 in the highest quartile of spending cuts; cases from 2015 and 2016 in the lowest quartile of spending cuts; and cases from 2015 and 2016 that saw spending increases.

Multiple regression analyses were run on each of these data subsets, using the independent variables that made up the strongest model from hypothesis three. The models were then compared to assess how well the identified model could explain reoffending in each of these circumstances. The total variance explained for each model was compared, to determine what proportion of reoffending can be explained by these variables in each circumstance, and the relative contribution of each variable was compared across models, to determine how important each factor is in different circumstances.

Statistical interaction effects

There are three potential statistical interaction effects. One effect is the confounding effect whereby one independent variable (IV_1), which is associated both with another independent variable (IV_2) and with the dependent variable (DV), may obscure the actual relationship between IV_2 and the DV (MacKinnon et al. 2000). When IV_1 is not included in the regression model, it appears that IV_2 has a stronger or weaker association with the DV than it does in reality. When IV_1 is then included in the model, this effect is adjusted for and the true relationship between the independent variable IV_2 and the DV becomes clearer.

A similar effect, known as mediation effect (MacKinnon et al. 2000), is also likely to feature here but cannot be as clearly evidenced. Similar to a confounding independent variable, a mediating independent variable can obscure the relationship between another independent variable and the dependent variable. The difference between confounding and mediating effects is that mediating effects imply causality - a change in IV_1 causes a change in IV_2 which then causes a change in DV. Within the limited boundaries of this study, causality cannot be addressed, and as mediating and confounding effects are statistically identical, differing only in concept, only confounding effects will be discussed (MacKinnon et al. 2000).

Finally, there are instances of suppression effects (MacKinnon et al. 2000). Suppression effects in this context occur when a confounding or mediating independent variable is obscuring the relationship between another independent variable and the dependent variable in such a way that its relationship is entirely obscured, rather than simply magnified or minimised. If, for example, two independent variables are positively associated with the dependent variable (DV) when considered alone, but then one (IV_1) becomes negatively associated with the dependent variable when considered together, it suggests that the second independent variable (IV_2) is negatively associated with IV_1 so strongly that it suppresses the positive association between IV_1 and the DV.

Data assumptions

Before conducting any analyses, two assumptions regarding the data had to be considered to confirm that the test is the correct choice of research design (Berry 1993). Multiple regression analysis requires one dependent variable, measured at the continuous level, and multiple independent variables measured at either the continuous or nominal level (Berry 1993). Then, as each analysis was conducted, SPSS was instructed to produce the necessary tables, graphs, and statistics to test a number of assumptions about the data that must be satisfied for the validity of a multiple regression model (source). The specific outcomes of this assumption testing are addressed in the results chapter, below.

Independence of observations

First, there should be independence of observations, meaning that the value of one data point for each variable is not dependent on the value of any other (Berry 1993). This can cause a problem because the model will overestimate the significance of a relationship (Osborne 2002). There is a risk of some dependent observations in this data, as one of the most common reasons for violation is time-series data. If the same variable is measured at frequent intervals, the value of the second measurement might be dependent on the first. If this assumption is violated, multiple regression cannot be used on the data and a different type of test would be required. This was tested for each model by ensuring that the Durbnin-Watson statistic falls within the acceptable range (Durbin and Watson 1951).

Linearity

There should be a linear relationship between the dependent variable and each independent variable (Berry 1993). If conducted with a nonlinear relationship, the multiple regression model would underestimate the relationship (Osborne 2002). Linear relationships were tested for visually, by interpreting partial regression plots for each independent variable with the dependent variable.

Homoscedasticity of residuals

Homoscedasticity means that the error of the model (how close it is to predicting the dependent variable) is constant for all values of the dependent variable (Berry 1993). This was tested for visually using a scatterplot (Hinton 2014). If the assumption was violated, the method will overestimate the relationship (Osborne 2002.).

Absence of multicollinearity

Multicollinearity occurs when two or more independent variables are highly correlated, which can obscure the associations between independent variables and the dependent variable (Berry 1993). There is a high risk of this in the data as there are multiple variables measuring very similar factors, such as different deprivation measures. This was mitigated by removing one or both of any independent variables with a Pearson's correlation coefficient of $r \geq 0.7$ from the model (Hinton 2014).

Absence of outliers

Significant or influential outliers can have a disproportionate impact on the regression model (Berry 1993), decreasing its validity. Outliers are detected automatically in SPSS, and were then examined individually to determine if they are genuine data points or possible errors in data collection or reporting. Genuine data points were left in the model, and any points deemed to be a true error were removed.

Normality of residuals

The assumption of normality of residuals (Berry 1993) requires that the residuals - the error between an actual value of the dependent variable and its predicted value - are normally distributed, which means they fit the standard bell-curve shape predicted by probability when plotted on a frequency graph. This was tested for visually, using a histogram. If normality is not found, the dependent variable or one or more of the independent variables can be transformed to present as normal. However, multiple regression analysis is fairly robust to the effects of non-normality, so the consequences of violating this assumption are less than with others (Osborne 2002.).

Results

This section presents the results of regression analysis and accepts or rejects the relevant hypotheses. It then provides a short summary of results before they are fully interpreted in the next section.

Hypothesis 1: There is a relationship between a local area's geographical factors and its reoffending rate

Following an iterative process of six multiple linear regression analyses involving four independent variables, a final model was produced to predict reoffending rate from three geographical factors: region, population, and rural-urban classification. Linearity, independence of observations, homoscedasticity, normality, and multicollinerarity were all successfully assessed, and no assumptions were violated. Five outliers were found, and were judged to be genuine data points and thus were not removed.

The multiple regression model statistically significantly predicted reoffending, $F(3, 1188) = 108.769$, $p < 0.05$, adjusted $R^2 = 0.214$. All three variables added statistically significantly to the prediction, $p < 0.05$. Regression coefficients and standard errors can be found in Table 1.

Table 1

Variable	***B***	***SE$_B$***	***β***
Intercept	0.352	0.005	
Region	-0.006	0.000	-0.344*
Population	-3.278×10^{-8}	0.000	-0.200*
Rural-Urban Classification	0.004	0.001	0.129*

Note. * = $p < 0.05$; B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient.

This demonstrates a relationship between a local area's geographical factors and its reoffending rates. 21.4% of the variance in reoffending rates can be explained by the model in Figure 1.

Figure 1

Reoffending rate = *0.352 - (0.006 x Region) - (3.478x10^{-8} x Population) + (0.004 x Rural-Urban Classification)*

Hypothesis 1 (there is a relationship between a local area's geographical factors and its reoffending rate) was therefore accepted.

Hypothesis 2: There is a relationship between a local area's socioeconomic factors and its reoffending rate

Following an iterative process of 31 multiple linear regression analyses involving 23 independent variables, a final model was produced to predict reoffending rate from unemployment rate, health deprivation, mean income, and barriers to housing and services. Linearity, independence of observations, homoscedasticity, normality, and multicollinerarity were all successfully assessed, and no assumptions were violated. Nine outliers were found, and were judged to be genuine data points and thus were not removed.

The multiple regression model statistically significantly predicted reoffending, $F(4, 1187) = 244.456$, $p < 0.05$, adjusted $R^2 = 0.450$. All four variables added statistically significantly to the prediction, $p < 0.05$. Regression coefficients and standard errors can be found in Table 2.

Table 2

Variable	*B*	SE_B	β

Intercept	0.265	0.009	
Unemployment Rate	0.007	0.000	0.439*
Income (Mean)	5.671×10^{-5}	0.000	0.142*
Health Deprivation	-2.602×10^{-6}	0.000	-0.364*
Barriers to Housing and Services Deprivation	1.025×10^{-6}	0.000	0.128*

Note. * = $p < 0.05$; B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient.

This demonstrates a relationship between a local area's socioeconomic factors and its reoffending rates. 45.0% of the variance in reoffending rates can be explained by the model in Figure 2.

Figure 2

***Reoffending rate** = 0.265 + (0.007 x Unemployment Rate) - (2.602x10^{-6} x Health Deprivation) + (5.671x10^{-5} x Income) + (1.025x10^{-6} x Barriers to Housing and Services Deprivation)*

Hypothesis 2 (there is a relationship between a local area's socioeconomic factors and its reoffending rate) was therefore accepted.

Hypothesis 3: There is a relationship between a local area's geographical and socioeconomic factors and its reoffending rate

Following an iterative process of ten multiple linear regression analyses involving ten independent variables, a final model was produced to predict reoffending rate from unemployment rate, health deprivation, mean income, barriers to housing and services, region, population, and rural-urban classification. Linearity, independence of observations, homoscedasticity, normality, and multicollinerarity were all successfully assessed, and no assumptions were violated. Ten outliers were found, and were judged to be genuine data points and thus were not removed.

The multiple regression model statistically significantly predicted reoffending, $F(7, 1184) = 157.276$, $p < 0.05$, adjusted $R^2 = 0.479$. All seven variables added statistically significantly to the prediction, $p < 0.05$. Regression coefficients and standard errors can be found in Table 3.

Table 3

Variable	***B***	***SE$_B$***	***β***
Intercept	0.294	0.010	
Region	-0.001	0.001	-0.074*
Population	$-2.623x10^{-8}$	0.000	-0.151*
Rural-Urban Classification	-0.004	0.001	-0.144*
Unemployment Rate	0.008	0.000	0.462*
Income (Mean)	$7.581x10^{-5}$	0.000	0.190*
Health Deprivation	$-2.552x10^{-6}$	0.000	-0.357*
Barriers to Housing and Services Deprivation	$7.095x10^{-7}$	0.000	0.089*

Note. * = $p < 0.05$; B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient.

This demonstrates a relationship between a local area's defining geographical and socioeconomic factors and its reoffending rates. 47.9% of the variance in reoffending rates can be explained by the model in Figure 3.

Figure 3

***Reoffending rate** = 0.294 + (0.008 x Unemployment Rate) - ($2.552x10^{-6}$ x Health Deprivation) + ($7.581x10^{-5}$ x Income) - ($2.623x10^{-8}$ x Population) - (0.004 x Rural-urban classification) + ($7.095x10^{-7}$ x Barriers to Housing and Services Deprivation) - (0.001 x Region)*

Hypothesis 3 (there is a relationship between a local area's geographical and socioeconomic factors and its reoffending rate) was therefore accepted.

Comparing relative contributions in combined geographical and socioeconomic model

The relative contributions of each independent variable in each model can be found in Table 4.

Table 4

Variable	***β: geographical model***	***β: socioeconomic model***	***β: combined model***
Region	-0.344*		-0.074*
Population	-0.200*		-0.151*
Rural-Urban Classification	0.129*		-0.144*
Unemployment Rate		0.439*	0.462*
Income (Mean)		0.142*	0.190*
Health Deprivation		-0.364*	-0.357*
Barriers to Housing and Services Deprivation		0.128*	0.089*

Note. * $p < 0.05$; β = standardised coefficient.

Hypothesis 4: There is a relationship between the annual change in a local area's spending on services (as a result of austerity) and its reoffending rate

A linear regression was conducted to understand the effect of the average annual percentage change in spending on services per capita since 2010 on reoffending rate. Linearity, independence of observations, homoscedasticity, and normality were all successfully assessed, and no assumptions were violated. Six outliers were found, and were judged to be genuine data points and thus were not removed.

Average annual percentage change in spending on services per capita since 2010 statistically significantly predicted reoffending rate, $F(1,892) = 47.115$, $p < 0.05$, adjusted $R^2 = 0.049$.

Regression coefficients and standard errors can be found in Table 5.

Table 5

Variable	***B***	***SE_B***	***β***
Intercept	0.312	0.002	
Average annual percentage change in spending on services per capita since 2010	-0.270	0.001	-0.224*

Note. * = $p < 0.05$; B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient.

This demonstrates a relationship between a local area's spending on services and its reoffending rate. 4.9% of the variance in reoffending rates can be explained by the prediction equation in Figure 4.

Figure 4

***Reoffending rate** = 0.312 - 0.270 x Average annual percentage change in spending on services per capita since 2010*

Hypothesis 4 (there is a relationship between the annual change in a local area's spending on services (as a result of austerity) and its reoffending rate) was therefore accepted.

Hypothesis 5: The relationship between a local area's geographical and socioeconomic factors and its reoffending rate is affected by local government spending cuts

All 2015 and 2016 data

A multiple linear regression was conducted on a selective sample of data, selecting all 2015 and 2016 cases (n=298). The mean value for spending change since 2010 in this sample was -11.6%; the minimum was -86.3% and the maximum was +18.0%.

The analysis was conducted to predict reoffending rate from unemployment rate, health deprivation, mean income, barriers to housing and services, region, population, and rural-urban classification. Linearity, independence of observations, homoscedasticity, normality, and multicollinearity were all successfully assessed, and no assumptions were violated. No outliers were found.

The multiple regression model statistically significantly predicted reoffending, $F(7, 290) = 28.915$, $p < 0.05$, adjusted $R^2 = 0.397$. Population, rural-urban classification, unemployment rate, mean income, and health deprivation added statistically significantly to the prediction, $p < 0.05$, while region and barriers to housing and services deprivation did not contribute significantly. This will be addressed in the next section.

Regression coefficients and standard errors can be found in Table 6.

Table 6

Variable	***B***	***SE_B***	***β***
Intercept	0.315	0.021	
Region	-0.002	0.001	-0.119
Population	-2.934×10^{-8}	0.000	-0.181*

Rural-Urban Classification	-0.005	0.002	-0.157*
Unemployment Rate	0.006	0.001	0.262*
Income (Mean)	6.166×10^{-5}	0.000	0.147*
Health Deprivation	-3.025×10^{-6}	0.000	-0.445*
Barriers to Housing and Services Deprivation	-2.047×10^{-7}	0.000	-0.027

Note. * $p < 0.05$; B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient.

This shows that there is a relationship between a local area's defining geographical and socioeconomic factors and its reoffending rates within the 2015 and 2016 data. 39.7% of the variance in reoffending rates can be explained by the model in Figure 5.

Figure 5

***Reoffending rate** = 0.315 - (3.025x10^{-6} x Health Deprivation) + (0.006 x Unemployment Rate) - (2.934x10^{-8} x Population) - (0.005 x Rural-urban classification) + (6.166x10^{-5} x Income) - (0.002 x Region) - (2.047x10^{-7} x Barriers to Housing and Services Deprivation)*

Areas most strongly affected by spending cuts

A multiple linear regression was conducted on a selective sample of data, selecting cases from 2015 and 2016 in the top quartile in terms of spending cuts since 2010 (n=73). The mean value for spending change in this quartile was -26.9%; the minimum (largest cuts) was -86.3% and maximum (smallest cuts) was -18.8%.

The analysis was conducted to predict reoffending rate from unemployment rate, health deprivation, mean income, barriers to housing and services, region, population, and rural-urban classification. Linearity, independence of observations, homoscedasticity, normality, and multicollinerarity were all successfully assessed, and no assumptions were violated. One outlier was found, and was judged to be a genuine data point and thus was not removed.

The multiple regression model statistically significantly predicted reoffending, $F(7, 65) = 8.014$, $p < 0.05$, adjusted $R^2 = 0.405$. Population, unemployment rate and health deprivation added statistically significantly to the prediction, $p < 0.05$. As above, there are multiple potential explanations for the other variables not adding significantly to the prediction.

Regression coefficients and standard errors can be found in Table 7.

Table 7

Variable	***B***	***SE_B***	***β***
Intercept	0.280	0.059	
Region	$1.16x10^{-4}$	0.002	0.006
Population	$-5.798x10^{-8}$	0.000	-0.282*
Rural-Urban Classification	-0.007	0.004	-0.218
Unemployment Rate	0.008	0.003	0.332*
Income (Mean)	0.000	0.000	0.207
Health Deprivation	$-3.873x10^{-6}$	0.000	-0.535*
Barriers to Housing and Services Deprivation	$5.003x10^{-7}$	0.000	0.054

Note. * $p < 0.05$; B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient.

This shows that there is a relationship between a local area's defining geographical and socioeconomic factors and its reoffending rates in areas most strongly affected by spending cuts. 40.5% of the variance in reoffending rates can be explained by the model in Figure 6.

Figure 6

Reoffending rate *= 0.280 - ($3.873x10^{-6}$ x Health Deprivation) + (0.008 x Unemployment Rate) - ($5.798x10^{-8}$ x Population) - (0.007 x Rural-urban classification) - ($5.003x10^{-7}$ x Barriers to Housing and Services Deprivation)*

Areas least strongly affected by spending cuts

A multiple linear regression was then conducted on a selective sample of data, selecting cases from 2015 and 2016 in the bottom quartile in terms of spending cuts since 2010 (n=72). The mean value for spending change in this quartile was -4.8%; the minimum (largest cuts) was -7.9% and the maximum (smallest cuts) was -1.0%.

The analysis was conducted to predict reoffending rate from unemployment rate, health deprivation, income, barriers to housing and services, region, population, and rural-urban classification. Linearity, independence of observations, homoscedasticity, normality, and multicollinerarity were all successfully assessed, and no assumptions were violated. One outlier was found, and was judged to be a genuine data point and thus was not removed.

The multiple regression model statistically significantly predicted reoffending, $F(7, 64) = 5.749$, $p < .05$, adjusted $R^2 = .319$. Only health deprivation added statistically significantly to the prediction, $p < .05$, and, as above, there are multiple potential reasons for this.

Regression coefficients and standard errors can be found in Table 8.

Table 8

Variable	*B*	SE_B	*β*
Intercept	0.317	0.033	
Region	-0.004	0.002	-0.243
Population	-1.878×10^{-8}	0.000	-0.152
Rural-Urban Classification	-0.003	0.004	-0.122
Unemployment Rate	0.003	0.003	0.130
Income (Mean)	9.522×10^{-5}	0.000	0.266
Health Deprivation	-3.203×10^{-6}	0.000	-0.532*
Barriers to Housing and Services Deprivation	-7.830×10^{-7}	0.000	-0.133

Note. * $p < 0.05$; B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient.

This shows that there is a relationship between a local area's defining geographical and socioeconomic factors and its reoffending rates in areas least strongly affected by spending cuts. 31.9% of the variance in reoffending rates can be explained by the model in Figure 7.

Figure 7

Reoffending rate *= 0.317 - (3.203x10^{-6} x Health Deprivation) + (9.522x10^{-5} x Income)- (0.004 x Region) - (1.878x10^{-8} x Population) - (7.830x10^{-7} x Barriers to Housing and Services Deprivation) + (0.003 x Unemployment Rate) - (0.003 x Rural-urban classification)*

Areas that saw spending increases

A multiple linear regression was then conducted on a selective sample of data, selecting cases from 2015 and 2016 that had seen spending increases since 2010 (n=10). The analysis was conducted to predict reoffending rate from unemployment rate, health deprivation, mean income, barriers to housing and services, region, population, and rural-urban classification.

The multiple regression model could not statistically predict reoffending, p = 0.077. This is most likely because of the very small sample size, so this model was judged to be unable to contribute to the study.

Comparing standardised coefficients

The standardised coefficients for the three groups (those with the largest cuts, smallest cuts, and all groups) were then compared to determine their relative contribution in each group (see Table 9 and Figure 8).

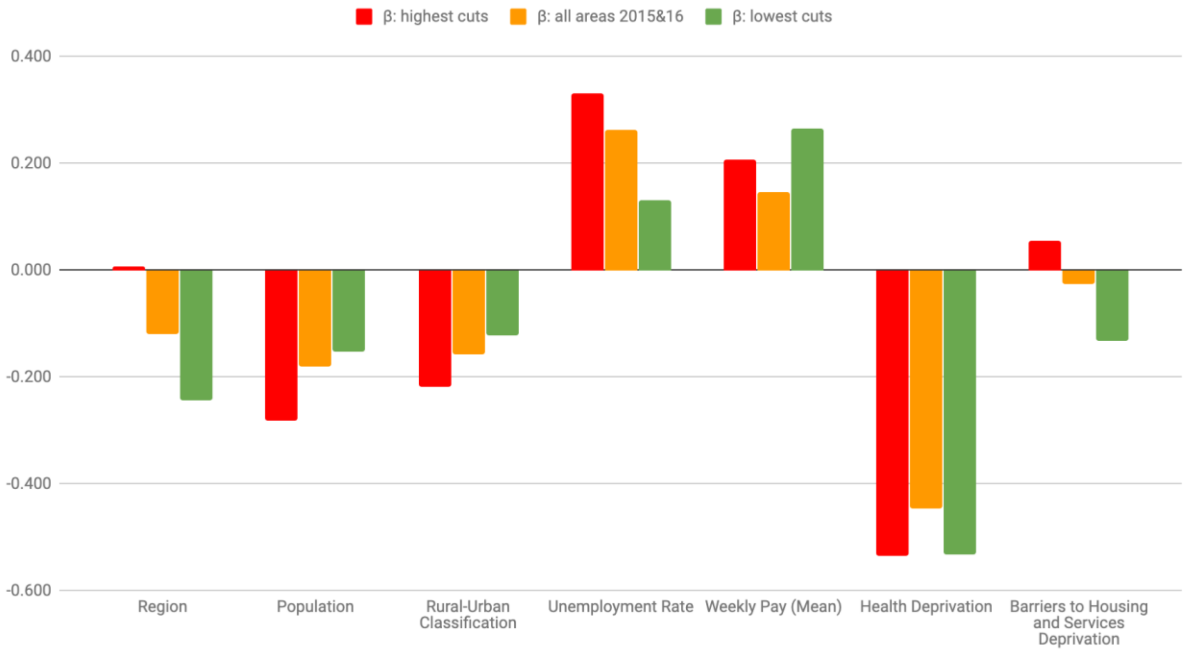
Table 9

Variable	***β: areas with highest cuts***	***β: all areas***	***β: areas with lowest cuts***
Region	0.006	-0.119	-0.243
Population	-0.282*	-0.181*	-0.152
Rural-Urban Classification	-0.218	-0.157*	-0.122
Unemployment Rate	0.332*	0.262*	0.130
Income (Mean)	0.207	0.147*	0.266
Health Deprivation	-0.535*	-0.445*	-0.532*
Barriers to Housing and Services Deprivation	0.054	-0.027	-0.133

Note. * $p < 0.05$; β = standardised coefficient.

In every instance, the relative contribution of both the geographical and the socioeconomic factors changes between all areas, areas with the highest cuts, and areas with the lowest cuts. Therefore, hypothesis 5 (the relationship between a local area's geographical and socioeconomic factors and its reoffending rate is affected by local government spending cuts) was accepted.

Figure 8



Summary of results

A multiple regression analysis found that 21.4% of the variance in a local area's reoffending rate can be explained by its geographical factors. Hypothesis 1 (there is a relationship between a local area's geographical factors and its reoffending rate) was therefore accepted.

A second multiple regression analysis found that 45.0% of the variance in a local area's reoffending rate can be explained by its socioeconomic factors. Hypothesis 2 (there is a relationship between a local area's socioeconomic factors and its reoffending rate) was therefore accepted.

These two models were combined, and a multiple regression analysis found that 47.9% of the variance in a local area's reoffending rate can be explained by its geographical and socioeconomic factors. Hypothesis 3 (there is a relationship between a local area's geographical and socioeconomic factors and its reoffending rates) was therefore accepted.

A linear regression analysis found that 4.9% of the variance in a local area's reoffending rate can be explained by its average annual change in spending on services per capita. Hypothesis 4 (there is a relationship between the annual change in a local area's spending on services (as a result of austerity) and its reoffending rate) was therefore accepted.

Multiple regression analyses and the subsequent comparison of standardised coefficients showed that the relative contribution of geographical and socioeconomic factors is different in areas that faced different levels of spending cuts during the measurement period. Hypothesis 5 (the relationship between a local area's geographical and socioeconomic factors is affected by local government spending cuts) was therefore accepted.

These results will be interpreted in the next section.

Discussion

This research set out to improve understanding of the impact of a local area's characteristics on offenders' ability to desist from crime, and to explore whether these impacts have been affected by austerity measures.

This has been done using multiple linear regression on a large dataset to develop an explanatory model of structural factors associated with reoffending, and then testing this model on different samples of the data.

Geographical and socioeconomic disadvantages

The primary question this research aimed to answer was: are there systemic geographical or socioeconomic disadvantages in ex-offenders' attempts to desist from crime?

The reoffending rate across England varies greatly, from a minimum of 19.2% (Trafford) to 42.1% (Middlesbrough) (Ministry of Justice 2019b). Due to the large amount of publicly available data, this study was able to collect and analyse variables that represent the characteristics of a local area. These were selected based on factors suggested by desistance and austerity literature, as well as some geographical characteristics to further the exploratory approach. The resulting models provide evidence for the impact of these factors on a structural level.

Relationships were found between both the geographical characteristics and the socioeconomic characteristics of a local area and its reoffending rate. When only geographical characteristics are considered, reoffending is highest in areas that (in order of importance): are northern; have low populations; and that are more urban. When only socioeconomic characteristics are considered, reoffending is highest in areas that have (in order of importance): higher unemployment; greater health deprivation, higher average income; and lower barriers to housing and services.

When combined, these characteristics can be used to explain almost half (47.9%) of the variance in the reoffending rate of a local area. When both geographical and socioeconomic characteristics are considered, reoffending is highest in areas that (in order of importance): have higher unemployment, greater health deprivation, higher average income, and lower populations; and which are more rural, with lower barriers to housing and services, and which are more northern.

Statistically, the combined model does not explain much more of the variance in reoffending than the socioeconomic model alone (47.9% as opposed to 45.0%). This suggests a confounding effect, whereby the model presents a direct relationship between the geographical factors and reoffending that is actually masking the relationship between one or more socioeconomic factors and reoffending (MacKinnon et al. 2000). However, when all characteristics are considered the geographical characteristics do still contribute significantly to the explanation of reoffending, so their associations cannot be entirely dismissed as representing socioeconomic characteristics. It may be that the remaining associations could be shown to be masking the relationship of other socioeconomic factors not included in this study, or that there are genuine geographical characteristics that are associated with reoffending, such as landscape, weather, or hours of darkness, for example.

The relationships between individual characteristics and reoffending are discussed below.

Unemployment, income, and inequality

Higher unemployment is positively associated with higher reoffending. Unemployment rate is the most important contributor to both the socioeconomic and combined socioeconomic and geographical models of reoffending. This relationship between unemployment and reoffending is consistent with much of desistance literature (Shover 1983; Uggen and Kruttschnitt 1998; Farrall and Calverley 2006). Employment allows offenders to overcome barriers to desistance by providing stability and income (Shapland and Bottoms 2011) as well as creating social bonds and feelings of self-efficacy (Sampson and Laub 1993; Maruna 2001). This evidence can potentially further our understanding of desistance by suggesting that high unemployment can act as a systemic barrier to offenders trying to desist from crime.

An interesting discovery was that higher income is also associated with higher reoffending, and was the third most important contributor in both models. This relationship seems potentially inconsistent with desistance literature when considered on its own, as income is a key barrier identified by many potential desistors (Bottoms and Shapland 2010). While data (Office for National Statistics 2019a) does show that the highest crime rates can be found in large metropolitan areas where the average income is well above the national average, such as London, there is limited evidence that income is the cause or is strongly related to crime or reoffending (Glaeser and Sacerdote 1999). A more common finding is that residents of poor areas are more likely to be victims of crime (Virtanen et al. 2007; Freedman and Owens 2011). One potential explanation for this is offered by crime theory as opposed to desistance theory. It is possible that an offender is not more likely to commit a crime in an affluent area, but is more likely to get caught due to a higher police presence or stronger community cohesion and informal social controls (Hope 2001). The evidence linking crime rates and affluence is mixed, however, and there is a stronger consensus for a link between “the ratio of affluence to poverty” in a local area and crime (Hope 2001). This ratio is otherwise referred to as relative poverty, or inequality (Whitworth 2012).

When reoffending’s associations with income and unemployment are considered together, a picture begins to form of areas with high income inequality, which some have identified as a barrier to desistance (Kelly 2000; Berk et al. 1980; Newburn 2016; Whitworth 2012; MacDonald et al. 2011), and which has been linked more strongly to crime than absolute poverty (Kelly 2000). Localised high unemployment and high income is a very basic indicator of income inequality, but previous research suggests it would be consistent with alternative measures, although less nuanced (Whitworth 2012; De Maio 2007).

As unemployment and income indicate income inequality, rather than social inequality (Wilkinson and Pickett 2009), this finding could be seen as providing support for either the economic or strain theories of inequality and crime (Chiu and Madden 1998; Merton 1938). The spatial proximity of high income and low income individuals, according the the economic theory (Chiu and Madden 1998), incentivises criminal activity by providing, or appearing to provide, higher potential economic returns from illegitimate rather than legitimate means. However, the notably higher importance of unemployment compared to income to the explanation of reoffending (contributing more than twice as much to the explanation) suggests that it is not the spatial proximity of high and low income leading to crime, but the structural barrier of high unemployment creating strain on those who feel prevented from achieving wealth through legitimate means, as posited by strain theory (Merton 1938). This is consistent with research from Whitworth (2012), who found that crime rates were positively associated with high unemployment and low house prices. Whitworth argues that this demonstrates that wealth is not acting as a 'magnet' for crime, attracting potential offenders based on economic rationality, but rather that the significant and consistent importance of unemployment in predicting crime suggests stronger evidence for strain theory, where unemployment represents the key barrier to success.

This is an important finding that has the potential to add significantly to our understanding of structural desistance, and should be explored further with more robust measures for inequality.

Health deprivation

Greater health deprivation - limitations or barriers that reduce quality of life due to physical or mental illness - is positively associated with higher reoffending. This is the second most important contributor, after unemployment, to both the socioeconomic and combined socioeconomic and geographical models of reoffending.

Health deprivation is a very broad measure and encompasses four factors: work-limiting illness or disability; acute or emergency health issues; premature death; and mental ill-health (Smith et al. 2015). As discussed above, the link between unemployment and reoffending is well-established (Shover 1983; Uggen and Kruttschnitt 1998; Farrall and Calverley 2006), so it is not surprising that work-limiting illness or disability would be associated with reoffending. Work-limiting illness or disability is also the heaviest weighted factor in the measure, so it is possible that this is responsible for a large proportion of the association.

The other factors in the measure could also lead to barriers to employment. Evidence suggests that employment is harder to secure and maintain for those with health issues (Link et al. 2019). This suggests an interesting distinction between crime theory and reoffending theory, as this barrier is likely to be worse for offenders with a criminal record, who will be more limited in their choices of employment and therefore may be limited to physically demanding work such as construction (Visher et al. 2011). Health issues can also act as a barrier to maintaining work. Research suggests that there are links between poor mental health and poor job performance, which potentially limits progression or even increases the chances of termination (Link et al. 2019).

This measure is important and significant while the impact of unemployment is considered in the model, so its relationship with reoffending cannot be entirely explained by its creation of barriers to employment. Link et al (2019) found that poor mental and physical health can also put a strain on other institutions, such as family and relationships, especially for offenders released from prison. Mental health can also create isolation from society (Courtin and Knapp 2017). Health deprivation, then, could be limiting offenders' ability to create social bonds and pro-social identities, which could be seen as creating barriers to desistance (Link et al. 2019; Sampson and Laub 1993).

The common theme with these explanations of the impact of health deprivation of reoffending is that they are creating barriers to the quality of life for some individuals within a community. It could be possible, therefore, to explain these associations within the framework of inequality theory (Whitworth 2012). If health issues are disadvantaging some members of a community this could lead to strain and feelings of frustration, particularly for ex-offenders who are potentially already more disadvantaged than the average person. Turning to illegitimate means to gain material wealth is not the only potential reaction to this strain, according to Merton (Merton 1938). Another possible response is to shun or rebel against society's norms, acting instead according to one's own normative values, which may include criminality. This could help explain instances of non-acquisitive crime as a reaction to strain (Whitworth 2012).

It is also possible that the association between health deprivation and reoffending could be explained by factors that have nothing to do with barriers to desistance. For example, a high prevalence of acute or emergency health issues, which is measured based on emergency hospital admissions rates, could be an indicator of an area with a high violent crime rate. Further research including more detailed information on crime rates, especially broken down into different crime types, would be extremely valuable in understanding this association more clearly.

One factor that is not acknowledged in any indices of deprivation is drug or alcohol use. Evidence shows that from an individual or agency perspective, substance dependency is often closely linked with barriers to desistance (Brunton-Smith and Hopkins 2013). It is a notable limitation of this data that structural issues related to substance use (i.e. a lack of available support, or barriers to accessing support) are not addressed. If further research could address this, perhaps it could explain more of the association between health deprivation and reoffending.

Population

Smaller populations are positively associated with higher reoffending. This is the most important geographical characteristic in the combined geographical and socioeconomic model, though its contribution is reduced by around 25% from the geographical model alone.

Again, crime theory could offer an explanation. Almost all criminological research involving population measures focuses on population density, with the common argument being that crime is higher in more densely populated areas due to their being greater opportunities for crime and weaker mechanisms of social control (Wikström et al. 2012). Intuitively, this finding seems inconsistent with these theories, but this study involves total population size, not density, which is much less widely researched (Nolan 2004). In the only study of crime this author could find involving total population size, Nolan (2004) found a positive association between crime rates and total population size in US cities. There is no evidence of a relationship between smaller populations and reoffending from other research. It is possible that a suppressing or confounding effect is occurring in the study, whereby another characteristic which is associated with population and which has not been included in the study is obscuring the relationship between population and reoffending (MacKinnon et al. 2000).

Population's contribution was reduced by 25% with the inclusion of socioeconomic variables, and further testing demonstrated that this was almost entirely due to health deprivation and unemployment. Without further testing, and the inclusion of more variables, it cannot be said what else is causing the relationship between population and reoffending.

Rural-urban classification

When considered only alongside other geographical factors, urbanicity is associated with higher reoffending. However, when socioeconomic factors are introduced, this association changes and rurality is associated with higher reoffending. Further testing demonstrated that the inclusion of unemployment caused the change. This suggested a suppression effect whereby unemployment is positively associated with urbanicity and, very strongly, with reoffending, and was suppressing the positive relationship between rurality and reoffending. The model was then giving the impression of the opposite relationship (MacKinnon et al. 2000).

This association between rurality and reoffending is not consistent with existing crime theories, which most commonly find that urban areas experience higher levels of crime (Glaeser and Sacerdote 1999), or with recent data suggesting that crime rates are significantly higher in urban areas compared to rural ones (Office for National Statistics 2019a). The concept of a confounding variable, or in non-statistical terms a mediating phase (Wikström and Treiber 2017), could help explain this. Research linking urbanicity and crime or reoffending commonly suggest an indirect link - no theories were found suggesting that the concept of 'being urban' leads an area to have higher crime rates without a reason. Two examples of the potential mediating phase between urbanicity and crime are that urban areas have higher populations and therefore provide greater opportunities for crime (Glaeser and Sacerdote 1999), and that they have weaker social controls (Whitworth 2012). In the context of this study, the mediating phase is unemployment: urbanicity is correlated with unemployment, which is correlated with reoffending. When unemployment is accounted for in the model, this apparent relationship between urbanicity and reoffending is gone.

With the effect of unemployment mitigated, the association that remains to be explained is between rurality and reoffending. There are several possible explanations.

One theory is that rural areas create greater barriers to desistance due to their remote locations, and often poor infrastructure across a large geographical area (Fox and Porca 2001). These are barriers that would affect everyone in these areas, but would arguably affect offenders more than average as they are likely to already be more disadvantaged (Hsieh and Pugh 1993).

Another explanation could be that in rural areas, where there are fewer opportunities for crime compared to urban areas, crime is more difficult to commit and involves more premeditation. Therefore, offenders in rural areas could be more likely to act based on a predefined motive, whether based on rational choice or not (Cornish and Clarke 1987), than opportunistically, and might, therefore, be more motivated to repeat offend.

There are clearly statistical effects occurring here, which is not surprising - intuitively there is no reason for any direct relationship between the rurality or urbanicity of a location and its reoffending rate that cannot be explained more clearly by socioeconomic characteristics. Further research could provide further explanation, but this is potentially a very interesting finding demonstrating that the often-cited link between reoffending and cities can be almost entirely explained by unemployment.

Barriers to housing and services

Greater barriers to housing and services are positively associated with lower reoffending. This is the least important socioeconomic contributor in both models, and is only more important than region in the combined model.

As with health deprivation, this is a complicated variable that covers a lot of different potential factors, some of which are likely to be more relevant than others. It is comprised of geographical barriers (distance from a post office, a primary school, a general store or supermarket, and a GP), and wider barriers (household overcrowding, homelessness, and housing affordability) (Smith et al. 2015).

Greater barriers to housing and services being associated with lower reoffending is inconsistent with evidence showing that an individual is more likely to desist if they have accommodation and support (Williams et al. 2012). There is no evidence, and nor does it make sense logically, that on an individual level finding it harder to access housing and services would make someone less likely to reoffend. However, from the structural perspective taken by this study this association indicates that there may be characteristics to these areas with large barriers to housing and services that could explain the low reoffending rate. For example, the 'wider barriers' covered by this measure include the affordability of housing (Smith et al. 2015). More affluent areas, with higher house prices, generally experience lower crime rates, which would present as a relationship between a barrier to housing and a low reoffending rate (Whitworth 2012; Freedman and Owens 2011).

Based on previous research, the services indicators are not expected to be closely linked to desistance. While distance from these services could indicate more general barriers to accessing support, they are not specifically the type of services that would be expected to be linked to desistance. Even distance from a GP, which could have implications for reoffending based on previously discussed health and substance use issues, could be an unrelated indicator. Further research is required but this author suggests that the physical distance from a GP is much less of a barrier to most offenders than the challenges of dealing with an oversubscribed local NHS service with few available appointments.

However, there is a significant relationship here, and its contribution must be explainable if the right variables are identified. Further research should begin by exploring the impact of affluence.

Region

More northern areas are positively associated with higher reoffending. This moves from the most important characteristic in the geographical model to the least important in the combined model, contributing more than 80% less. This suggests a powerful confounding effect between region and one or more socioeconomic factors (MacKinnon et al. 2000). Further tests demonstrated that strong positive associations between northern areas and both health deprivation and unemployment, both of which are also positively associated with reoffending.

The fact that the relationship between northern areas and reoffending can be largely explained by the confounding effect of unemployment and health deprivation is widely supported by previous research. Evidence suggests that areas in the north face, on average, more deprivation and multiple disadvantages than in the south (The Ministry for Housing, Communities, and Local Government 2015), and research demonstrates that areas in the north have been more disadvantaged by austerity measures (Gray and Barford 2018; Smith et al. 2016; Beatty and Fothergill 2016). It has been shown that unemployment, inequality, and health deprivation are associated with higher crime and reoffending, and there is existing research linking these disadvantages, such as poverty and inequality, with reoffending (Kelly 2000).

However, region does still contribute statistically to the model. Therefore, its apparent impact in the initial model cannot be entirely explained by the socioeconomic factors that are later introduced. It may be that they can be explained by other socioeconomic factors not included in this study, or that there are genuine geographical factors that impact reoffending, such as landscape, weather, or hours of darkness, for example. This is an interesting finding that provides further evidence for the structural geographical inequalities in reoffending and austerity, and should be explored further.

Variables that did not contribute to the final explanatory models

Some variables were not included in the final explanatory models.

Time delay variables

Despite being tested as alternatives for each socioeconomic characteristic, no time delay variables contributed significantly more than their original variable so were not included (Braun and Oswald 2011). Time series data is complex, and to accurately model the delayed impact of any variable may require a more complex methodology, such as a time series regression (Aiken et al. 1991).

Median income

Mean and median income were both tested in early regression models, but due to being so strongly correlated they could not be included together without violating the assumption of multicollinearity (Osborne 2002). The mean measure was found to contribute more powerfully to the explanation of reoffending. This was an interesting finding: mean values are more sensitive to outliers, and this could have implications when discussing concepts like inequality or the affluence of an area. Further testing, ideally including other measures of central tendency and dispersion, could be very helpful particularly towards the understanding of local inequality.

Statutory homelessness and rough sleeping

Statutory homelessness and rough sleeping provide a much simpler and more direct measure of an area's structural accommodation issues than the barriers to housing and services deprivation measure. Based on data linking accommodation issues with reoffending (Williams et al. 2012), these were expected to contribute more significantly. It is possible that limitations with the data, as discussed above in the methodology chapter, prevented their significant contribution, and this factor should not be dismissed from future research.

Crime deprivation

Unexpectedly, crime deprivation, which is comprised of crime rates for burglary, violence, theft, and criminal damage (Smith et al. 2015), did not contribute notably to any model. This potentially suggests that crime and reoffending rates do not have a straightforward linear relationship as might be assumed. Further research into this could add significantly to our understanding of the difference between the causes of crime and reoffending.

Education, employment, and income deprivations

Education, employment, and income deprivation measures all contributed to varying degrees in early models, but were very strongly correlated with each other and with health deprivation, so could not be included together. Health deprivation contributed much more significantly and was therefore selected over any of these measures (Braun and Oswald 2011). It is likely that these measures would be more important contributors than barriers to housing and services, and could potentially explain the remaining contributions of the geographical versions, and it is a limitation of this methodological approach that they were not able to contribute.

Living environment deprivation

Living environment deprivation was strongly correlated with health deprivation, and contributed very little so was removed from early models.

16-64 population size

16-64 population size was strongly correlated with population, and contributed significantly less so was removed from early models.

Austerity and barriers to desistance

The second question this study aimed to answer was: has austerity had any impact on the structural disadvantage in ex-offenders' attempts to desist from crime?

Before addressing the question by testing the explanatory model of reoffending on selective samples from the data, it was necessary to establish that any observable change in reoffending during the measurement period was related to spending cuts as a result of austerity measures. A simple linear regression was conducted and found that the average annual change in spending is negatively associated with reoffending. A 1% average annual decrease in spending on services per capita is associated with an increase of 0.27% in reoffending rate.

This is consistent with research demonstrating the impact of austerity policy on a wide range of factors related to desistance (Bramley and Besemer 2016). Although the impacts of austerity are not straightforward, with local government restructuring and a redistribution of centralised grants potentially obscuring the observable financial impacts, local government spending has been found to be a robust basic indicator (Gray and Barford 2018).

Once a relationship had been established between spending cuts as a result of austerity measures and reoffending, the explanatory model could be tested on selective samples of data representing the areas most and least strongly affected by austerity.

Austerity measures and reoffending rates

The model's explanatory power - the proportion of the variance in reoffending it can explain - changed when the model was tested on areas that were most affected and least affected by austerity measures. The overall model, and every individual characteristic except region, explains a larger proportion of the variance in reoffending in areas that were the worst affected by austerity (40.5%) than in the whole of England (39.7%). This suggests that the impact of structural factors associated with reoffending was exacerbated when an area was heavily affected by austerity measures. In areas less severely affected, the model explains a smaller proportion of the variance in reoffending (31.9%), suggesting that the impact of these factors is reduced.

None of these three models is as statistically sound as those developed above. There are two likely reasons for this. One is that this is not the optimised model for these samples - it is optimised for the full dataset, and is simply being tested on these samples to enable a comparison of its explanatory power under different circumstances. The second reason is the smaller sample sizes, which weaken the statistical power of a regression model (Weisburd and Britt 2014).

The explanatory power of the geographical and socioeconomic characteristics is discussed below.

Health deprivation

In all three tests greater health deprivation is positively associated with higher reoffending, and is the most important contributor.

In areas most affected by spending cuts, health deprivation becomes a more important contributor to the explanation of reoffending, suggesting that limitations to quality of life as a result of physical or mental ill-health have become even greater barriers to desistance. This could indicate that these areas are more dependent on public services and other forms of state support than elsewhere, and that the management or mitigation of these barriers to desistance becomes harder when this support is reduced. This theory is supported by Gray and Barford (2018) who found that support services including adult social care were among the hardest hit.

In areas least affected by spending cuts, the impact of health deprivation also becomes more important in explaining reoffending. This is not consistent with any austerity or desistance literature, and is hard to explain in isolation. It could be that there are some interaction effects occurring: health deprivation is the only factor that contributes to this model with statistical significance, so it could be that the model's statistical power is too low to detect a relationship between one or more of the other independent variables and reoffending, and that health deprivation is reporting a false relationship masking the impact of another independent variable. This requires further research to explore the potential interactions between health deprivation and other independent variables.

Unemployment, income, and inequality

In all three tests, higher unemployment is positively associated with higher reoffending. Unemployment rate becomes a much more important factor in areas most affected by spending cuts, and much less important in areas least affected. Unemployment has consistently been shown to act as a structural barrier to desistance, but this could suggest that the impact of austerity measures is to exacerbate the impact of unemployment as a barrier by removing other support that could help to manage or mitigate its effect. This is consistent with research suggesting that austerity most impacted poorer areas and those already disadvantaged, who were, therefore, less resilient to additional challenges (Gray and Barford 2018). That unemployment becomes notably less important in areas least affected could suggest that these areas have been less disadvantaged and therefore have a stronger safety net or support system to enable them to overcome unemployment as a barrier to desistance.

In all three tests, average income is also positively associated with higher reoffending. That both unemployment and income remain positively associated with reoffending, and become more important factors in areas most affected by spending cuts, could suggest that the impact of inequality may be more pronounced here as a result of austerity. This is strongly supported by research demonstrating that austerity policies have exacerbated inequality throughout the UK (Beatty and Fothergill 2016), and by research demonstrating the impact of inequality on crime and desistance (Whitworth 2012).

In areas least affected by spending cuts, income is a more important factor than unemployment for the first time. The reduced importance of unemployment relative to income could suggest support for the economic theory of inequality and crime (Chiu and Madden 1998). Unemployment as a barrier has become less important, so it could be that offenders are not acting out of frustration, but out of a rational choice that illegitimate activity could provide greater returns due to the spatial proximity of high income earners.

Further research with more robust measures of inequality would allow for this interesting relationship to be explored more thoroughly.

Geographical factors

In all three tests, rurality and smaller populations are positively associated with reoffending. Both factors are more important to the explanation in areas that were most affected compared to those least affected.

Building on earlier observations that geographical characteristics are likely to be representing relationships on behalf of other factors that have not been accounted for, this suggests that these unknown factors become more important in areas most affected by austerity. Based on the similar behaviour of the identified socioeconomic factors becoming more important in areas most affected by austerity, it seems plausible that these are also socioeconomic variables that have not yet been identified. This is supported by Gray and Barford’s (2018) evidence that small and rural areas (often northern towns) have been hit the hardest by austerity. In areas that have been least affected by austerity, rurality and small populations are still positively associated with reoffending, but become less important. This suggests that the unidentified factors become less important in areas least affected by austerity, and therefore that their impact is effectively managed or mitigated by the safety net or support services provided by the state.

Region and barriers to housing and services

Region and barriers to housing and services did not contribute significantly in any of the three tests, and behaved erratically. This is likely because the limited sample size does not create enough statistical power to apply a model that is not optimised for the sample (Weisburd and Britt 2014). Further research with a larger sample size could provide clarification, but in this instance the contributions of region and barriers to housing and services will not be considered.

Strengths and limitations of this research

Multiple regression analysis allowed for an iterative process to determine the model that could best explain the variance in reoffending, but it has a number of methodological limitations. Firstly, the analysis does not allow for multicollinearity (Weisburd and Britt 2014), which meant that not all relevant variables could be included in the final model, and therefore that it was prevented from explaining a greater proportion of the variance in reoffending.

Secondly, multiple regression models assume linear relationships between all variables, but in reality, relationships are rarely perfectly linear. Testing for linearity during assumption testing mitigates this risk somewhat by excluding any obviously nonlinear variables, but the validity of the models may still be limited if the relationships are not absolutely linear (Osborne 2002). Further research could analyse this data using different forms of regression analysis and compare the resultant models to increase understanding of the relationships between variables.

Finally, there is no one agreed-upon process for comparing and selecting a regression model with an exploratory process, although there are some standard measures to be taken into account (Braun and Oswald 2011). This potentially limits the reliability of the models, as different researchers may make different decisions in the assessment and selection process.

There are also limitations to the study design. The decision to take a purely structural approach to interpreting the data, although made consciously and for good reasons, will always limit the strength of the explanatory model because in reality nothing is ever purely structural, and the role of individual agency is important in criminological research (Paternoster and Bushway 2011). Future research could take a mixed-methods approach, collecting individual-level quantitative and qualitative data to allow for a more comprehensive understanding of the interaction between structure and agency.

The final list of variables included in the research is limited. The limited scope and timeframe of the research meant that the iterative process was not as comprehensive as it could have been, and the final dataset was compiled and treated as an inflexible data source throughout the iterative process. If more time was available, new variables could have been researched and introduced as the analysis and comparison with previous research brought new theories to light. Further research would allow more time for this process.

The large dataset increases the reliability of the study. The data was compiled from credible sources, and is the most accurate and reliable data available. The standardisation of local authority unique identifiers ensured that the process of compiling the final dataset was reliable.

The ambitious and exploratory nature of the approach is a positive contribution to desistance literature, and the study makes good progress towards quantifying many aspects of desistance theory that have never been evidenced on a large, quantitative scale before. While the models, especially those used to answer the second research question, are far from a complete understanding of the structural factors affecting desistance, the study demonstrated that the approach is valid and suggests many potential directions for future research.

Conclusion

The UK's reoffending rate has remained stubbornly high, despite numerous waves of government policy aimed at addressing it. This costs the UK an estimated £18.1bn per year, and impacts hundreds of thousands of lives (Newton et al. 2019).

Desistance research has developed a strong understanding of the process of turning away from crime, recognising that there is no one pathway to desistance and that successful support should be holistic and individualised (McNeill et al. 2012). Its over-reliance on qualitative and longitudinal studies, however, has given it a limited perspective, with no understanding of the systemic structural barriers beyond the glimpses picked up from individual experiences.

This study addressed this limitation by using multiple regression analysis to identify the key systemic structural barriers that impact desistance on a local level. In doing this, the study has achieved three things: first, it has demonstrated that there are systemic, structural barriers to desistance that face offenders on a local level. It has drawn a link between the impacts of austerity on local services and reoffending rates. And finally, it has shown that the impacts of austerity have potentially exacerbated the systemic barriers facing would-be desisters in already disadvantaged areas, clearly highlighting the value of more extensive research on this issue.

Three primary socioeconomic barriers were identified: unemployment, income inequality, and health deprivation. In areas most affected by these three issues, then, would-be desisters are at a systemic disadvantage compared to elsewhere in the country. After these barriers had been accounted for, there were still geographical characteristics that appeared to present barriers: rural areas in the north with small populations have greater barriers to desistance than elsewhere. This shows a clear parallel with other disadvantages felt disproportionately across the country: small northern towns have been repeatedly shown to have been hit hardest by austerity measures, with the biggest impacts coming in the form of unemployment and a reduction in public services (Gray and Barford 2018).

Austerity measures were also found to be strongly related to the these barriers: in areas that saw the biggest decreases in spending between 2010-2016, unemployment, income inequality and health became even bigger barriers to desistance. In areas that saw the smallest decreases, the barriers became less significant. This study cannot draw any causal links, but this suggests a potential impact of austerity on the 'safety net' - the welfare policies that exist to protect the most vulnerable and disadvantaged (House of Commons 2019).

This has significant implications. First, it shows that reducing reoffending cannot be the responsibility of the Ministry of Justice alone. The department's goal of reducing reoffending is the right one, but its efforts haven't been fruitful up until now. Evidence of the importance of these society-wide systemic issues demonstrates how much offenders need a society-wide approach to tackling them (Owers et al. 2011).

Second, it highlights yet another impact of austerity disproportionately targeting the most disadvantaged. The consistency of findings in a huge wealth of austerity literature was astounding - that deprived, disadvantaged, mostly northern towns were being hit more than anywhere else with almost every negative outcome of austerity. This thesis has mentioned a few of these studies but there are dozens, if not hundreds of examples, and the evidence is overwhelming. If the UK really is seeing the 'end of austerity' (Jordan 2019) then the reinvestment in public services must be done thoughtfully, with an awareness of the ongoing impacts that cuts have had on the most disadvantaged.

Finally, it demonstrates that this approach works and can significantly improve our understanding of desistance with relatively little work. This was an ambitious study, and was necessarily limited by time and resources. There are a huge number of options to explore this work further, however, starting simply with throwing the net wider and gathering as much data and as many potential explanatory variables as possible to better understand these barriers. The optimised regression model was able to explain 47.9% of the variance in reoffending, which means there is still a great deal left to be understood (and further research to strengthen or challenge these findings). Of course a large proportion of this will come down to factors that are much harder to measure - the human elements that desistance literature explores qualitatively, for example - but there are undoubtedly more socioeconomic factors out there that can be used to strengthen this model.

The most important factors can also be explored in more depth, particularly inequality and health deprivation, which were not straightforward measures in this study. And with the regression approach (perhaps exploring more complex methods to explore nonlinear relationships) the nuances of these relationships can be explored further by including non-desistance related variables, in order to cancel out their impact and hone in on the impacts of desistance variables further. In no particular order, further study could seek to account for the impact of demographic factors, local policing, social structures and institutions like family and marriage, the impact of any interventionist programmes, local crime rates, structural education factors like investment in schools, local industries, and many many more. There is also more data becoming available all the time - since the time of analysis, the 2019 Indices of Deprivation have been released and could add a new dimension by looking at how these areas’ deprivation rankings have changed. And in general, the more years of data that are available the more powerful the model has the potential to be.

Desistance literature's greatest strength is also its biggest shortcoming. The core tenet is a belief that people can change, and by always focusing on the stories of successful desisters, it creates a positive narrative of hope that says that anyone can make the difficult journey from criminal behaviour to desistance (McNeill et al. 2012). By doing this, however, it detracts from the fact that that journey is hard, and as the impacts of austerity and increasing inequality in the UK continue to get worse, it is only getting harder. It is right that we are supporting offenders through the painstaking journey as best we can, but we should also be doing everything possible, for the good of everyone in society, to make the journey a little less treacherous.

Appendix A: Region variable - assigned numerical values

Region name	Assigned numeric value
North East	1
Yorkshire and the Humber	2
North West	3
East Midlands	4
West Midlands	5
East of England	6
London	7
South East	8
South West	9

Appendix B: List of variables

Variable name	Variable type
Case ID	Identifier
Authority name	Identifier
Authority IDa	Identifier
Authority IDb	Identifier
Year	Identifier
Authority Type	Identifier
Region ID	Independent
Population	Independent
16-64 Population	Independent
Rural-Urban Classification	Independent
Multiple Deprivation	Independent
Income Deprivation	Independent
Employment Deprivation	Independent
Living Environment Deprivation	Independent
Education, Skills, and Training Deprivation	Independent
Barriers to Housing and Services Deprivation	Independent
Health Deprivation	Independent
Crime Deprivation	Independent

Average Annual Change in Spending on Services per capita since 2010	Independent
Average Annual Change in Spending on Services per capita since 2010 Quartile	Splitting
Income (Median)	Independent
Income (Median) -1 year	Independent
Income (Median) -2 years	Independent
Income (Mean)	Independent
Income (Mean) -1 year	Independent
Income (Mean) -2 years	Independent
Unemployment Rate	Independent
Unemployment Rate -1 year	Independent
Unemployment Rate -2 years	Independent
Statutory Homelessness	Independent
Statutory Homelessness -1 year	Independent
Statutory Homelessness -2 years	Independent
Rough sleeping	Independent
Rough sleeping -1 year	Independent
Rough sleeping value -2 years	Independent
Reoffending Rate	Dependent

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