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Is austerity a cause of slower improvements in mortality in high-income countries? A panel analysis

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ABSTRACT

Background: The rate of improvement in mortality slowed across many high-income countries after 2010. Following the 2007–08 financial crisis, macroeconomic policy was dominated by austerity as countries attempted to address perceived problems of growing state debt and government budget deficits. This study estimates the impact of austerity on mortality trends for 37 high-income countries between 2000 and 2019.
Methods: We fitted a suite of fixed-effects panel regression models to mortality data (period life expectancy, age-standardised mortality rates (ASMRs), age-stratified mortality rates and lifespan variation). Austerity was measured using the Alesina-Ardagna Fiscal Index (AAFI), Cyclically-Adjusted Primary Balance (CAPB), real indexed Government Expenditure, and Public Social Spending as a % of GDP. Sensitivity analyses varied the lag times, and confined the panel to economic downturns and to non-oil-dominated economies.
Results: Slower improvements, or deteriorations, in life expectancy and mortality trends were seen in the majority of countries, with the worst trends in England & Wales, Estonia, Iceland, Scotland, Slovenia, and the USA, with generally worse trends for females than males. Austerity was implemented across all countries for at least some time when measured by AAFI and CAPB, and for many countries across all four measures (and particularly after 2010). Austerity adversely impacted life expectancy, ASMR, age-specific mortality and lifespan variation trends when measured with Government Expenditure, Public Social Spending and CAPB, but not with AAFI. However, when the dataset was restricted to periods of economic downturn and in economies not dominated hydrocarbon production, all measures of austerity were found to reduce the rate of mortality improvement.
Interpretation: Stalled mortality trends and austerity are widespread phenomena across high-income countries. Austerity is likely to be a cause of stalled mortality trends. Governments should consider alternative economic policy approaches if these harmful population health impacts are to be avoided.

1. Background

The rate of improvement in mortality rates stalled across many high income countries around 2012, pre-dating the COVID-19 pandemic (Fenton et al., 2019a). The changed trends in the UK are evident for women and men, across almost all age groups, and for almost every specific cause of death, suggesting that the causes are impacting across multiple causal pathways simultaneously (Currie et al., 2021; Public Health England, 2018; Ramsay et al., 2020). The stalled average trends mask a rapid widening in health inequalities by deprivation in England & Wales (Rashid et al., 2021) and Scotland (Fenton et al., 2019b), and worsening mortality inequalities by ethnicity in the USA (Woolf et al., 2021), with mortality rates for people living in the most disadvantaged groups increasing (Fenton et al., 2019b; Rashid et al., 2021; Walsh et al., 2020; Woolf et al., 2021). The change in trends also been recorded in Iceland, the Netherlands, Portugal, France and Germany, among others (Fenton et al., 2019a; Ho and Hendi, 2018).

Many hypotheses have been proposed to explain the stalled mortality trends. Demographic and artefactual hypotheses (Murphy et al., 2019; Public Health England, 2018) can now be ruled out as substantive explanations (McCartney et al., 2022a). Although this stalling is due to a change in trends across almost all age groups and specific causes of death (Currie et al., 2021; Public Health England, 2018; Ramsay et al., 2020), the marked contribution some specific causes (cardiovascular

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disease, drug-related deaths (Walsh et al., 2021), dementias) and the timing of an influenza outbreak in 2015, led to arguments that there were disease-specific contributions or artefacts that may be important (Murphy et al., 2019; Public Health England, 2018; Raleigh, 2018). Again, it now seems less likely that there are specific causes that can be disassociated from wider processes, with the possible exception of the lagged contribution from increased obesity prevalence (McCartney et al., 2022a).

A more contested explanation, but one that has been ignored in some reports (for example, Public Health England, 2018; Marshall et al., 2019), is whether austerity (Stuckler et al., 2017) is a cause. Austerity is, "characterised by reductions in government spending and/or increases in taxation after accounting for 'automatic stabilisers' in the economy (such as changes in tax revenues or payment of unemployment benefits, which vary depending on whether there is economic growth or recession)" (McCartney et al., 2022b, p.519). Thus, summary measures of austerity can move in the same direction as a result of tax increases or spending decreases, and irrespective of the distributional implications, particular taxes or spending areas impacted. Within the UK context, austerity has been operationalised primarily as (real terms) erosions in public spending following changed macroeconomic policy priority in 2010. There is evidence that these changes have had negative health consequences in England through the mechanisms of reduced (or slower rates of increase) funding for local government (Alexiou et al., 2021), social care and healthcare (Watkins et al., 2017), and reduced value and increased conditionality of social security benefits (Wickham et al., 2020).

More generally, and using overall summary measures of austerity, there is convincing evidence up to 2013 that austerity is associated with slower mortality improvements across high income countries (Toffolutti and Suhrcke, 2019), and some evidence using more limited international austerity measures that it contributed to the stalling to 2015 (Rajmil and Fernández de Sanamed, 2019). Although the negative health impacts of cuts to local government spending (Alexiou et al., 2021; Stokes et al., in press) and changes to social security in England is clear (Wickham et al., 2020; Kim et al., in press), there is less evidence of the impact on mortality trends of austerity policies across other high income countries after 2010.

This paper addresses the following questions:

- Which high-income countries have experienced a stalling in mortality trends, and what is the timing and extent of any stalling?
- What has the austerity experience of high-income countries been between 2000 and 2019 (using a range of measures, including the extent to which austerity has been implemented during periods of economic downturn)?
- To what extent does the experience of austerity explain trends in a range of mortality-based measures?

2. Methods

2.1. Study design and settings

We applied fixed-effects panel regression modes for an unbalanced panel of UN-defined high-income countries (including UK nations, Hong Kong and Taiwan, as data were available separately). The restriction to high-income countries was necessary because of the limited availability of detailed mortality data (see below). We refer to these population as 'countries' throughout without seeking to comment on sovereignty. Sensitivity analyses were performed which restricts the panel to: 1. Periods of economic downturn (defined as years where GDP per capita remains below a previous peak); and 2. Non-oil-dominated economies (countries where 'oil rents' represented >9.16% of GDP in the latest available year, i.e. the two largest categories in the World Bank dataset) as they had greater variation in austerity due to oil price changes. Deviations from the pre-analytical protocol (McCartney et al., 2020) are justified in Supplement 1.

2.2. Exposures

Austerity is characterised by reductions in government spending and/or increases in taxation after accounting for 'automatic stabilisers' in the economy (such as changes in tax revenues or expenditure on unemployment benefits due to economic growth or recession) (McCartney et al., 2022b). Following Toffolutti and Suhrcke (2019), we measured austerity through the Alesina-Ardagna Fiscal Index (AAFI) and undertook sensitivity analyses measuring austerity as: real per capita Government Expenditure (indexed to 2007, GE); Public Social Spending (PSS) as a percentage of GDP; and annual change in the Cyclically Adjusted Primary Balance (CAPB) (Supplement 2). The fixed-effects study design eliminates time-invariant confounding. For this, the AAFI and CAPB measures account for automatic stabilisers including unemployment rates; whilst PSS is calculated as a percentage of GDP. As austerity impacts on economic growth, adjusting for GDP in the models would arguably be over-adjustment. Nonetheless, we employed this as a sensitivity analysis. As a crude means of estimating the role of under-employment and mean household incomes, these were adjusted for in models shown in the sensitivity analyses (S8). UK exposure data were applied to each of the UK nations. More detail on the data sources for each of exposure measures is provided in S2.

2.3. Outcomes

Period life expectancy at birth, all-cause age-standardised mortality rates (ASMRs) (for all ages), age-specific mortality rates (standardised within age strata) and lifespan variation (as a proxy for socioeconomic inequalities (Popham et al., 2013)) were calculated (Supplement 3). Specifically, lifespan variation was operationalised as the average life years lost when a death occurs (Vaupel and Canudas Romo, 2003). Each was analysed for the total population and then stratified by sex. The underlying data were sourced from the Human Mortality Database (www.mortality.org) which is limited to high-income countries.

2.4. Statistical analysis

Descriptive analyses (involving simple line graphs and segmented regression analyses) were undertaken to identify trends and break points in the outcomes using the R 'segmented' and 'ggplot2' packages, constraining to the identification of a single turning point between 2000 and 2019.

The assessment of the relationship between austerity and mortality-derived measures was undertaken using annual data by way of a family of fixed-effects panel regression models were fitted using the R 'plm' package for those countries with available data (Supplement 5). In addition to the above, sensitivity analyses varied the two-year time to zero and five-year lags (Supplement 8).

The equation for the regression model is:

$$y_{it} = \alpha_i + Bx_{it} + e_{it}$$

where:

α is the unobserved time-invariant country fixed effect.
$i = 1, \ldots, N$ represents the country within the panel
$t = 1, \ldots, N$ represents the year of the data
y is the mortality outcome
B is the regression coefficient
x is the austerity measure
e is the error term

The country-years included in each analysis are shown in Supplement 4. The number of datapoints available for the panel regression varies according to the analysis as the availability of the four measures differ for each country. Moreover, the sensitivity analyses for lag time

changes the number of available data points. As an example, 667 data points are in the panel for the unlagged analysis of life expectancy on AAFI.

Cross-sectional dependence was detected and probably relates to the simultaneous adoption of austerity across many countries in the panel around 2010–12. Serial correlation was also detected indicating the expected underlying differences between countries. Heteroscedasticity was detected for the models using Public Social Spending and CAPB. Therefore, the reported standard errors were checked using a Sandwich estimator, but were essentially unchanged suggesting that this had little impact on the results.

3. Results

3.1. Timing and scale of the stalled trends in life expectancy and mortality

Breakpoints in the trends in life expectancy were identified across populations, with 29/37 (after removing the duplication of the individual UK nations with the UK overall) experiencing a slower rate of improvement in the later time period (Fig. 1, S6.1-S6.8, Table S6.1). The USA experienced deteriorating life expectancy in the later period (as did Iceland and Scotland, but for a shorter time). Among those countries with breakpoints in their trends before 2009 there was no clear pattern as to whether the rate of change was faster or slower in the later period. That said, almost all countries with breakpoints after 2009 exhibited slower subsequent rates of improvement, with marked slowdowns in England & Wales, Estonia, Iceland, Scotland, Slovenia, and the USA after 2011. The worsening post-breakpoint trends after 2009 were more pronounced for females than males (Figures S6.4-S6.8 and Table S6.1). The breakpoints in the trends, and the magnitude of the changed trend, for age-standardised mortality (ASMR) at all ages for females and males combined were very similar to those for life expectancy (Figures S6.9-S6.13 and Table S6.2).

For deaths between the ages of 0 and 1 year (Figures S6.14-S6.15), and ASMR between 1 and 14 years (Figures S6.16-S6.17) there was evidence that for the majority of populations the rate of improvement was slower in the later time periods, although for several countries no breakpoints could be identified. Between the ages of 15 and 29 there was again a majority of countries for which the later trends were worse than the earlier trends, but there was substantial variation across populations (Figures S6.18-S6.19). Estonia and Lithuania displayed markedly faster rates of improvement in this age group after around 2008, whilst others experienced worsening mortality rates in absolute terms (including Canada, Latvia, Slovenia and the USA). The ASMR trends for 30–49-year-olds were more stable, and a majority of countries saw a slower rate of improvement in the later time period with some experiencing a deterioration (notably Canada, Croatia, England & Wales, Scotland and the USA) (Figures S6.20-S6.21). Stalling trends were evident in all countries except Latvia and Lithuania in the later time period for those aged 50–69, with a marked decline in the rate of improvement obvious in the UK nations and USA. For Iceland and Luxembourg, the breakpoints were identified near the start or end of the data series making these less reliable estimates (Figures S6.22-S6.23). For the oldest age group (70+ years) the ASMRs improved throughout the time series except in Croatia and Latvia pre-breakpoint, and in Poland and Greece post-breakpoint. However, the majority of countries again saw slower rates of improvement in the later time period (Figures S6.24-S6.25).

Lifespan variation (e†) most commonly reduced over time for the total populations of each country, but notably increased in Iceland, Portugal, Scotland and the USA after identified breakpoints (and in Hong Kong, based on a very short post-breakpoint time period, Figure S6.26). As for the other mortality measures, for a majority of countries the rate of change worsened after the identified breakpoints (Figure S6.27).

3.2. Trends in measures of austerity across countries

The trends in austerity as measured by the AAFI is provided in Figure S7.1, with the commonly used threshold for austerity (of < -1.5) indicated (Toffolutti and Suhrcke, 2019). The trends in each country are non-linear, with alternating periods of austerity and fiscal stimulus across countries. Notably, all countries experienced periods of austerity on this measure, including Germany and the USA (Table S7.1). The values for Kuwait and Saudi Arabia were especially volatile. The trends in real indexed Government Expenditure generally increased over time across countries (Figure S7.2), although many countries displayed a decline for at least part of the time series after 2010 (e.g. Cyprus, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Palau, Portugal, Puerto Rico, Saudi Arabia, Slovenia, Spain and USA), again indicating periods of austerity on this measure.

The data on Public Social Spending (as a percentage of GDP) revealed marked divergence and variation over time across countries (Figure S7.3). There were pronounced differences on this measure with relatively high percentages in Austria, Belgium, Denmark, Finland, France, Germany and Sweden, and relatively low percentages in Australia, Chile, Estonia, Iceland, Ireland, Israel, Korea, Switzerland, UK and USA. The percentage consistently increased in Italy, Japan and Korea, and was generally decreasing in the Netherlands and Sweden. Many countries (including Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Portugal, Spain, UK and USA) had a change in trend after 2010 indicating a move towards austerity, although the extent of this varied.

The final measure of austerity (CAPB) indicates austerity when its value increases from the previous year (Figure S7.4). Again, on this measure all countries had periods of austerity, but this varied substantially between years and countries.

3.3. Impact of austerity on mortality trends

The estimated impact of austerity on total, female and male life expectancies, at 0, 2 and 5 year lags, varies according to the measure of austerity. For AAFI there is no large or precise impact of austerity, but for Government Expenditure, Public Social Spending and CAPB austerity is found to have negative impacts with 0 and 2 year lags, but no impact with a 5 year lag (Fig. 2 and Table S8.1). The impacts are marginally, but consistently, worse for males than females, and the estimates for the impact of changes in Government Expenditure are much more precise than for the other measures.

The relationships between life expectancy and the four austerity measures were replicated for all-age ASMRs, and age-specific mortality rates, with austerity (measured with Government Expenditure, Public Social Spending and CAPB) found to be detrimental for each of the outcomes, but there was no clear relationship for the AAFI measure. The negative impacts of austerity were greater with increasing age for the age-specific mortality rates, with effect estimates at younger ages closer to zero, and with shorter lag periods between exposures and outcomes (Tables S8.1-S8.8 and Figures S8.1-S8.12). Similarly, austerity measured by Government Expenditure, Public Social Spending and CAPB was found to exacerbate lifespan variation. No relationship was identified with AAFI (Figures S8.13-S8.16).

Restricting the panel to include only periods of economic downturn had a marked impact on the results. Harmful impacts of austerity were observed at zero lag for AAFI, Government Expenditure and Public Social Spending, with a 2-year lag for Government Expenditure and Public Social Spending, and with a 5 year lag for Government Expenditure (Fig. 3 and Table S8.9). The effect estimates for austerity measured by Government Expenditure changes were much greater than for the other measures, although the scale of austerity for a unit change across the austerity measures is not easily comparable. No austerity effect was detected with the CAPB measure at any lag.

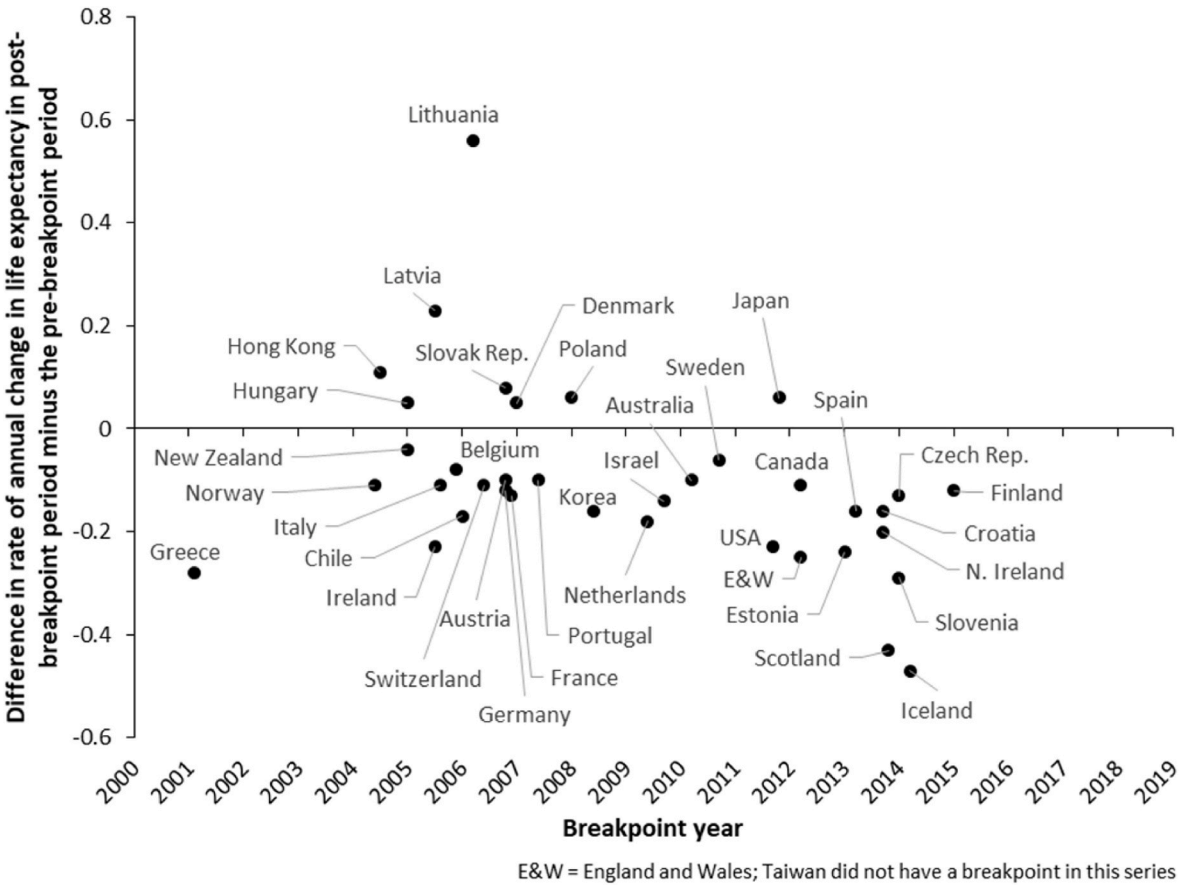

Fig. 1. Difference between annual rate of change in life expectancy in years before and after identified breakpoints, plotted with the breakpoint year. Lower life expectancy values indicate a slower rate of improvement (or faster deterioration) in the later time period (total populations, 2000–2019).

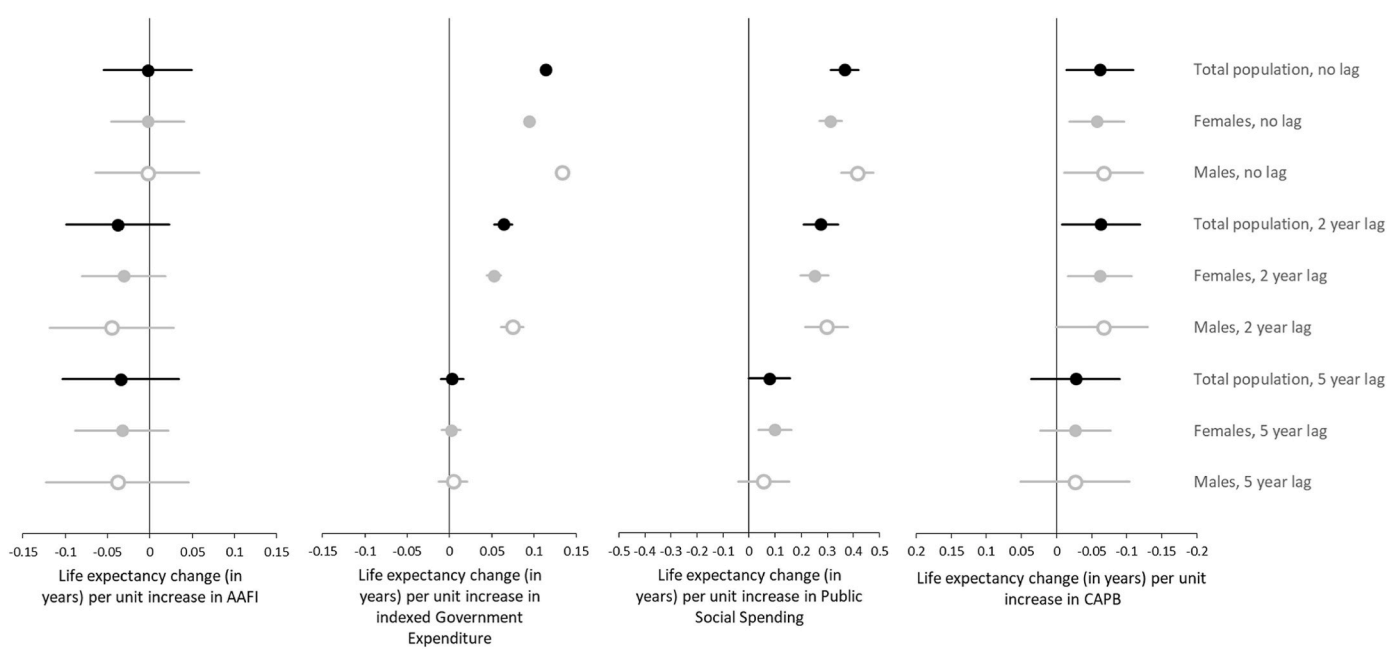

Fig. 2. Relationship between total, female and male life expectancy change and austerity (AAFI, Government Expenditure, Public Social Spending and CAPB) with 0, 2 and 5 year lags (estimates to the left of the zero line indicate that austerity is beneficial, and to the right is harmful).

As noted, hydrocarbon-dominated economies, such as Saudi Arabia, demonstrated extensive oscillations in their fiscal positions. Excluding these countries from the panel demonstrates deleterious effects on mortality improvements on all measures of austerity, except AAFI. Government Expenditure and Public Social Spending were significant for lags of 0, 2, and 5 years, whereas for CAPB significance was found for

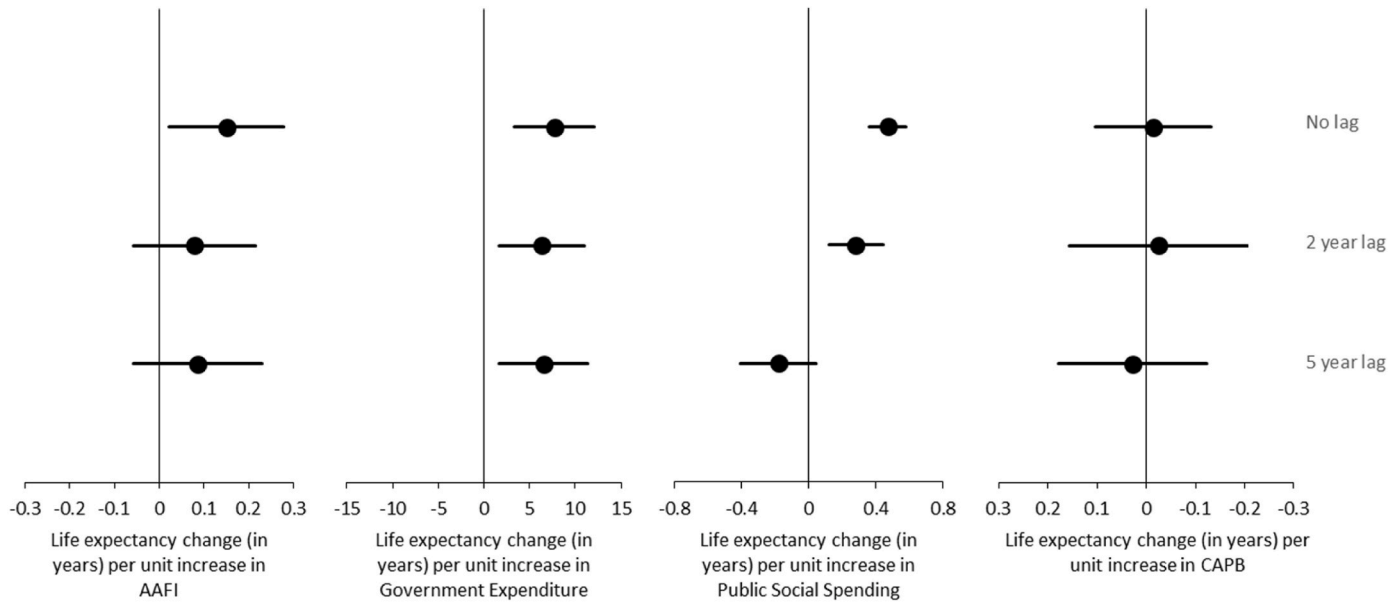

Fig. 3. Relationship between total life expectancy change and austerity (AAFI, Government Expenditure, Public Social Spending and CAPB) with 0, 2 and 5 year lags, restricted to periods of economic downturn (estimates to the left of the zero line indicate that austerity is beneficial, and to the right is harmful).

0 and 2 year lags (Fig. 4 and Table S8.10). Again, the effect sizes for a unit change in austerity was largest for Government Expenditure.

The sensitivity analyses which adjusted for household incomes reduced the damaging effects of austerity measured by Government Expenditure to close to zero, but were preserved when measured by Public Social Spending and (for males) for CAPB (Figures S8.17-S8.20 and Table S8.11). Adjusting for real GDP per capita made the effect estimates less precise across austerity measures, but significant adverse impacts on mortality trends were found with Government Expenditure (although these could have been due to chance), Public Social Spending (with zero- and 2-year lags) and CAPB (with zero lag) (Figures S8.21-S8.24 and Table S8.12). The final sensitivity analyses which adjusted for underemployment showed no impact of austerity measured by AAFI or CAPB, but harmful impacts with Government Expenditure and Public Social Spending (Figures S8.25-S8.28 and Table S8.13).

The results of the pre-specified additional analyses of the impact of austerity on underemployment and mean household incomes are provided in Figures S8.29-S8.36 and Table S8.14. The effect estimates for the relationships between each of the austerity measures and both outcomes were generally imprecise and did not indicate a clear relationship.

4. Discussion

4.1. Statement of principal findings

Stalled improvement in life expectancy and mortality trends were identified across most high-income countries between 2000 and 2019. The slower rate of improvement, or worsening, was marked in England & Wales, Estonia, Iceland, Scotland, Slovenia, and the USA, and

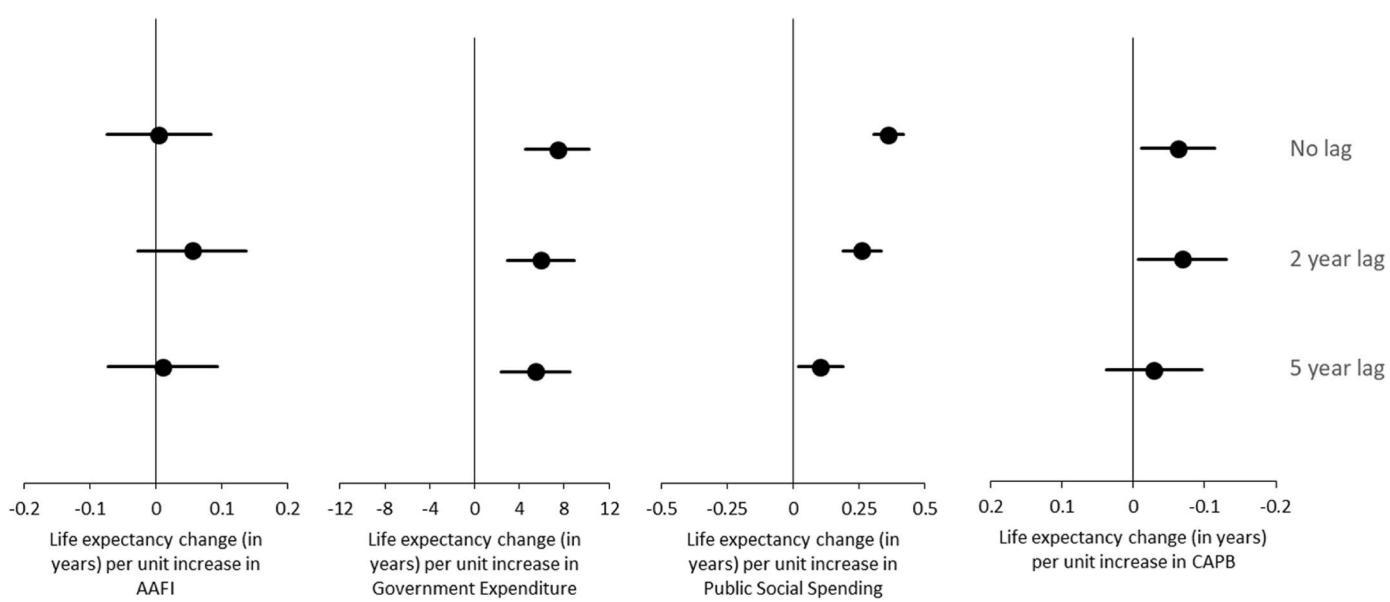

Fig. 4. Relationship between total life expectancy change and austerity (AAFI, Government Expenditure, Public Social Spending and CAPB) with 0, 2 and 5 year lags, restricted to non-oil-dominated economies (estimates to the left of the zero line indicate that austerity is beneficial, and to the right is harmful).

particularly for females. There was also a deterioration in lifespan variation in Iceland, Portugal, Scotland and the USA.

All countries experienced periods of austerity when measured by AAFI and CAPB, with more extreme values in oil-dominated economies. When austerity was measured by change in Government Expenditure there was evidence of widespread exposure (including in Cyprus, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Palau, Portugal, Puerto Rico, Saudi Arabia, Slovenia, Spain, and the USA). Public Social Spending indicated increasing austerity over time in the Netherlands and Sweden, and that the Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, the Netherlands, New Zealand, Portugal, Spain, UK, and the USA moved towards austerity after 2010.

Austerity was found to be harmful for life expectancy, ASMR, age-specific mortality and lifespan variation when measured with Government Expenditure, Public Social Spending and CAPB, especially with shorter lags between exposures and outcomes. Harmful impacts were also identified when austerity was implemented during economic downturns and in non-hydrocarbon dominated economies (both observed for three of four austerity measures).

4.2. Strengths and weaknesses of the study

This study has several strengths. A pre-analytical protocol was produced to reduce the risks of post-hoc rationalisation. The sensitivity analyses allowed the impact of varying the measure of austerity to be investigated, and it is clear that this is important given the stronger relationship for austerity measured by Government Expenditure, Public Social Spending and CAPB. These analyses also revealed that shorter lag periods had greater impacts, and that austerity implemented during economic downturns and in non-oil-dominated countries was similarly harmful. The fixed effects panel regression approach eliminated the risk of time-invariant confounding, whilst the key time-varying confounders relating to ageing of the populations, and changes in GDP and unemployment, were accounted for in the outcome and exposure measures respectively. The use of segmented regression analyses to identify breakpoints in the trends in outcomes improves upon most previous analyses of the stalled mortality trends (Currie et al., 2021; Ho and Hendi, 2018; Public Health England, 2018; Ramsay et al., 2020), as does the inclusion of trends in lifespan variation as a proxy for inequalities. The treatment of the austerity measures as continuous, rather than categorical, variables arguably also provides this study with greater sensitivity compared to others (Rajmil and Fernández de Sanamed, 2019; Toffolutti and Suhrcke, 2019).

That said, we acknowledge weaknesses in our approach. Principally, none of the measures of austerity used provide information on the distributional impact or affected policy areas. Indeed, some of the measures (particularly AAFI and CAPB) may not be able to account for austerity that is targeted on social security (as has been the case in the UK), as these assume that previous public spending on unemployment at a given point in the economic cycle can be applied to future periods. The AAFI and CAPB also do not differentiate between austerity implemented as tax increases or public spending reductions, and this is likely to be important for population health outcomes. Finally, it is possible that time variant confounding by other aspects of economic policy, such as potential inequality effects associated with monetary policy (for example, Dow, 2017) not captured by our measures is playing a role.

4.3. Strengths and weaknesses in relation to other studies, discussing important differences in results

The impact of the stalling on mortality rates is substantial, and has been enumerated elsewhere as a life expectancy 1.24 and 1.49 years lower for females and males respectively in the UK by 2018 than would have been expected based on previous trends (Minton et al., 2020). This gap continues to grow, and results in excess mortality every year. In comparison, the impact of COVID-19 on life expectancy in England & Wales for 2020 was a loss of 1.02 years (Islam et al., 2021). The results of this study triangulate those of others which found detrimental mortality and health impacts of austerity. This includes international comparisons using different data, methods and time periods (Rajmil and Fernández de Sanamed, 2019; Toffolutti and Suhrcke, 2019), as well as studies of reductions in local government spending (Alexiou et al., 2021), reduced value and increased conditionality of social security benefits (Wickham et al., 2020; Katikireddi et al., 2018), and changes in incomes (Richardson et al., 2020) (all of which form part of the broader austerity policy in the UK). Taken together, this now provides clear evidence that austerity is an important cause of the stalled mortality trends across many high-income countries since 2010. The omission of austerity as a possible explanation for the stalled mortality trends from some prominent reports Marshall et al. (2019); Public Health England (2018); and dismissal in others (Raleigh, 2018), is disappointing, not least because the hypothesis was articulated shortly after the stalled trends were first analysed (Hiam et al., 2017) and there was evidence which showed the negative impacts of austerity from earlier time periods (Toffolluti and Suhrcke, 2019). It is also clear that austerity has been a much more widespread phenomenon than is sometimes contented (e.g. that Germany has not experienced austerity (Raleigh, 2018)).

4.4. Meaning of the study: possible explanations and implications for clinicians and policymakers

The stalled mortality trends have not been a prominent public health concern since the COVID-19 pandemic, despite the much larger impact of long-term trends in health inequalities than even the worse predictions for COVID in terms of Years of Life Lost (YLL) (McCartney et al., 2021a). However, if economic policy returns to the pre-pandemic austerity framing, it seems unlikely that population health will improve, and the opportunity to redesign the economy to address current and future challenges (including climate change, inequality and adequate funding of public services) will be lost (McCartney et al., 2021b). A different approach could be taken, wherein a rapid transition to a low carbon and equitable economy, and a change in the economic relationships which underpin socioeconomic inequalities (Sayer and McCartney, 2021), could provide the context for population health to flourish.

4.5. Unanswered questions and future research

Future research could further interrogate the relationship between austerity and mortality trends by examining: the impacts of austerity delivered through changes in taxes in comparison to changes in spending; the impacts of specific austerity-related policies (including, for example, the co-operation of the UK's Department for Work and Pensions in data linkage requests to facilitate high quality evaluations); the impacts of austerity with different distributional consequences; the impacts of changes in spending across different departmental areas (e.g. military versus social security); the impact of austerity characterised qualitatively; and the interactions with monetary policy changes, such as quantitative easing and interest rate changes.

5. Conclusion

The majority of high-income countries have seen a stalling in the rate of improvement, or a worsening, in life expectancy and ASMR trends between 2000 and 2019. All high-income countries within our sample experienced periods of austerity as measured by AAFI and CAPB, whilst many others had periods of austerity detectable across all four measures (including Government Expenditure and Public Social Spending). For most measures of austerity, it was found to be detrimental to trends in life expectancy, ASMR, age-specific mortality and lifespan variation. The impacts are greatest with short lag periods and reduce to close to

zero after 5 years. The stalled trends in life expectancy and mortality observed in many high-income countries prior to the COVID-19 pandemic is likely to be at least in part due to austerity policies. If governments wish to prioritise health improvement as we emerge from the initial phases of the COVID-19 pandemic, austerity policies should be avoided.

Credit author statement

The study was conceived and designed by GM with input from RM and FP. The data was gathered, tidied and analysed by GM with help from FP. The manuscript was drafted by GM with critical contributions and edits from RM, FP, RD and DW.

Data sharing

All of the underlying data used in this study is publicly available from the cited databases. All of the data generated from this study is contained within the supplementary materials.

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Declarations of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data used in this paper are publicly available datasets which we do not own. References to these datasets are provided.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2022.115397.

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