Regional Trends in Mental Health Inequalities in Young People Aged 16-25 in the UK and the role of cuts to local government expenditure: Repeated Cross-sectional analysis using the British Household Panel Survey/UK Household Longitudinal Survey

Abstract

Young people's mental health globally has been in decline. Because of their low perceived need, young people's services tend to be the first cut when budgets are reduced. There is a lack of evidence on how a reduction in services and opportunities for young people is associated with their mental health. Additionally, how this may be magnified by place and the assets and challenges of place. The aim of this study is to explore trends in young people's mental health measured by GHQ-12 over time in the twelve regions of the UK. We estimated an interrupted time series model using 2010 as a break point from which there was a shift in government policy to a prolonged period of large reductions in central government funding. Repeated cross-sectional data on young people aged 16-25 is used from the British Household Panel Survey and its successor survey UK Household Longitudinal Survey. Results showed a statistically significant reduction in mental health for young people living in the North East, Wales, and the East of England. The North East was the region with the largest reduction in funding and saw the greatest reduction in young people's mental health. Next, we look at how reductions in local government expenditure related to services for children and young people: children's social services, education, transportation, and culture; explain the observed decline in mental health. We employ a Blinder-Oaxaca Decomposition approach comparing young people's mental health between 2011 and 2017. Results show a marginally statistically significant decrease in young people's mental health over this time. Unobserved factors related to transport spending and children's social services explain some of this gap. Area level factors such as deprivation, infrastructure, and existing assets need to be considered when distributing funding for young people's services to avoid exacerbating regional inequalities in mental health.

Introduction

Young people in high income countries are in the midst of a mental health crisis. Between 2010-2020, feelings of sadness, hopelessness, suicidal thoughts and behaviours increased by approximately 40% for young people in the US (Adams 2023). For young people in the UK, aged 17 to 19 years old the prevalence of a likely mental disorder rose from 10.1% in 2017 to 17.7% in 2020. This increase in poor mental health in the UK was also seen for 7 to 16 where it rose from 12.1% in 2017 to 16.7% in 2020 (Newlove-Delgado et al .2022). In Australia, the prevalence of operationally defined mental disorders increased for 16–24-year-olds by 50% between 2007 to 2021 from 26% to 39% in 2021 (McGory et al. 2023).

It is essential to meet the needs of young people at risk of poor mental health (WHO 2021). Approximately 75% of adults with a diagnosable mental health condition, had their first onset of poor mental health during adolescence and young adulthood (Khan 2018). Adolescents with poor mental health are at increased risk of social exclusion, discrimination, stigma, poor educational outcomes, risk taking behaviour and poor physical health (WHO 2021). Thus, poor mental health in young adulthood has the potential to impact across the life course increasing the likelihood of unstable employment, poor family and social functioning as well as contributing to health inequalities (McGorry et al. 2007).

Following the Global Financial Crisis in 2008 and the associated economic fallout, the UK had been in a period of fiscal austerity between 2010-2018 (Williams 2019). Austerity involved a reduction in total spending as a percentage of GDP (Brien 2023). Services for young people have been particularly affected by reductions in funding. Every region of England saw funding cuts for youth services by at least 60% with some areas such as the North West facing cuts of 74%, the North East 76% and the West Midlands 80% (YMCA England & Wales N.D). Sunderland in the North East of England had the largest decrease in funding over this period at

84% (Williams and Franklin 2021). The public health grant to local government to fund sexual health services, a service where the highest users are those between 16-25 (Tanton et al. 2018) was reduced by £1 billion (24%) between 2015/16 to 2020/21 (Local Government Association 2022). Between 2009-2010 and 2019-20, expenditure per student which included funding for the day to day running of the school and capital expenditure in England fell by 9% in real terms (Education Policy Institute 2022). Altogether these cuts to services used by young people to support social interactions, sexual health and education may impact on mental health.

There is a growing body of evidence which shows that these austerity policies affect health, in particular for those who are already vulnerable to poor health leading to increased inequalities. For example, austerity policies are associated with worsening mental health (Stuckler et al. 2017). Barr et al. (2015) showed that austerity policies contributed to an increasing trend in poor mental health between 2009-2013 and rising inequalities in mental health. A report by the British Medical Association found that increasing levels of child poverty from austerity measures was increasing poor health in children and the likelihood of long-term negative health and economic outcomes (British Medical Association 2016). Fahy et al. (2023) investigated the impact of cuts to planning, cultural, environmental and planning services on adult mental health. They explore potential mechanisms by which these cuts to local budgets may impact on adult mental health using aggregate data at the lower super output area (LSOA). They hypothesised that cuts to local services may impact on social cohesion, physical activity opportunities, employment (if budgets for training and public transport are cut). They found cuts to planning budget was associated with the largest decrease in mental health (albeit the coefficient was small).

To address the growing prevalence of poor mental health in young people, in 2017, the UK government published the Green Paper 'Transforming Children and Young People's Mental Health Provision', aiming to solicit feedback from stakeholders on how to reduce the rising

prevalence in poor mental health and mental health inequalities. The policy focus has been on improving access and early identification by schools and the wider community (Griffin et al. 2022). These policies however have ignored the wider social determinants of health and how these may be contributing to increasing poor mental health in children and young people. These wider social determinants such as poor-quality housing, food insecurity, and lack of high-quality employment opportunities may have been exacerbated by austerity (Carpenter 2022; Jenkins et al. 2021; Karamessini and Rubery 2014) contributing to poor mental health.

The aim of this paper is to explore the relationship between mental health and local authority expenditure across services provided to children and young people. We build on previous research that has mainly focussed on changes to local authority expenditure on adult outcomes (Fahy et al. 2023; Stucker et al. 2017; Barr et al. 2015). Our theoretical model is based upon the Dahlgren and Whitehead (1991) framework for understanding the social determinants of health. We hypothesise that young people's mental health will be partially influenced by the wider macroeconomic conditions and expectations about future economic growth. From the Great Recession there is evidence that economic downturns influence young people's confidence, trust in institutions, and an ability to find a high-quality job, with young people aged 18-25 the most affected (Schoon and Mortimer 2017). At a more local level, cultural assets such as concert halls, galleries, tracts of the natural environment (Gibson n.d.), green space, educational and training opportunities, and the quality and ease of access of children and youth services will influence mental health. Household characteristics such as household employment, income, size and composition can either mitigate against or exacerbate assets and deficits in the local area. We hypothesise that changes in macroeconomic conditions from the Financial Crisis of 2008, led to changes in funding allocation decisions to local authorities, these wider changes may have also directly impacted on household's financial position ultimately impacting on young people's mental health. Regional differences in outcomes may

stem from areas having different assets and deficits (e.g. cultural, educational opportunities, green space, children and youth services) which will be differentially impacted by changes in funding allocations.

In our model, we do not consider peer effects and social interactions directly but acknowledge that these are important influences on young people's mental health. We define young people based upon the Children and Family Act 2014; a young person is someone between the ages of 16 and 25 (Children and Family Act 2014). This research will provide important insights into potential policy levers that may not have been considered around funding allocations that could support young people's mental health. We also provide evidence on potential drivers of regional differences in mental health and how this may be contributing to observed mental health inequalities.

Methods

Data

Data on mental health and young people characteristics come from two household surveys: the British Household Panel Survey (BHPS) and its successor survey the UK Household Longitudinal Study (UKHLS), also known as Understanding Society Survey. The BHPS encompassed approximately 5,500 households and 10,300 individuals across Great Britain. Each household member aged 16 and over completed a questionnaire covering various aspects of their life including health, employment, aspirations, and opinions. The survey ran from 1991 to 2008. The UKHLS began collecting data in 2009. It is a nationally representative longitudinal survey that consists of approximately 40,000 households whose members aged 16 and above. People are asked about their health, employment, social life, aspirations, and views. Surveys are filled in online (University of Essex, Institute for Social and Economic Research 2022).

Both studies are drawn from a random sample of households. A two-stage sampling procedure was used. Primary selection was based upon postcode which were then grouped into geographical strata to ensure a nationally representative selection of households (Institute for Social and Economic Research 2022). Every individual is re-interviewed in approximately 12-month intervals. The BHPS fieldwork period was between September to December of each survey. The UKHLS sampling period for each survey wave is approximately 24 months (Understanding Society Survey 2024).

We chose to use household surveys that ask respondents about their general mental health rather than administrative data on mental health service usage because of stigma around mental health (Beers et al. 2020) and difficulties with accessing mental health services which had been exacerbated by austerity (Cummins 2018). Health service usage may thus not adequately capture need. In addition, those accessing mental health services may have worse mental health than young people's whose mental health may have worsened because of a lack of amenities in their local area reducing their quality of life, but not to the point where they needed treatment. Differences in mental service provision between England, Wales, Scotland, and Northern Ireland would also mean that we would not be able to investigate differences across the different countries of the UK.

Local Authority Expenditure

There are 367 local authorities in England, Scotland, and Wales (Stowers 2023) and 11 local government districts in Northern Ireland (Office of National Statistics 2021a) Data on local authority expenditure on education, transportation, children services and culture between 2004 to 2017 comes from the Place Based Longitudinal Data Resource year (Alexiou and Barr 2021). Data is per-capita expenditure to allow comparisons between local authorities. For our analysis, this data is scaled up to the regional level for the twelve different regions of the UK:

1) Greater London; 2) South East; 3) East of England; 4) South West; 5) West Midlands; 6) East Midlands; 7) Yorkshire and Humber; 8)North West; 9) North East; 10) Scotland, 11)Wales; and 12) Northern Ireland (Office of National Statistics 2021 b). We linked this data with the BHPS-UKHLS data to explore the role of local authority expenditure on young people's mental health outcomes.

The BHPS and UKHLS sample is not powered at the local authority level by age groups. Thus, to ensure that we have an adequate sample size, we aggregate the local authority expenditure data up to the regional level. The cuts to local authorities from 2010 varied by type of local authority (unitary authorities faced bigger cuts) and more disadvantaged local authorities faced greater cuts (Atkins and Hoddinott 2020). On average more disadvantaged local authorities are likely to be in Northern Regions with 19 out of 20 of the most deprived areas in England being in the North of England (Ministry of Housing, Community, and Local Government 2019). Thus, by comparing across regions we should be able to identify if and how cuts to funding across local authorities in a region is associated with and contributes to young people's mental health.

Estimation Sample

We used data from wave 1 to 18 in the BHPS (year 1991 to 2008), and wave 1 to 8 in UKHLS (year 2010 to 2017). To link the two datasets, we followed the guidelines in the user guide (Fumagalli et al. 2017) employing the code for the statistical software programme STATA provided by the data holder to build waves which ranged from 1 to 26. Following the harmonisation of data guidelines (Fumagalli et al. 2017), we developed year variables so that our final data consists of the years 1991 to 2017. This year data came from date of interview, in some model specifications we use wave data to identify year. When we use wave as our year indicator there is a gap for 2009 in between the BHPS and UKHLS survey (Fumagalli et

al. 2017). We chose 2017 as the end point for our sample because after the general election in 2017, the Conservative party maintained their majority government with Theresa May as Prime Minister. As part of her post-election pledge, she agreed to end austerity which was officially announced with the budget in 2018 (Sabbagh and Inman 2018). Thus, we are only focussing on those years where austerity was an official policy of the UK government.

For each wave, we restricted the sample to young people aged 16 to 25 years old. In our first estimation model exploring how young people's mental health has changed over time we had a sample of 108,644 individuals. Given young people could enter or exit based on whether they meet the age criteria in each wave, it should be noted that the sample composition was subject to variations across waves. Some people will be present in more than one wave.

Linked BHPS-UKHLS and Expenditure Data

To examine the contribution of expenditure on variation in young people's mental health, we linked data from the BHPS-UKHLS with data on local authority expenditure which is averaged up to the regional level (e.g. we take the mean expenditure of all local authorities in a region). When the BHPS-UKHLS is linked with the expenditure data we had a total of 302 observations. All regions had 26 observations with the exception of Northern Ireland which had 16 observations. A sample of Northern Ireland was only added to the BHPS sample in 2001. Our estimation sample to explore if and how local authority expenditure contributed to declines in young people's mental health consisted of 19,871 young people with 63,833 observations.

O*utcome Variable*

The main outcome of interest was young people's mental health, measured by the 12-item general health questionnaire (GHQ-12). GHQ-12 is a self-administrated screening instrument used as a general measure of psychiatric well-being and common mental disorders (Goldberg

1972). Items on the GHQ-12 assess the severity of mental problem over the past four weeks using a 4-point Likert-type scale. These responses are aggregated to generate a total score ranging from 0 to 36, with higher scores indicating worse health (del Pilar Sánchez-López and Dresch, 2008). In our data analysis, we reverse coded the scores, with 0 indicating the worst mental health and 36 indicating the best mental health.

Local Government Expenditure

We focus on per-capita expenditure measured in pound sterling (GBP) that is directly related to services used by young people which includes education, culture, transportation, and children's social care expenditure (Alexiou and Barr 2021). In the analysis this data is aggregated from the local authority level to the regional level. Children's social care is a statutory service and thus this funding is ring-fenced (Department for Education 2023), whereas education, culture, and transportation is not.

Analysis

We apply an interrupted time series (ITS) approach (Bernal et al. 2017) to examine the impact of a reduction in local authority expenditure on services for young people on mean mental health of young people living in the twelve regions of the UK. An ITS approach is chosen because we are examining a large-scale intervention (a reduction in central government funding to local authorities) that impacted on all of the UK. Thus, our treatment sample size is effectively N=1. We have data on young people's mental health for 20 years prior to the change in policy and data for 7 years post policy. Because we have multiple observations both pre and post intervention, even though there is no control group, using ITS means that we can employ a quasi-experimental approach that has an element of internal validity (Linden 2015). We use this approach to explore regional differences as each region can act as a counterfactual for itself. Thus, we can explore if and how austerity policies affected the mental health of young

people in each region of the UK and how this may contribute to worsening regional inequalities in mental health.

We use 2010 as the intervention period (or break point) for the change in trend in young people's mental health. In 2010/11 this was a start of an eight-year period of cuts to local authorities' central government grant in response to the fallout from the Financial Crisis in 2008. This cut in the central government grant required local authorities to reduce spending to services that were not ring fenced. This included culture, education, and transport. Thus, there was a lag in implementation from the Financial Crisis which is why we do not use 2008 as our break point year.

The model is expressed as:

$$GHQ_{tr} = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 T_t X_t + x_{tr} + \epsilon_t \quad (1)$$

Where GHQ_t is the mean GHQ-12 measured at time t in each of the twelve regions r. The period of austerity began in 2010 (Williams 2019), X_t is a dummy variable, with '1' indicating during fiscal austerity (≥2010), and '0' indicating pre-austerity (<2010). T_t is the time since the start of the study, which in our case is 1991 (Linden 2015). The interaction term $T_t X_t$ represents the impact of austerity policy on mental health. x_{tr} mean regional socioeconomic characteristics including age, number of children in household, household size and number of people employed in household. The random error term ϵ_t follows a first-order autoregressive (AR(1)) process.

β_0 represents baseline mean mental health (GHQ-12). β_1 is the change in GHQ-12 over time before the austerity policy (e.g. pre-intervention trend). β_2 represents the change in the level of GHQ-12 that occurs in the period immediately following the introduction of the austerity policy. β_3 represents the difference of GHQ-12 between pre-austerity and post-austerity policy.

β_3 is the coefficient of interest which we present graphically for each region to ease interpretation of results.

The ITS approach assumes that any time-varying variables impacting on the outcome of interest change at a relatively slow pace such that they would be distinguishable from the sharp jump of the intervention indicator (Linden, 2015). In our sample we have observations for some young people across multiple years. The ITS approach controls for serial autocorrelation removing some of the bias associated with using repeated measures over time. We also take the mean of GHQ across region. By taking this average we will remove individual time-constant heterogeneity biasing the results.

Blinder-Oaxaca decomposition

To understand if and how changes to local government expenditure are contributing to the observed decline in young people's mental health, we employ a Blinder-Oaxaca Decomposition Approach. This approach was originally developed by two labour economists, Blinder (1973) and Oaxaca (1973) to identify how much of the observed gap in wages between men and women were due to differences in observable characteristics such as educational attainment and how much was due to factors that could not be observed in the dataset such as discrimination. Since its creation it has been used across the health social sciences. For example, to identify the factors contributing to ethnic gaps in adolescent obesity (Taber et al. 2016) and differences in health practices by socioeconomic status (Kino and Kawachi 2020). This approach has also been used to look at changes over time in test scores for children in Indonesia (Barrera-Osorio et al. 2011), Vietnam (Dang et al 2021), and low pay gaps by gender for par-time employment in the UK (Nightingale 2021).

Following the literature looking at differences in outcomes over time (Dang et al 2021; Nightingale 2021; Barrera-Osorio et al 2011), we estimated a modified Blinder-Oaxaca

decomposition to explore how a reduction in local government expenditure influenced young people's mental health. We compare the contribution of local government expenditure for young people aged between 16-25 years old in 2011, before the reductions in local authority expenditure (N=6431) and young people aged 16-25 in 2017 at the peak of reductions in local authority expenditure (N=4309). We chose these two time points as we wanted to focus on the austerity period to understand if and how it was contributing to increasing regional inequalities in mental health. The differences in mental health over time can be decomposed as:

$$\overline{GHQ_{2017}} - \overline{GHQ_{2011}} = (\overline{X_{2017}} - \overline{X_{2011}})\hat{\beta}_{2017} + \overline{X_{2011}}(\hat{\beta}_{2017} - \hat{\beta}_{2011}) \qquad (2)$$

The left-hand side represents the mean observed difference in mental health among young people in 2017 and 2011. The first term of the right-hand side captures the parts of the difference attributed to differences in observed characteristics between young people in 2017 and young people in 2011 ('explained' or 'endowment' part), and the second term shows the part of the gap in mental health for young people between 2011 and 2017 that is due to unobserved factors which may be time constant or vary over time or could be cohort effects ('coefficient' or 'unexplained' part). X includes age, gender, expenditure on education, culture, transportation, and children's social care.

The basic Blinder-Oaxaca Decomposition Approach selects one group as the comparison group (in our case young people in 2017) and one group as the reference group (in our equation young people in 2011). When estimating the model, switching the reference group may change the results. Following the suggestion from Oaxaca and Ransom (1994), Neumark (1988), we weight the estimates from a pooled sample of the two groups (Neumark, 1988; Oaxaca & Ransom, 1994).

Sensitivity Analysis:

To test the sensitivity, of employing the breakpoint of 2010 and how year is defined, we conduct additional analysis using alternative breakpoints and ways of defining survey year in the ITS analysis. We estimated an ITS model excluding 2008 and using 2011 as a break point. We also compare between representing years by wave and by date of interview.

Results

Table 1 summarises young people's characteristics at regional level. Mean GHQ over the sample period ranged from 25.08 in the South East to 25.82 in Northern Ireland. The mean age for the sample is approximately 20. In each region between 45% (Scotland and Northern Ireland) to 52% (North East) of the sample is male. The average household size in each region is approximately 3, except for Northern Ireland where it is approximately 4. The number of people employed in each household ranges from between 1.77 in the North East to 2.19 in the South East.

Table 2 shows how the sample has changed over time in 5-year intervals. One-way analysis-of-variance (ANOVA) suggested the mean of age, household size, number of children in household and number of people in employment in each household were significantly different across waves. The findings indicated the compositional shift occurring within the sample over time. This needs to be considered when interpreting the results.

Figure 1A-D show trends in expenditure per person for children's social services, transport, culture, and education respectively. To interpret the figures, looking at Figure 1A, for the North East per person expenditure on children's social services was approximately 85p in 2010 which increased to £1.05 in 2017. Across all regions, there was an increase in expenditure on children's social services over time. This is a statutory service provided by local government which may explain why it is increasing over time. There were decreases in funding per person in education and culture across all regions. With the exception of London where there was a

decrease in transport funding, for other regions transport funding per person was relatively flat over this period.

Table 3 shows the average of GHQ-12 before and after 2010 (the start of austerity). In Table 3, we can see that the largest reduction in mental health was in the North West (0.91) which started as the happiest region before 2010 and moved into fifth place. Post-2010 Northern Ireland had the highest mean GHQ-12 score (25.92). The smallest decline in mental health was in the South East (0.04). The area with the lowest mean GHQ-12 scores post-2010 is the East Midlands (25.03). The North West, West Midlands, East Midlands, East of England, and South West had statistically significant declines in mean mental health when comparing pre-2010 to post-2010.

In Figure 2, we show mental health measured as GHQ-12 across all study years. We can see that there is a drop in mental health across all regions in 2008, at the time of a Global Financial Crisis. Mental health then rebounds but on average is lower in the UKHLS than in the BHPS sample. From looking at this descriptive analysis, we cannot say if this decline in mental health over time is from the changing sample composition or from a changing macroeconomic environment. This is explored further in the ITS and decomposition analysis.

Did Austerity Policies Contribute to Increasing Regional Mental Health Inequalities

Figure 3 graphically presents the trend in in young people's mental health for the regions of the UK, before and after the introduction of austerity (e.g. 1991-2009 and 2010-2017). All regions saw a decrease in young people's mental health in 2008. This was the final year of the BHPS survey and the year of the Global Financial Crisis. From looking at the different graphs we can see that the relationship between austerity policies and young people's mental health is not the same across different regions. This suggests evidence of regional inequalities in young people's mental health. For most regions, visually it appears that there was a change in trend

in mental health after 2010; even though in many regions there was an improvement in mental health compared to 2008. Over the austerity period, there was a large decline in young people's mental health in the North East of England. Northern Ireland is the outlier where young people's mental health improves. This may be because we have less observations for Northern Ireland as it only became part of the sample in 2001 or it may be because with the Good Friday agreement and improved stability may have contributed to improvements in mental health.

Figure 4 shows the coefficients and 95% confidence intervals of the ITS estimation of austerity policies on mental health (e.g. mean change in mental health score post-2010 compared to pre-2010 for each region). We can see statistically significant declines in mental health for Wales (-0.155 decrease in mean GHQ-12 score post-2010), the North East (-0.309 decrease in mean GHQ-12 score post-2010), and the East of England -0.185 decrease in mean GHQ-12 score post-2010). The change in young people's mental health is not statistically significantly different for the other regions. These results also highlight that region matters as the results are heterogenous across regions with the largest mean change in the North East. We explored if and how regional characteristics may exacerbate mental health inequalities in the Blinder-Oaxaca decomposition.

In Table 4, we estimate if the change in mean young people's mental health between 2011 and 2017 can be explained by decreases in expenditure at the local authority level to services relevant to young people's mental health using a Blinder-Oaxaca Decomposition Approach. The results show that there is a marginally statistically significant decrease in young people's mental health between 2011 and 2017. Age is the only observable characteristics that significantly explains this difference in young people's mental health between 2011 and 2017. The coefficient effect (unobserved component) of spending on transport which can be thought of as the differential impact of transport spending when comparing the two cohorts significantly contribute to the observed gap in young people's mental health. Whereas the

coefficient effect (unobserved component) of spending on children's social services improved young people's mental health between 2011-2017. Children's social services are a statutory service provided by local governments which was ring fenced. Evidence suggests that contrary to other services provided by local government's spending on children's social services increased by 41.6% between 2009/10 and 2021/22 (Institute for Government 2023). Two of the coefficient effects are statistically significant suggesting that there are unobserved factors related to place such as existing amenities (in the case of transport spending) that may accentuate reductions in young people's mental health contributing to regional inequalities.

Sensitivity Analysis:

In Table A1, we present the results across a range of different model specifications varying how we classify dates and if we use 2010 or 2011 as the break point. There is some variation when we use year compared to when we use wave as the break point. When we use wave to identify year, we find a negative and statistically significant reduction in mental health for the North East, South East and Scotland. When we use actual date of interview to identify year, we find a negative and statistically significant reduction in mental health in the North East, East of England, and Wales. When we use 2011 as a break-point instead of 2010, using either wave or interview date we have a statistically significant reduction in mental health in the North East, East of England, South West, Wales, and Scotland. This suggests that our main results provide a conservative estimate.

Discussion and Conclusion:

In this paper, we used repeated cross-sectional data on young people's mental health between 1991-2017 to explore the relationship between mental health and macroeconomic conditions. We found that there was a statistically significant decline in mental health from 2010 for young people living in the North East, East of England, and Wales. We hypothesised that

macroeconomic conditions may partially influence this observed decline in young people's mental health. Local authority expenditure on services for children and young people decreased by £325 million between 2010-11 and 2019-20 (Williams and Franklin 2021). With the North East region having the largest decline in funding (Williams and Franklin 2021). Prior to these cuts each region of the UK has different assets, infrastructure, amenities and challenges. It is likely that these prior conditions will interact with funding cuts which were also not the same across regions resulting in unequal changes to the built environment and services for young people. This may have exacerbated the challenges facing some regions contributing to mental health inequalities. We explored this using a Blinder-Oaxaca Decomposition Approach comparing young people's mental health in 2011 (prior to funding cuts) and 2017 (peak of funding cuts). We find that there was a marginally statistically significant decrease in young people's mental health between that time. The coefficient effects or factors that we cannot observe related to spending for transport and children's social services significantly contribute to the gap in young people's mental health. This suggests that place matters. The results suggest that initial conditions particularly around transport infrastructure are important. Thus, reductions in funding for areas with lower quality/levels of these amenities/assets prior to cuts such as the North East had worse mental health outcomes after funding cuts.

This research fits within a growing body of literature showing that reductions in funding to local areas is contributing to increasing inequalities in health (Fahy et al. 2023; Stucker et al. 2017; Barr et al. 2015). Evidence suggests that the social determinants of health are a major contributor to mental health (Allen et al. 2014; Viner et al. 2012). Reductions in funding to local areas and wider fiscal austerity may impact on educational opportunities, transport which could impact on work opportunities, local infrastructure and opportunities for social and cultural engagement. Many regions that were already struggling with supporting young people

to reach their potentials had the largest cuts to their budgets such as the North East. The North East of England was also the region with the largest decline in young people's mental health.

Strengths and Weaknesses:

The strength of our study is that we were able to use data over a long time period to understand trends in young people's mental health. We were able to link individual data with local area data to better understand the impact of place on mental health inequalities. A weakness of the study is that we are unable to identify if and how people use these services and service quality to identify mechanisms by which these funding cuts contribute to mental health. Future research should investigate if investment changes these trends.

Policy Implications

There is growing recognition of the need to address the mental health crisis in young people. This research identifies how young people's needs cannot be ignored when allocating resources. McKnight et al (2015) found that young people's services faced the biggest cuts from austerity. Failure to adequately invest in children and young people leads to substantial long term social, economic, and health costs. Whereas investment in young people has a high social return supporting a more resilient economy (Kearney and Pardue 2023).

Our findings suggest that unequal cuts to funding may be contributing to inequalities in mental health in young people. The UK has the highest level of regional inequalities in economic productivity in Europe (Myles 2023). To address these large inequalities, resource allocation formulas need to consider a wider range of factors such as how place and existing services or lack thereof may exacerbate existing inequalities.

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Table 1. Summary of characteristics by region

		GHQ-12	Age	Male (%)	Household size	Number of people in employment in household
North East	mean	25.48	20.48	52	3.51	1.77
	SD	0.74	0.33	0.06	0.26	0.19
North West	mean	25.75	20.48	50	3.54	1.90
	SD	0.64	0.19	0.03	0.25	0.18
Yorkshire and the Humber	mean	25.37	20.44	50	3.64	1.84
	SD	0.43	0.34	0.04	0.27	0.14
East Midlands	mean	25.41	20.44	50	3.48	1.87
	SD	0.65	0.28	0.04	0.21	0.12
West Midlands	mean	25.41	20.38	47	3.80	1.93
	SD	0.53	0.24	0.03	0.24	0.15
East of England	mean	25.46	20.50	48	3.69	2.11
	SD	0.56	0.24	0.02	0.23	0.20
London	mean	25.57	20.82	47	3.68	1.92
	SD	0.43	0.42	0.04	0.48	0.18
South East	mean	25.08	20.36	47	3.62	2.19
	SD	0.47	0.22	0.03	0.11	0.19
South West	mean	25.57	20.42	47	3.34	2.06
	SD	0.66	0.21	0.03	0.12	0.14
Wales	mean	25.39	20.33	47	3.59	1.88
	SD	0.55	0.28	0.03	0.19	0.13
Scotland	mean	25.58	20.45	45	3.40	1.89
	SD	0.45	0.38	0.03	0.13	0.15
Northern Ireland	mean	25.82	20.06	45	4.06	1.96
	SD	0.31	0.15	0.04	0.14	0.18

Table 2. Summary of characteristics by 5-year interval

	1991-1995			1996-2000		
	N	mean	SD	N	mean	SD
GHQ-12	8,209	25.79	4.98	10,071	25.61	5.30
Age	8,688	20.65	2.84	10,567	20.56	2.87
Male	8,688	0.50	0.50	10,567	0.48	0.50
Household size	8,688	3.46	1.40	10,567	3.45	1.44
Number of people employed in household	8,688	1.87	1.26	10,567	1.97	1.24
	2001-2005			**2006-2012**		
	N	mean	SD	N	mean	SD
GHQ-12	12,029	25.60	5.44	33,833	24.84	5.81
Age	13,230	20.39	2.91	40,037	20.34	2.89
Male	13,230	0.47	0.50	39,728	0.46	0.50
Household size	13,230	3.56	1.53	40,037	3.79	1.63
Number of people employed in household	13,230	2.04	1.23	40,037	1.92	1.23
	2012-2018			**Bartlett's equal-variances test**		
	N	mean	SD	Chi square	P value	
GHQ-12	32,652	25.15	5.77	436.080	0.000	
Age	39,727	20.26	2.84	17.880	0.001	
Male	39,727	0.48	0.50	0.330	0.988	
Household size	39,727	3.88	1.66	704.430	0.000	
Number of people employed in household	39,727	1.90	1.20	54.132	0.000	

Table 1. Summary of GHQ-12 before and after 2010

		Youth's mental health			
		Before 2010	**After 2010**	**Difference**	**p-value**
North East	mean	25.58	25.25	-0.33	0.30
	SD	0.74	0.73		
North West	mean	26.03	25.13	-0.91***	0.00
	SD	0.55	0.28		
Yorkshire and the Humber	mean	25.40	25.30	-0.10	0.60
	SD	0.45	0.38		
East Midlands	mean	25.58	25.03	-0.55**	0.04
	SD	0.708	0.209		
West Midlands	mean	25.55	25.08	-0.47**	0.03
	SD	0.55	0.29		
East of England	mean	25.63	25.08	-0.55**	0.02
	SD	0.58	0.28		
London	mean	25.62	25.45	-0.17	0.37
	SD	0.47	0.28		
South East	mean	25.09	25.05	-0.04	0.85
	SD	0.53	0.35		
South West	mean	25.80	25.07	-0.73**	0.01
	SD	0.62	0.45		
Wales	mean	25.48	25.18	-0.29	0.22
	SD	0.59	0.37		
Scotland	mean	25.66	25.38	-0.28	0.15
	SD	0.47	0.37		
Northern Ireland	mean	25.73	25.92	0.18	0.26
	SD	0.30	0.31		

***p<0.001; **p<0.05

Table 2. Blinder-Oaxaca decomposition of mental health between 2011 and 2017

General Health	Coefficient	Standard Error
Differential		
Health in 2011	25.32***	0.08
Health in 2017	25.06***	0.13
Health gap between 2011 and 2017	0.26*	0.14
Endowment		
Age	0.02**	0.01
Female	-0.03	0.02
Expenditure on culture	-0.07	0.42
Expenditure on education	0.48	0.35
Expenditure on transportation	0.02	0.07
Expenditure on children	0.03	0.27
Total	0.44	0.71
Coefficient		
Age	-1.48	1.01
Female	0.31	0.45
Expenditure on education	0.54	2.75
Expenditure on culture	-2.53	2.21
Expenditure on transportation	-2.17**	0.63
Expenditure on children's social services	7.82**	3.41
Constant	-3.01	2.83
Total	-0.17	0.72
Number of observations	6648	

***p<0.001; **p<0.05

Figure 1A: Trends in Children Social Services Expenditure per Person by Region

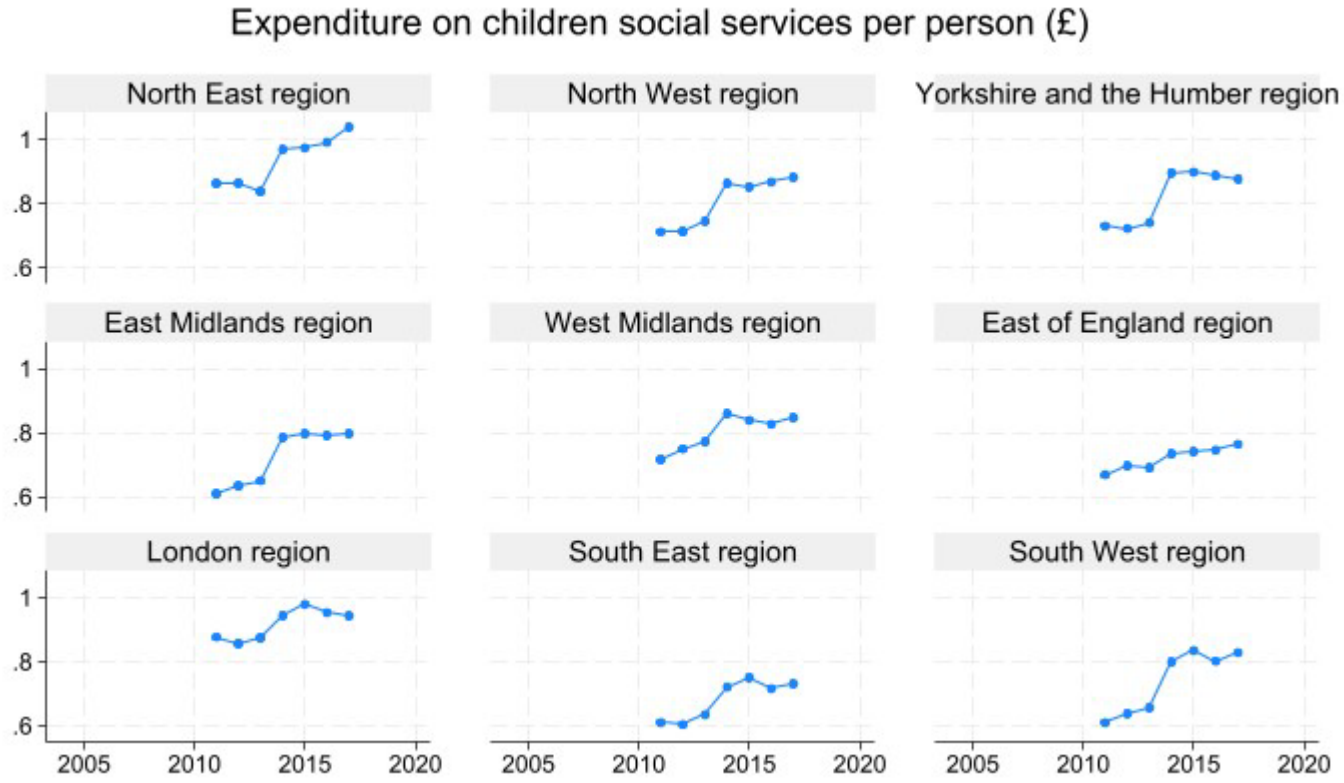


Figure 1B: Trends in Transport Expenditure by Region Per Person

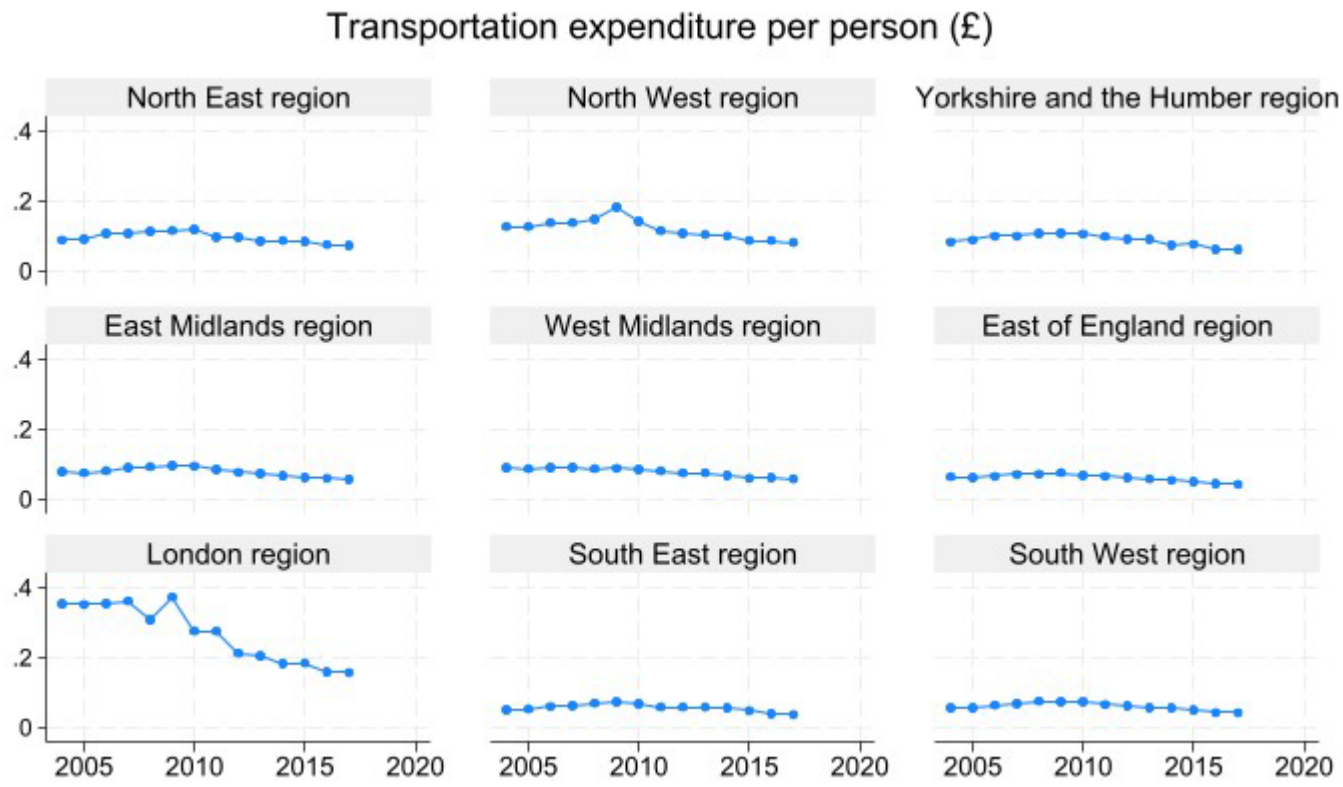


Figure 1C: Trends in Expenditure on Culture by Region

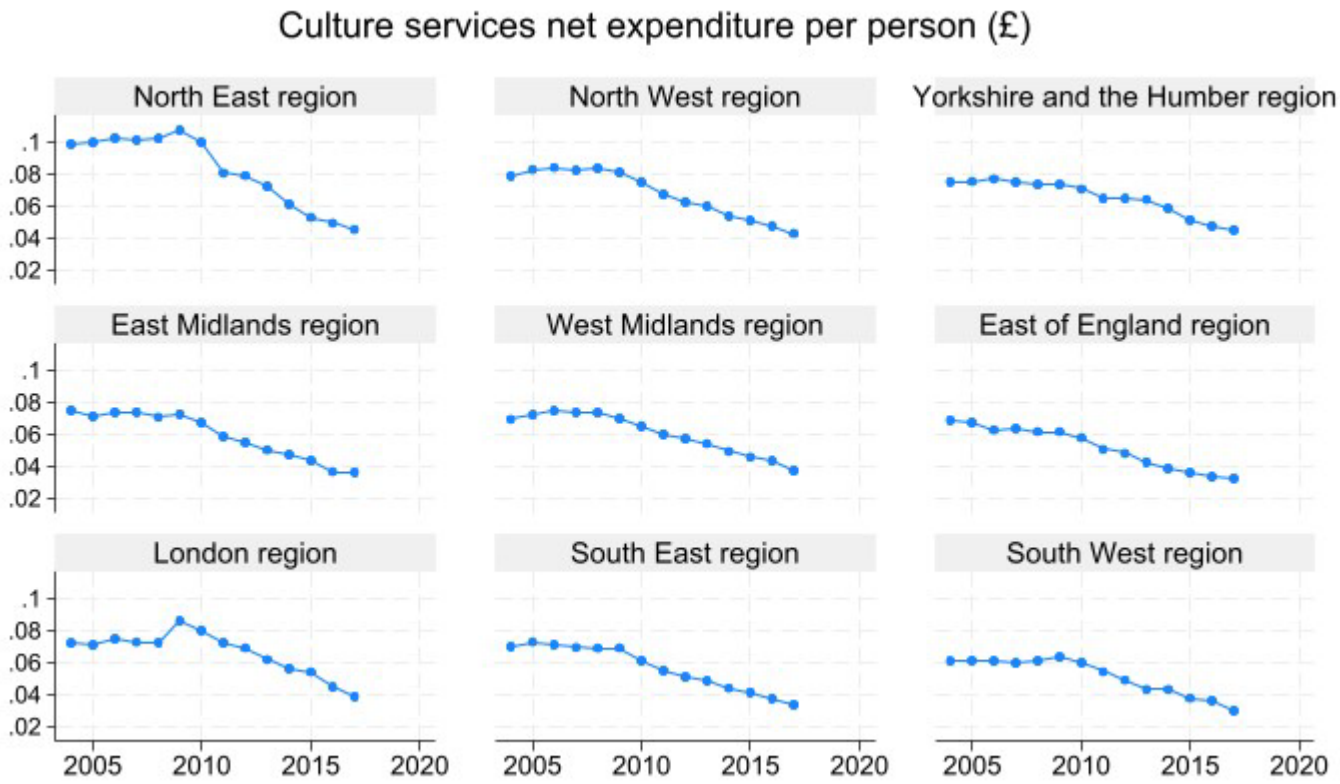


Figure 1D: Trends in Expenditure on Education by Region per person

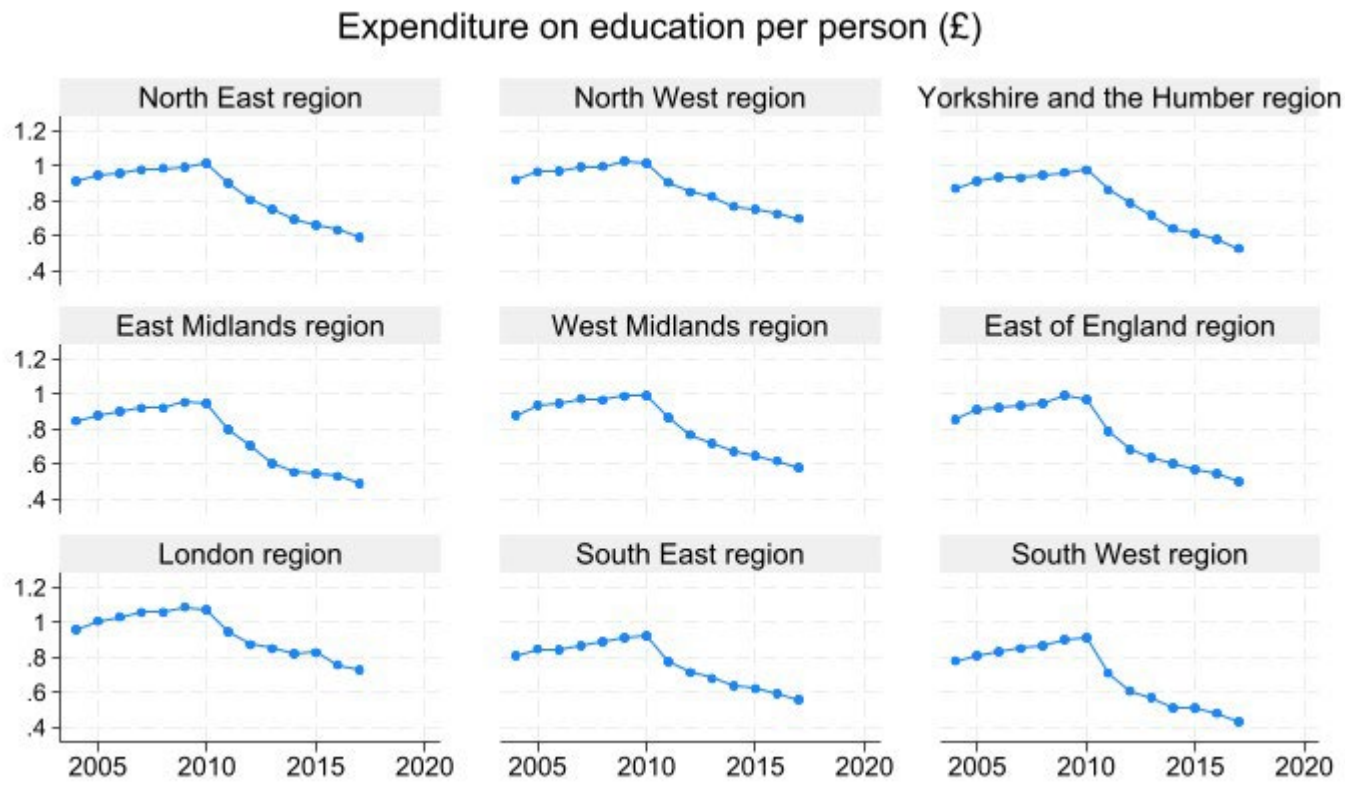


Figure 2. Trends of GHQ-12 by Region

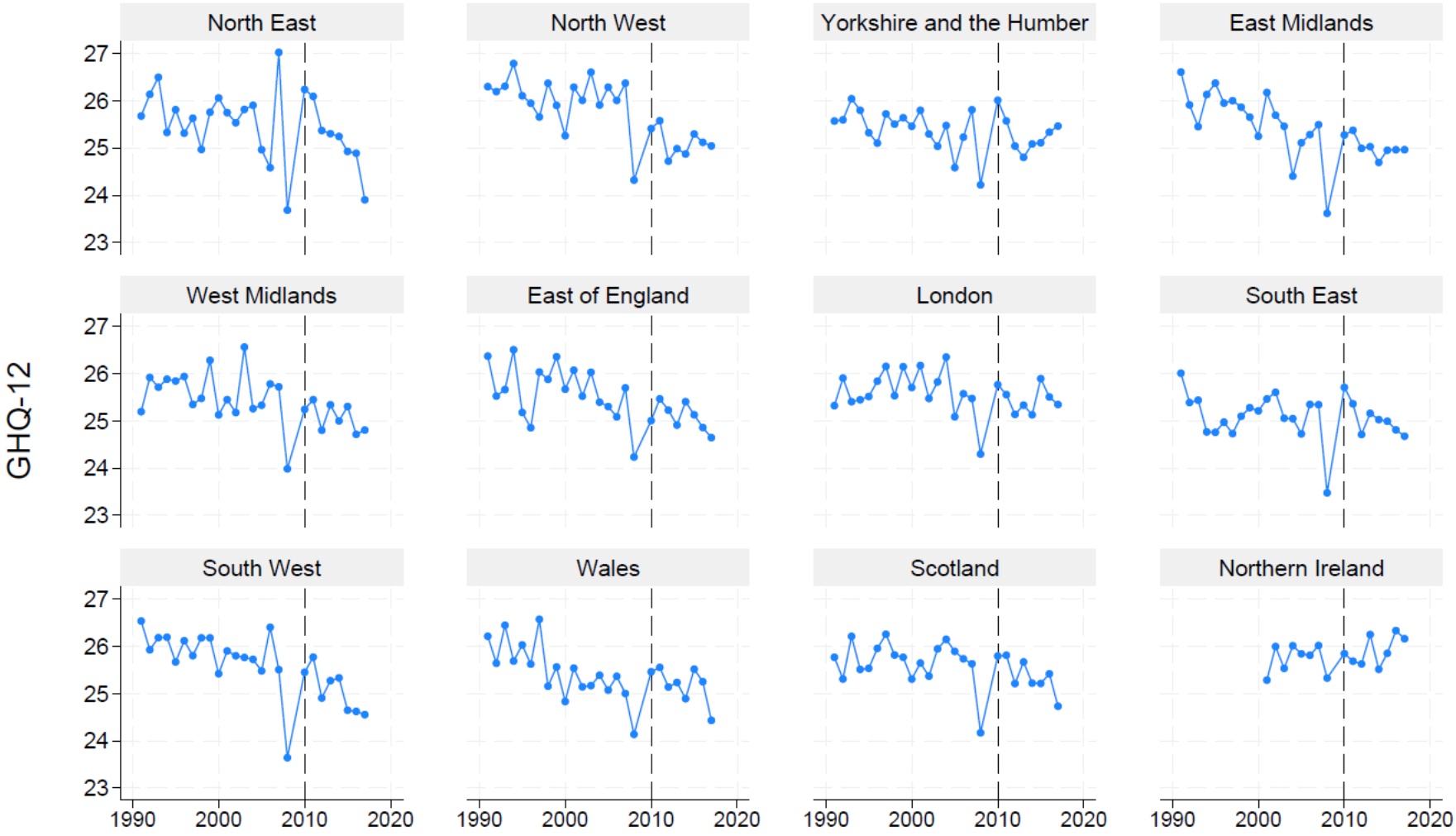


Figure 3. ITS Analysis showing trends in young people mental health over time and how these trends have changed since the introduction of austerity measures in 2010

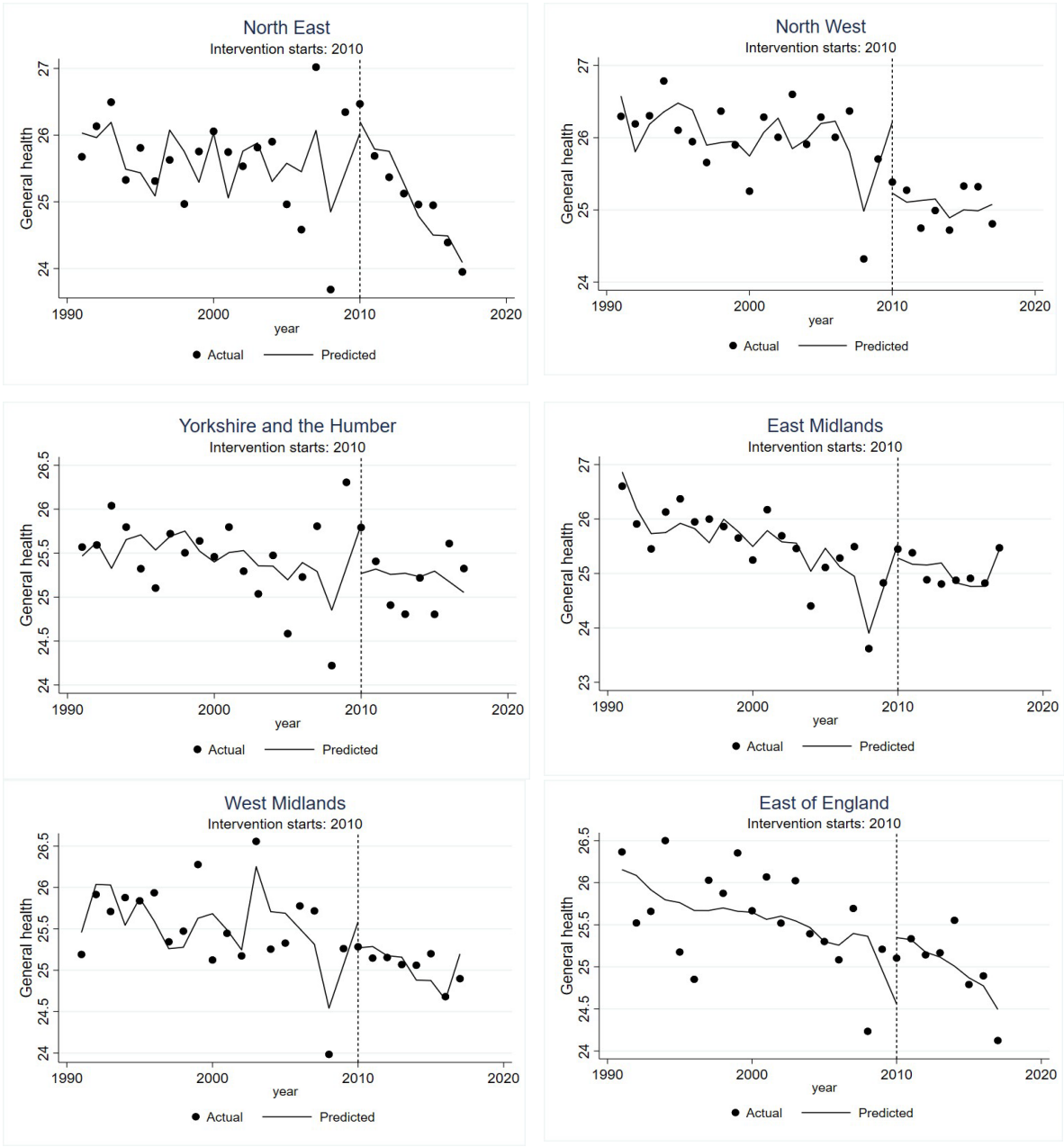


Figure 3. ITS Analysis showing trends in young people mental health over time and how these trends have changed since the introduction of austerity measures in 2010 (continued)

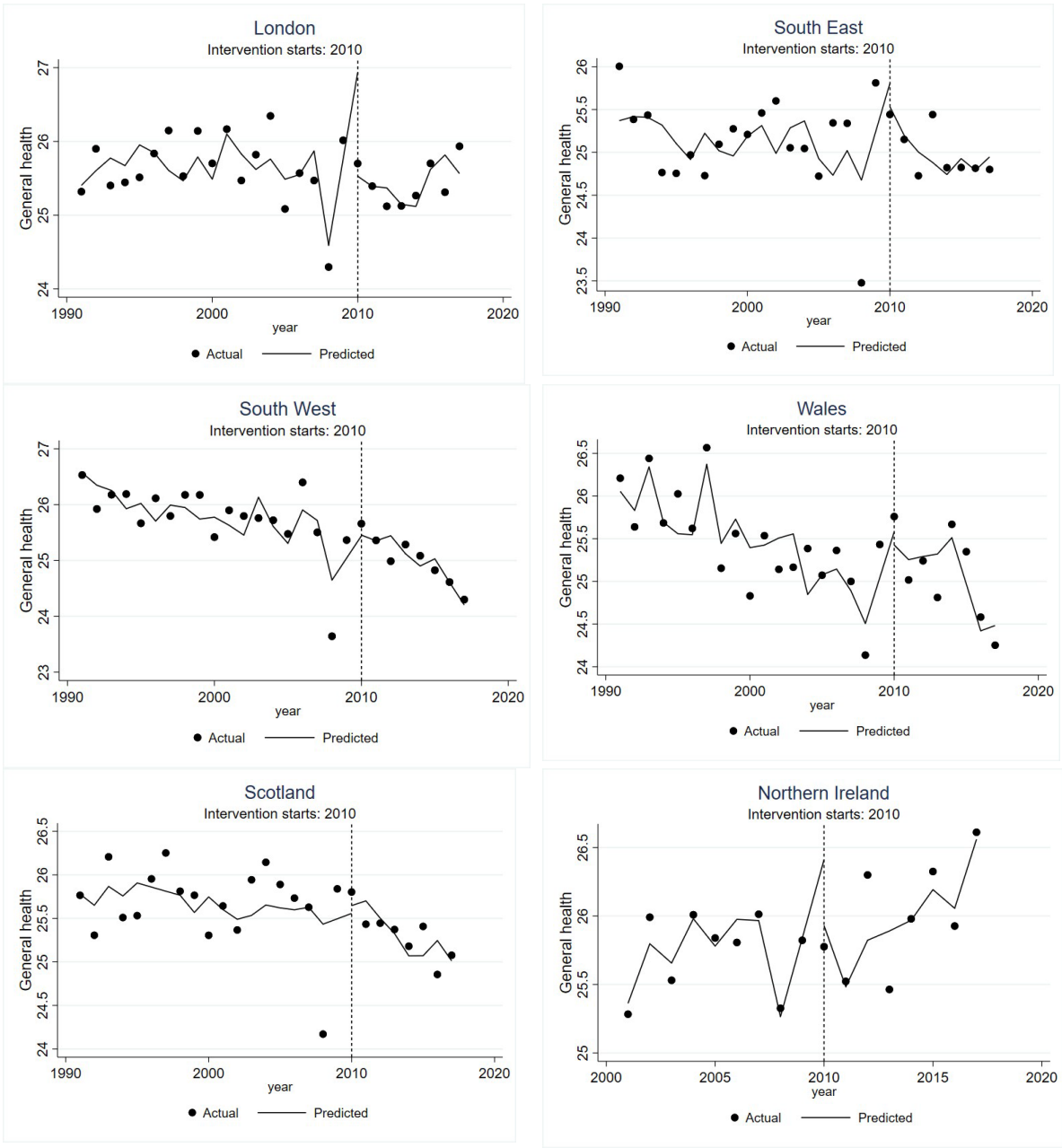
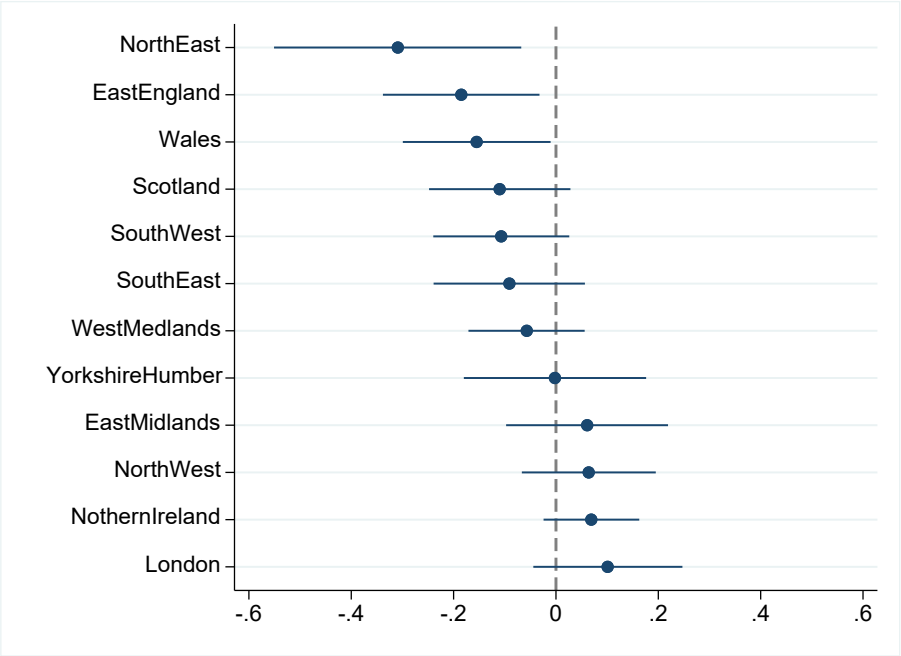


Figure 4. Coefficients (mean change) and 95% Confidence Intervals from ITS equation comparing mental health pre-2010 and post 2010



Note: 2010 is the break point in the ITS equation. Coefficients show mean decrease in mental health measured by GHQ post-2010 compared to pre-2010 when year is defined by interview date.

Table A1: Alternative ITS equations using 2010 as the cut-point and 2011 as breakpoint excluding data from 2008

	2010 as break point				2011 as break point with year 2008 excluded			
	data based on waves		data based on interview date		data based on waves		data based on interview date	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
North East	-0.267 **	(0.102)	-0.309 **	(0.115)	-0.330 **	(0.123)	-0.263 *	(0.150)
North West	0.057	(0.071)	0.064	(0.063)	0.010	(0.067)	0.038	(0.062)
Yorkshire and the Humber	-0.019	(0.065)	-0.002	(0.085)	0.028	(0.093)	0.038	(0.107)
East Midlands	0.068	(0.079)	0.061	(0.076)	0.057	(0.088)	0.069	(0.089)
West Midlands	-0.036	(0.069)	-0.057	(0.054)	-0.030	(0.058)	-0.056	(0.052)
East of England	-0.140	(0.110)	-0.185 **	(0.073)	-0.164 **	(0.079)	-0.179 **	(0.067)
London	-0.087	(0.065)	0.101	(0.070)	0.025	(0.066)	0.091	(0.066)
South East	-0.138 **	(0.086)	-0.091	(0.071)	0.014	(0.056)	0.037	(0.062)
South West	-0.145	(0.068)	-0.107	(0.063)	-0.136 **	(0.045)	-0.115 **	(0.050)
Wales	-0.099	(0.057)	-0.155 **	(0.069)	-0.178 **	(0.062)	-0.176 **	(0.087)
Scotland	-0.151 **	(0.075)	-0.110	(0.066)	-0.158 **	(0.045)	-0.109 **	(0.041)
Northen Ireland	0.052	(0.054)	0.069	(0.041)	0.044	(0.053)	0.008	(0.073)

Note: We conduct the analysis under four scenarios: i) analysis based on waves with 2010 as the break point (column 2&3); ii) analysis based on the actual interview date with 2010 as the break point (column 4&5); iii) analysis based on waves excluding 2008 and with 2011 as the break point (column 6&7); and iv) analysis based on the actual interview date excluding 2008 and with 2011 as the break point (column 8&9); Standard errors are in parenthesis. *p<0.1; **p<0.05.