

Summary of peer reviewed papers from project entitled:
Recession, austerity and health: changing area socio-economic conditions and their relationship to individual health and wellbeing outcomes in Scotland

Background information on the study design

This project involved collaboration between researchers associated with CRESH at University of Edinburgh, University of Durham and University of Newcastle on Tyne, and Advisors from Public Health Scotland and Health Protection Scotland.

Outputs published in 6 peer-reviewed papers are summarised below (p3 et seq.).

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Disclaimer: The research reported below reflects only the authors' views and the Research Executive Agency is not responsible for any use that may be made of the information it contains.

Aims of the research

We aimed to assess how individual risk of mental illness, recorded by self-report and by NHS general practitioner prescriptions, related to economic and social conditions and other 'wider determinants' in the individual's place of residence (controlling for their individual attributes), and how the findings might relate to policy and practice addressing mental health inequalities and care in Scotland.

The principal focus of the research was on how locally variable socio-economic factors were associated with mental health inequalities in Scotland in the period 2009-2015. We initially focussed especially on varying conditions in the local economy as determinants of mental health. We then proceeded to put these findings into context by including analysis of local variation in other 'wider determinants' of mental health (crime rates, social cohesion, urban rural disparities and proximity to green space).

Data used for this project

With approval from the University Ethics Review Committee, Data Controllers in charge of the SLS, and the Public Benefit and Privacy Panel (PB&PP) which has oversight of use of NHS data for research, we conducted research under secure conditions using anonymised information on individuals in a 5.3% representative sample of the Scottish population, drawn from the Scottish Longitudinal study (SLS), combined with linked data on NHS prescriptions which indicated treatment for mental illness. The NHS prescription data were made available by the electronic Data Research and Innovation Service (eDRIS) team that are part of Public Health Scotland ([ISD Services | Electronic Data Research and Innovation Service \(eDRIS\) | ISD Scotland](#)). The eDRIS data were approved for use in this study by the PB&PP committee. Approved Edris data were transmitted, under secure conditions, to the data managers for the Scottish Longitudinal Study (SLS). We also used linked data on the geographical areas of residence of individuals in the SLS sample, based on publicly available data for geographical areas published by the Office of National Statistics and data on average income loss within districts due to welfare benefit reforms, that were made available by the Centre of Regional Economic and Social Research at Sheffield Hallam University, UK, based on their research on the uneven impact of Welfare Reform (as reported by: Beatty, C. and Fothergill, S. (2018) Welfare reform in the UK 2010-16: Expectations, outcomes and local impacts. *Social Policy & Administration*, 52 (5), 950-968).

The analyses reported were carried out using data prepared by the SLS data managers who linked the information on NHS prescriptions and geographical indicators to data on individuals,

drawn from the SLS, to provide a dataset which was analysed by our research team. Access for our approved researchers to analyse the data was provided under secure conditions in the Secure Research Service (SRS) laboratory in Edinburgh holding the Scottish Longitudinal Study data. The data were analysed statistically in ways which protect individual confidentiality, while testing for factors which explain variation in mental health across a very large sample of residents from across Scotland. Results released for publication were cleared by the SRS staff prior to publication. The results were disseminated in peer reviewed research papers and through various communication and engagement activities:

Acknowledgement: Permission to use the SLS in combination with other data sources has been approved by the data controllers of the SLS and by the Public Benefit and Privacy Panel, responsible for governance of use of NHS eDRIS statistics, held securely in the ESRC Administrative Data Research Centre in Edinburgh. The analysis was undertaken in the National Records of Scotland SLS secure data centre. The SLS Data Custodian approved the manuscripts for publication. The help provided by staff of the Longitudinal Studies Centre Scotland and eDRIS is gratefully acknowledged. The LSICS is supported by the ESRC/JISC, the Scottish Funding Council, the Scientists Office and the Scottish Government. The authors alone are responsible for the interpretation of the data. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

Published peer reviewed research papers

We summarize below **6 peer reviewed papers generated from this project**. The findings reported in these papers relate to a large and representative sample of individuals living in Scotland, drawn from the Scottish Longitudinal Study, including mental health indicators, based on self-reported mental health recorded in the 2011 population census, and on NHS data recording receipt of general practitioner prescriptions for mental illnesses and service use 2009-2015. The findings from analysis of the full dataset used in this study show how variation in risk of mental illness, measured by self-report and prescription for mental illnesses, relate to personal characteristics, and to conditions in the person's area of residence.

Our key findings were that, controlling for individuals' personal and household characteristics, risk of mental illness was associated with conditions in their local area of residence. These area level risk factors included, at the scale of Local Authorities, changes in employment rates during the 'great recession' (starting in 2008), and the loss of income due to subsequent welfare benefit reforms. Also, at the more local level of Data Zones, area risk factors for individual's mental health included levels of poverty, levels of reported crime, urban/rural differences, residence in Islands vs. mainland settings, and proxy measures of 'social cohesion'.

Technical advances reported in these papers include methods used for analysis demonstrating how mental illness recorded by self-report related to medical prescribing. We also contributed to the development of small area indicators relevant to risk of mental illness, in order to further contextualise our data analyses. These include primary development and application to Scotland of Peter Congdon's 'Social Fragmentation Index' (SFI) (Congdon, P.(1996)The epidemiology of suicide in London. Journal of Royal Statistical Society, Series A 159,515–533). We believe this represents the first use of the SFI in the Scottish context. A new 'Social Gifting' measure was also tested as a proxy for local social cohesion. Thus our research has demonstrated to collaborators in NHS Scotland new approaches aimed at modelling the incidence of new cases of anti-psychotic and psychotropic drug prescription in the population. We also demonstrated innovative approaches to analysing and interpreting records on mental health prescribing, that can inform researchers in public sector organizations as well as academic institutions. The following section of this report summarises in more detail the findings in each of the published papers.

Summary of 6 peer reviewed papers based on this research

The **full references and links to six published papers** summarized below are given in the **References** section at the end of this report.

Paper 1

Curtis, Pearce, Cherrie, Dibben, Cunningham, Bambra (2019)

Changing labour market conditions during the 'great recession' and mental health in Scotland 2007-2011: an example using the Scottish Longitudinal Study and data for local areas in Scotland

This preliminary study explored whether self-reported mental health of individuals, recorded in the population census in 2011, was associated with recent labour market trends in their local authority of residence during the recession starting in 2008. The analysis used data for over 120,000 individuals from the SLS, aged between 16 and 59 years in 2001, we used census data on self-reported mental illness collected in the 2011 population census in Scotland. We examined the associations between self reported mental illness and predictor variables including individual attributes and linked data on local deprivation and on trends over time in employment rates at the local authority level (classified using Group Based Trajectory Modelling) for the period between 2007 and 2011 (corresponding to the onset of recession).

We found that, controlling for individual risk factors and for the degree of socio-economic deprivation in their immediate neighbourhood before the recession began, the risk of reporting a mental illness was associated with Local Authority employment trend after the recession started. Residents in areas with a marked downward trend in employment rates showed similar risks of mental illness to those in areas where employment rates were at very low levels throughout the period. The results suggested that local labour market decline associated with the recession may have been a mental health determinant influencing mental health inequalities in 2011.

These preliminary findings using data on self-reported mental illness raised questions about whether similar associations with local economic conditions might be found in relation to medically diagnosed mental illness. There were also further questions about how other conditions, apart from employment rates, in one's area of residence might help to explain the association between mental illness and employment trends at area level. These questions were addressed in papers 2-4, summarised below, using NHS prescription data provided by eDRIS, together with some additional geographical data and linked to the original data set with PB&PP approval.

Paper 2

Cherrie, Curtis, Baranyi, McTaggart, Cunningham, Licence, Dibben, Bamba, Pearce, (2020)

Use of sequence analysis for classifying individual antidepressant trajectories to monitor population mental health.

Building on Paper 1, and using NHS prescription data provided by edris, the research reported in Paper 2 aimed to demonstrate an innovative approach to the classification of change in mental health status, using administrative data on NHS prescriptions provided by edris, linked to the sample of the Scottish population used in the research reported in paper 1. With advice from co-authors at Public Health Scotland and Health Protection Scotland, we used sequence analysis to classify individuals into categories with similar patterns of change, (2009-2014) in prescribing of antidepressants (with dosage likely to be used to treat depressive illness). We examined how people in these categories varied according to prescriptions for other mental health problems (anxiolytics and antipsychotics) and whether they reported mental illness in the 2011 census. We also showed how antidepressant prescription patterns were associated with characteristics of the individual sample members and their areas of residence.

The results showed that for prescription of antidepressants, 5 distinct prescription pattern groups were observed, indicating: (1) no prescriptions (76%), (2) occasional prescriptions (10%), (3) continuation of prior use of prescriptions (8%), a new course of prescriptions started (4%) or ceased taking prescriptions (3%). The likelihood of reporting a long standing mental illness in the 2011 census varied according to the prescription pattern and was greatest for those in the group who continued prior use of antidepressants. The risk of being in the group that started a new course of antidepressant prescriptions was greater among those categorised as young, 'white', 'female', of low social grade, residing in socially deprived neighbourhoods, living alone, separated/divorced or out of the labour force.

We concluded that the use of sequence analysis for classifying individual antidepressant trajectories offers a novel approach that allows us to capture trends in mental health risk. By classifying individuals into groups based on their antidepressant medication use, we could better identify how over time, medically diagnosed mental illness is associated with individual risk factors and contextual factors at the local level and the macro political and economic scale.

Paper 3

Cherrie, Curtis, Baranyi, Cunningham, Dibben, Bambra, Pearce, (2021) Regional economic trends and inequalities in mental health: a data linkage study of the effects of the Great Recession and austerity on anti-depressant prescription usage in Scotland.

In this paper we report analysis of 86,500 individuals in our study sample from the SLS who were of working age and economically active and employed in the labour market in 2011. The aim was to explore how varying economic conditions at Local Authority (LA) level during the 'great recession' and the subsequent welfare benefit reforms (impacting on average incomes) related to changes in prescription of antidepressants between 2009 and 2015. Changes in antidepressant prescriptions were classified using the method described paper 2. Economic trends for LAs were categorised using annual data on the proportion of the working age population in fulltime employment (2004–14) sourced from the NOMIS Official Labour Market Statistics, Office for National Statistics. Economic impact of austerity was measured by an indicator of annual income lost per working age adult due to welfare reforms (2010–15) published by Beatty & Fothergill (Centre for Regional Economic and Social Research, Sheffield University; see reference above). LAs were classified according to trends in these indicators using group-based trajectory modelling.

We examined how the individual risk of starting a new course of antidepressant prescriptions (indicating onset of medically diagnosed depression) related to Local Authority employment trends in the person's LA of residence. We also assessed the contributory role of welfare reforms on average income in their LA. Several other factors were also controlled for in the models, including the person's age, sex, ethnicity marital status, living alone, social grade and the Carstairs deprivation score for the person's local neighbourhood (these had been identified in Paper 1 as likely to relate to mental health status of individuals in this sample).

We found that employed individuals living in regions where employment rates were not recovering post-recession to pre-recession levels had the highest risk of beginning a new course of antidepressants. Individuals living in areas with better recovery trajectories had the lowest risk. Mediation analyses showed that 50% of this association was explained by the local impact of welfare benefit reforms on average incomes. The results suggest that economic conditions and welfare policies in the study period impacted on population mental health and inequality in mental health in Scotland.

Paper 4

Baranyi, Cherrie, Curtis, Dibben, Pearce, (2020) Neighborhood Crime and Psychotropic Medications: A Longitudinal Data Linkage Study of 130,000 Scottish Adults.

This paper focussed particularly on crime levels as an aspect of social conditions in local communities which may help to explain variation in mental health. Analyses were carried out to test whether, among individuals studied, there was an association between starting to take prescriptions for mental illnesses in the period 2009-2014 and crime levels, recorded in 2011, in their local area of residence. We report on research using data for 129,945 adults from the SLS sample used for this project (excluding those who were already receiving prescriptions during the first 6 months of the study period). The analysis controlled for various individual characteristics, and also for income deprivation in their local area.

The results showed that people residing in high crime areas were more likely to start new prescriptions for antidepressants (with dosage likely to be used to

treat depressive illness) or antipsychotic medications, in comparison to those living in neighbourhoods with low crime levels. The association between community crime levels and prescription was particularly strong among younger and middle-aged adults. Crime levels showed stronger positive association with prescriptions for antidepressants among individuals (especially women) aged 24–53 years in 2009 and prescriptions for antipsychotics among men aged 44–53 years in 2009.

Paper 5

Baranyi, Cherrie, Curtis, Dibben, Pearce, (2020)

Changing levels of local crime and mental health: a natural experiment utilising self-reported and service use data in Scotland.

Building on findings in Paper 4, this analysis explored how, for individuals in the SLS sample studied, *change* in crime levels in their local area (data zone) of residence was associated with self-reported mental illness and with prescriptions for mental illnesses. The results relate to 112,251 adults aged 16-60 years. Self-reported mental illness was measured using data from census questions. Individuals were categorised as medically treated ‘cases’ if they had at least six prescriptions in 2010/12 for antidepressants (with dosage likely to be used to treat depressive illness), or for antipsychotic medication. The analysis controlled for individual social and economic characteristics. Data on residential mobility over the study period was used to distinguish between ‘stayers’, who did not move to a different data zone during the study period, and ‘movers’ whose data zone of residence changed.

The results showed that, in addition to average crime exposure during follow-up, recent increases in crime (2007/09-2010/12) were associated with higher risk of self-reported mental illness, among ‘stayers’ aged 16-30, and among ‘movers’ aged 31-45. Also, worsening crime rates were positively associated with antidepressant prescriptions among young ‘stayers’, and with antipsychotic prescriptions among younger middle-aged ‘movers’. We conclude that *changing* neighbourhood crime exposure is related to individual mental health, but associations differ by psychiatric conditions, age and in relation to residential mobility.

Paper 6

Halliday, Clemens, Dibben, (2022)

The island effect: Spatial effects on mental wellbeing and residence on remote Scottish islands,

This paper reports research on how ‘social cohesion’ in local communities was associated with indicators of mental illness in the SLS sample used for this project, and to what extent this might account for differences in mental health outcomes between urban and rural areas. The analysis relates to 114,428 individuals, aged 23-68 years, from the SLS sample used for this project. Mental illness was categorized using two variables: whether the person reported a mental illness in the 2011 Census; and whether NHS records indicated that they had been prescribed anxiolytics or antidepressants (with dosage likely to be used to treat depressive illness). Area (Data Zone) of residence was classified into urban-rural categories according to the Scottish Government classification of urban/rural areas and whether the location was on an Island or on the mainland in Scotland. Area of residence was also classified according to two proxy indicators of ‘social cohesion’: the Social Fragmentation Index (SFI),

developed by Peter Congdon and shown in other studies to relate to risk of mental illness), and a new indicator of 'Social Gifting' (SGI) based on local response rates to national social surveys of the population (2012-2017). The analysis also controlled for individual's gender, ethnicity, age and social grade.

The findings showed that, controlling for individual characteristics, those living in more remote areas, especially Island communities, were less likely to have mental illnesses, as measured by the two health indicators used. The indicators of local 'social cohesion' included in the analysis seemed to account for a significant part of this geographical difference. This study therefore emphasises the likely significance of social cohesion as part of the 'social structures' which help to prevent mental illness.

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