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Methodological approaches to measuring mental health in a cost-of-living crisis: a rapid review

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- Quasi-experimental study designs, using population surveys, can measure public health policy.
- Studies using population-level surveys should plan to stratify analyses by ethnicity.

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Title: Methodological approaches to measuring mental health in a cost-of-living crisis: a rapid review

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stakeholder meetings in guiding the focus of the review and interpretation of findings.

Abstract

Background: Cost-of-living crises are damaging to population mental health and require a public health response. It is important to assess whether public health interventions are effective. We aimed to identify population-level methods and measures and the appropriateness of the measures for vulnerable populations.

Methods: A rapid evidence review was undertaken. Nineteen databases, including grey literature, were searched for evidence published between 1970 and April 2023.

Results: Seven reviews, nine primary studies and two reports from grey literature were identified. Methods consisted of analyses of existing data from national or regional cohort studies, household panel surveys, repeated cross-sectional surveys, routine medical data, or data on suicide death rates. Twelve brief validated mental health measurement tools, embedded in population-level surveys, were identified. Two quasi-experimental studies used data from a UK household panel survey to examine the impact of the introduction of specific welfare policies on mental health. Studies identified socio-economic vulnerabilities, but it was not possible to determine whether data were effectively captured from people from minority ethnic groups.

Conclusion: Population-level surveys can be used in quasi-experimental studies to measure the effects of a public health initiative with specific roll out dates to tackle cost-of-living impacts. It is unclear as to whether the identified methods and tools are suitable for use with people from minority ethnic groups.

215 words.

Abbreviations:

Acronym	Full Description
CRPD	Clinical Practice Research Datalink
GHQ-12	12-item General Health Questionnaire
GDP	Gross Domestic Product
ONS	Office for National Statistics
PHQ-8	Population Health Survey
SF-12	Short Form 12 Mental Health Component Summary

THIN	The Health Improvement Network
UKHLS	Understanding Society: The UK Household Longitudinal Study
WEMWBS	Warwick-Edinburgh Mental Well-being Scale

Background

During 2021 and 2022 the UK experienced a sharp rise in inflation. For many people, wages and welfare payments did not keep up with the rate of inflation, leading to a cost-of-living crisis. Energy, food, fuel, and housing became less affordable leading to adverse short and long-term health outcomes [1]. There is evidence from past economic crises, such as the 2008/2009 global financial crisis (the Great Recession) that economic shocks and increases in the cost-of-living have a detrimental effect on mental health across the population and that vulnerable populations are disproportionately affected [2]. Furthermore, people with poorer mental health are more likely to experience further reductions in income. The negative impacts on mental health and well-being induced by the cost-of-living crisis could lead to future financial and health problems, potentially creating a downward spiral that can persist even if economic conditions improve [3].

In response, national and regional public health interventions may be put into place to mitigate the effects of the cost-of-living crisis. It is important for policymakers and practitioners to be able to evaluate the impact of any public health measure on mental health at a population level, but designing the studies, recruiting participants, and collecting the data can be expensive and time consuming. However, there are ongoing surveys and cohort studies undertaken by governments and national and regional organisations that include mental health measurement methods and which could potentially be used to evaluate the effect of public health interventions. An overview of mental health measures could assist researchers and policy makers seeking to understand the impact of public health interventions on mental health.

We conducted a rapid review of articles that evaluated the impact of economic crises on population mental health. The aims of the review were to 1) identify and appraise available population-level measures for assessing the impact on mental health of any public health response to the cost-of-living crisis and 2) identify whether the measures are appropriate for use in vulnerable populations.

The purpose of the review was not to summarise the findings of included articles (i.e., impact of the economic crises on mental health or outcome of any public health interventions), or to identify how often different methods of measurement were used to evaluate the effect of economic crises on mental health, but explore what methods and tools are available and appropriate for monitoring the impact of the cost-of-living crisis on mental health and determine if these methods and mental health measurement tools suitable for specific vulnerable populations?.

Methods

We conducted a rapid review, which is a form of knowledge synthesis that accelerates the process of conducting a conventional systematic review by abbreviating or omitting specific methods to generate the evidence for stakeholders in a resource-efficient manner [4]. The review was conducted in line with best practice guidance for rapid reviews [5], and was based on existing reviews plus more recent primary studies that may not be covered by reviews.

Study selection and searches

The study selection criteria are shown in Table 1. The search strategy was developed and carried out in several parts (JW and EH). As per the study selection criteria, we searched for secondary evidence published between 1970 to 2023 and for primary evidence from 2021 to 2023 relating to cost-of-

living and mental health. Further 'mop-up' searches were conducted to ensure we had identified all relevant mental health tools used to measure mental health during an economic crisis (1970 to 2023) and, because this study was of particular interest to Welsh policy-makers we conducted a search to identify research on cost-of-living and Wales (1970 to 2023). Search results were downloaded to Endnote 20.3 (Clarivate) and duplicates removed.

Searches ran to April 2023 in the following databases: KSR Evidence; Ovid Medline, Embase, PsycInfo, SSP and HMIC; EbscoHOST CINAHL; Scopus; Wiley Cochrane; ProQuest ASSIA, SSA, SA and SD; Social Care Online; TripPro; PROSPERO; Google and Google Scholar. The MEDLINE search strategies are available in the supplementary materials.

Study selection process

All references identified by the literature searches were screened for eligibility using the criteria listed in Table 1 by title and abstract. Potentially relevant full texts were assessed for inclusion using a structured approach. Firstly, existing reviews describing the effect of the cost-of-living crisis on mental health were assessed for relevance using their inclusion/exclusion criteria and characteristics of included studies. Reviews that did not clearly define their inclusion/exclusion criteria or where the majority of included studies did not fit our eligibility criteria (e.g., mainly cross-sectional studies) or that did not include a description of measurement tools were excluded. We made a pragmatic decision to include reviews with a minority of studies that did not meet our inclusion criteria because we were aware that many individual studies in this field were cross-sectional, and few reviews existed that only included longitudinal studies. However, due to the number of relevant articles identified it was not possible to include all reviews and studies. As multiple reviews were found that could potentially answer the research questions, the largest or most recent reviews that included details of the available tools and methods were chosen for inclusion.

Relevant full texts of primary studies from 2021 to April 2023 were screened and included according to the following criteria 1) used evaluation methods not previously identified from reviews 2) with an experimental/quasi-experimental design 3) studies of high relevance to UK populations 4) included detailed exploration of strengths and limitations of evaluation methods.

Initial screening was conducted by a single reviewer (CE). A second reviewer dual screened 20% of the primary studies for quality assurance purposes (LB).

Data extraction

The following data were extracted: study details (author, year, country, purpose, design), number of included studies and key characteristics from secondary evidence, mental health measurement methods and tools, economic measures, sources of data, strengths and limitations of the measurement tools as identified by study authors and vulnerable groups as identified by study authors. Where necessary further, non-systematic, searches were conducted to obtain details of the characteristics of the identified measurement tools and methods, prioritising articles describing the original development and validation of the tool. A full review and quality assessment of the psychometric properties of each tool was beyond the scope of this rapid review, instead a brief description of each tool, including domain, number of items, time taken to administration and

availability was extracted. Data were extracted by the lead author, with 20% of records dual extracted for quality assurance by a second reviewer (DJ).

Quality appraisal

Formal quality appraisal of the evidence presented by the reviews and studies that used the methods was beyond the scope of the rapid review. We provide a narrative description of the search strategy and inclusion criteria of included reviews and studies and discuss pros and cons of potential study designs using the methods identified.

Results

After duplicates were removed, 6,775 titles and abstracts of records were screened, of which 190 were identified for full text screening. We identified 18 papers for inclusion (Figure 1).

Four systematic reviews [6-9], one scoping review [2] one clinical guideline [10] and one rapid review from grey literature [11] were included. The reviews included a total of 322 different identifiable studies, of which 52 were included in more than one review (although Martin-Carrasco reported using evidence from a total of 354 studies, detailed data were only extracted from 69). In addition, we identified nine further peer-reviewed primary studies [3, 12-19] and two reports from grey literature [20, 21].

A detailed summary of study characteristics, mental health and economic measurement methods, author assessments of the methods used, and groups identified as particularly vulnerable are available in Tables 2, 3 and 4 for peer-reviewed secondary evidence, peer-reviewed primary studies, and grey literature respectively.

Identified study designs and sources of data.

Table 5 summarises the different study designs, characteristics, and examples of sources of data from the reviews and primary studies. Most studies included in the reviews were large observational studies involving sample sizes in the thousands. They were secondary analyses of existing data drawn from national or regional cohort studies, household panel surveys, repeated cross-sectional surveys [2, 6-10], or used medical records or prescribing data [2, 9, 10] or were ecological time-series studies using national or regional suicide death rates [2, 6, 8, 10] . One case-control study that was included compared mental health outcomes from a country that experienced a recession with one that did not [6]. The reviews were, in general, not specific about which datasets were used, although one review [10] named two UK surveys: "The Health and Activity Lifestyle Survey" and "The English Longitudinal Study of Aging" as sources of data.

Many studies included in the reviews compared mental health in the years pre- and post-onset of an economic crisis, some described treating the Great Recession of 2008/2009 as a 'natural experiment'. It is not clear from the reviews exactly how the date of onset of the economic crisis was determined and whether this was comparable across studies. Only two reviews [6, 9] gave details of specific economic measures. The macro-economic indicators that were used included national and regional rates of unemployment, gross domestic product (GDP) and home foreclosure rates. Individual or household-level indicators included employment status, job security, household income, perceived financial stress, indebtedness, and household tenure.

The additional primary studies and grey literature provided more details about study design and data sources. Of the UK-based studies, seven used data from "Understanding Society: The UK Household Longitudinal Study" (UKHLS) [3, 11, 15-17, 19, 20] , one used data from the "Scottish Longitudinal Study" [14], one from the "Welsh Health Survey" (now "National Survey for Wales") [18] and one from the Office for National Statistics (ONS) "Opinions and Lifestyle Survey" [21]. The former two are panel surveys that follow the same households or individuals over time, replacing participants who leave the sample and include data linkage with external datasets, including health data. The latter two are repeated cross-sectional surveys and include a different representative sample at each wave. Economic indicators were those also identified in the reviews. In addition, primary studies in the UK measured deprivation using the Index of Multiple Deprivation, other regional income indicators and aggregated data from other household surveys such as the "Wealth and Assets Survey" and "Household Labour Survey".

Seven of the primary studies were observational [3, 12-16, 18] and two used a quasi-experimental design [17, 19]. Both quasi-experimental studies used data from UKHLS to examine the effect of the introduction of specific welfare policies (the "Bedroom Tax" and the introduction of Universal Credit) on mental health.

Mental Health Measures

Mental health outcomes were frequently assessed using validated mental health measurement tools, which are embedded in many of the cohort and panel surveys. Twelve brief validated mental health or mental wellness measurement tools, self-administered, or administered by an interviewer, were identified from the included articles [22-33]. These are listed in Table 6. The 12-item General Health Questionnaire (GHQ-12) [22], the Short Form 12 Mental Health Component Summary (SF-12) [23] and the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) [24] are all embedded into UKHLS, the WEMWBS [24] is used in the "National Survey for Wales" and the 8-item Population Health Survey (PHQ-8) [25] is used in the "Opinions and Lifestyle Survey". Additional measures of mental health included data from medical and hospital records for incidence of mental illness, prescription of medication, suicide attempts and suicide rates. In the UK, aggregated data from GP recorded diagnoses from the Clinical Practice Research Datalink (CRPD) and primary care data from The Health Improvement Network (THIN) are available and panel surveys such as the Scottish Longitudinal Study are linked with medical records on an individual level.

Potential biases in study design

All reviews and studies included some discussion on strengths and limitations of study methodology (Tables 2, 3 and 4).

We identified one systematic review [8] that had the aim of evaluating biases in studies assessing the effects of the Great Recession on health in Spain. This review included 53 studies and evaluated bias using an adapted tool. Four main biases were identified: problems with evaluation, time bias, failure to adjust for confounders such as seasonal effects, and inconsistencies in defining the date of onset of the Great Recession. The biases identified are summarised below.

Problems with evaluation existed with a repeated-cross sectional design where the sample surveyed before recession onset did not consist of the same individuals as the sample surveyed after onset,

and therefore were subject to confounding. Studies judged at lower risk of bias in this domain attempted to control for confounding by either matching subjects from the samples before and after the crisis; stratifying the samples by common characteristics, often into groups considered most vulnerable, or using multilevel modelling analyses. Glonti et al (2015) also recommended other analyses such as dynamic modelling or structural equation modelling. Other reviews also point out that it is not possible to infer causality from studies with a repeated cross-sectional design, although a strength of these studies is that they are frequently national surveys that are representative of the population. However, if a longitudinal panel survey with a repeated measures design is used, the evaluation problems may be reduced and there is stronger evidence for causality.

Time bias existed in time series studies where there were a very few data points after crisis onset, or where there was no consideration given to any potential lag between exposure and outcome. Time series studies were mainly those where the health outcome was suicide. Studies into suicide rates are ecological studies using aggregated data of unknown quality and causality cannot be inferred.

Other reviewers also discussed failure or inability to adjust for confounding. A limitation of using existing datasets for secondary analysis is that data of relevance to the secondary analysis may not have been collected. For example, it was observed that UK population panel and repeated cross-sectional surveys do not always ask about both mental health and household economics in detail, and not all income- or employment-related factors of interest were included in all survey waves.

Surveys use self-reported data which may not be accurate. However, potential biases in the use of medical records were discussed in several other reviews and studies. Data in hospital and medical records were observed to be of variable quality and dependent on the structure of services and record keeping. Any reorganisation of mental health care services post-onset of an economic crisis can introduce bias by potentially altering who can access services and may disproportionately affect the most vulnerable. The use of prescribing data can introduce bias since the availability of drugs may vary, different prescribers may have different prescribing thresholds which may affect different population sub-groups differently, and the same drug may be given for conditions that are not mental-health related. One review [9] commented that people seeking medical care were not necessarily those most impacted by economic crises. Where data from medical records have been aggregated, individual behaviour cannot be inferred, and the data cannot capture variation in services between population sub-groups. For example, an economic crisis may increase suicide rates for some population sub-groups but if suicide prevention strategies are provided at the same time, these may benefit different population sub-groups and the net result may be a zero increase. However, it was observed that an advantage of aggregated data was that they reflect the environmental effects of changes in the economy beyond an individual's personal circumstances.

Vulnerable groups

All the reviews and grey literature and some primary studies identified population groups whose mental health was most likely to be affected by an economic crisis. All the mental health measurement tools were used for this purpose, except for the WEMWBS. All the reviews presented the data narratively and neither reviews nor primary studies commented on the suitability of the methods and tools to measure mental health in vulnerable groups. However, data were presented on people living on lower incomes, unemployed or at risk of unemployment, in financial or housing insecurity or living in more deprived areas prior to the crisis. The reviews also examined data

stratified by gender and age. Other groups identified as being vulnerable were people with pre-existing mental health problems, people living in households with dependent children, and migrants. One primary study [21] also identified adults with a disability or long-term illness as being at risk. No included study or review presented data from people from minority ethnic groups.

Discussion

Summary of the findings

This rapid review aimed to answer two questions:

What methods and tools are available and appropriate for monitoring the impact of the cost-of-living crisis on mental health?

We identified multiple studies that examined the impact of economic crises on mental health over time using national surveys from many different countries using different methods. Data from population-level panel surveys may be most useful. These large surveys incorporate validated mental health tools and questions to determine financial security at household or individual level and may be linked to medical records (e.g. Clinical Practice Research Datalink (CPRD) data in UK). Many studies are observational in design, but we also identified two relevant quasi-experimental case-control studies to examine the impact of specific welfare policies in the UK (the "Bedroom tax" and the introduction of Universal Credit). A quasi-experimental study design could also be suitable for measuring the impact of a specific public health initiative that has a clear roll-out date.

Are methods and mental health measurement tools suitable for specific, vulnerable populations?

All the reviews and most primary studies found people living in financial insecurity were at higher risk of poor or worsening mental health and most examined gender differences. It therefore appears that the methods and tools are suitable for use in men and women, across the socio-economic spectrum, living in different housing tenures and with different employment status. However, it is possible that some potentially vulnerable groups are not well represented when using the methods and data sources identified. Few studies presented data from other groups that are often marginalised such as migrants and people living with disabilities or long-term poor health. We also identified no studies that examined whether people from minority ethnic groups were more at risk of deteriorating mental health during economic crises. It is therefore not clear as to whether the methods identified are suitable for all marginalised populations.

Strengths and limitations of this rapid review

Evidence for this rapid review has been drawn from reviews that included over 300 studies, and from primary studies and grey literature. We identified appropriate available population level datasets that include both validated mental health tools and collect socioeconomic outcomes and identified appropriate study designs and provided information about their strengths and limitations.

However, our rapid review has limitations. All the included reviews summarised data from individual studies narratively and varied in the detail they provided on study designs and strengths and limitations. The identification of vulnerable groups appeared not to be systematic in most reviews and it is possible that data on vulnerable groups were not captured. There is a strong overlap in the

literature with studies describing the impact of economic crises on mental health and the impact of any austerity policies that followed the Great Recession on mental health. We did not include austerity as a search term, and it is possible that relevant studies were excluded. However, the purpose of this review was not to examine the evidence that either economic crises or austerity policies affect mental health, but to describe available methods of measuring changes to population mental health in response to public health intervention. In addition, although the search strategy was comprehensive and included evidence from peer-reviewed articles and from grey literature, we had to exclude much of the identified grey literature due to lack of methodological detail and lack of information on data sources and measurement tools and, due to challenges in searching grey literature, it is likely that we did not identify all relevant documents. However, our overall aim was to identify the range of relevant methodological approaches (or population-level measures) used rather than identify all papers reporting the use of each approach. It is possible that there are datasets and tools used by charities and institutions that we did not identify.

Implications for policy and research

Our rapid review has identified existing methods and tools likely to be suitable for measuring the impact of public health initiatives on mental health in people from different socio-economic groups during a cost-of-living crisis. However, it is unclear as to whether the identified methods and tools adequately capture data from people from minority ethnic groups, who already experience disparities in mental health care [34]. The reported evidence did not allow us to determine whether the methods used to capture ethnicity of participants are inadequate, or whether recruitment of people from minority ethnic groups was low. In the short-term, reports and studies using panel surveys such as UKHLS or that use medical records should present data on ethnicity, or highlight where it is missing, and plan to stratify analyses by ethnicity if possible. In the longer-term it may be necessary to develop new methods to better capture data from people from minority ethnic groups.

Conclusion

Internationally a wide variety of data sources and datasets has been used to explore the impact of economic crises on mental health. Both medical records and longitudinal individual and household surveys that include validated brief mental health measurement tools are available. The surveys aim to be representative of the population and collect information on other health-related and socio-economic outcomes and using them to measure the effects of public health policy is efficient. The choice of study design is likely to be a pragmatic decision based on the exact research question and availability of data, although care should be taken if data on important confounders are missing.

3626 words.

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	Inclusion criteria	Exclusion criteria

s/costoflivinganddepressioninadultsgreatbritain/29septemberto23october2022.

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Table 1: Study selection criteria

Population	Adults or households	Organisations and systems (e.g., exploring how an organisation such as a health / educational organisation or system responds) Children/adolescents only
Exposure	Cost-of-living crisis or economic / financial crisis	Related to financial stress caused by Covid-19 and/or measures to tackle Covid-19 or other infectious disease or disaster (natural or man-made)
Outcome	Mental health e.g., • Depressive/affective disorders • Anxiety disorders • Disruptive behaviour and dissocial disorders • Stress • Wellbeing • Suicide attempts/ideation • Suicide completion rates	Physical health Behavioural outcomes (such as healthy eating, physical activity) Sleep outcomes Psychosis Schizophrenia Substance misuse Eating disorders
Evaluation	Appraisal of the following: • Validated population-level surveys • Population-level mental healthcare use (including, but not limited to primary and secondary care records, hospital admissions, medication use)	Appraisal of questionnaires used only for individual level data. Non-validated tools developed specifically for a study (bespoke tools)
Study design	• Systematic reviews; scoping reviews; rapid reviews, organisational reports; clinical guidance Primary research, limited to: • Longitudinal observational studies (panel surveys, time series, interrupted time series and qualitative studies) • Repeated, population-level cross-sectional studies • Population-level intervention studies (randomised, non-randomised and single arm)	Single timepoint cross-sectional studies Individual-level intervention studies
Countries	Conducted in UK, Europe, Australia, New Zealand.	All other countries
Language of publication	English	
Publication date	Secondary evidence from 1970 Primary studies 2021- present	

Publication type	Published, including grey literature	Conference abstracts Preprints
Other factors	Prior to 2021 relevant measures will be identified from secondary evidence (systematic reviews; scoping reviews; rapid reviews; rapid evidence assessments; organisational reports; clinical guidance). This date limit was arrived at since preparatory work had identified a large, eligible, scoping review that included articles published up to the end of Dec 2020	

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Publication type	Published, including grey literature	
Other factors	Prior to 2021 relevant measures will be identified from secondary evidence (systematic reviews; scoping reviews; rapid reviews; rapid evidence assessments; organisational reports; clinical guidance). This date limit was arrived at since preparatory work had identified a large, eligible, scoping review that included articles published up to the end of Dec 2020	

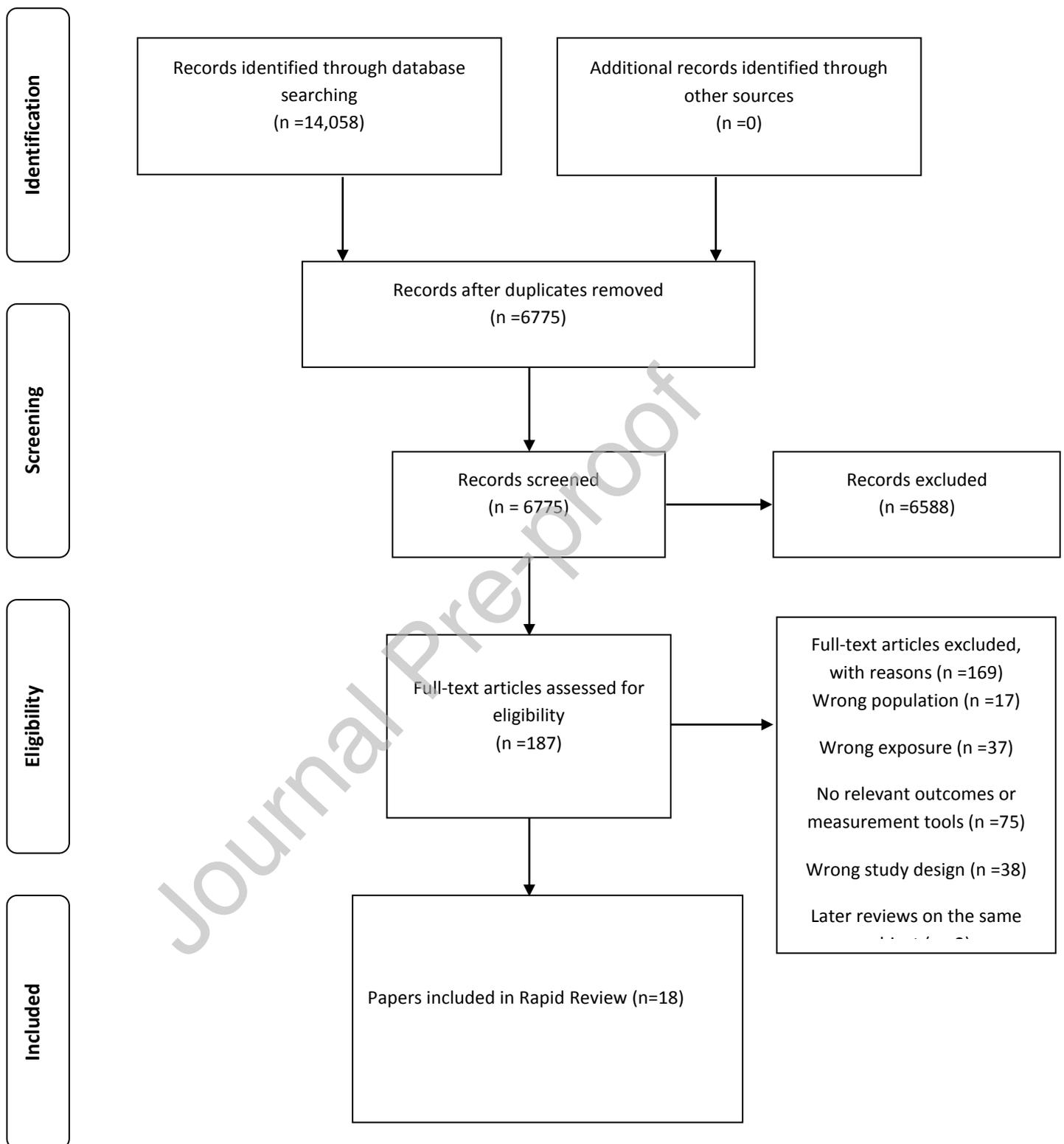**Figure 1: Search results and study selection**

Table 2 Summary of peer-reviewed secondary evidence

Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
Frasquilho, 2016 [6] (Any)	Systematic review Examined evidence on population mental health during recession and identified vulnerable groups Articles published between 2004 and 2014 Any economic crisis/recession Outcomes: Psychological well-being; mental health distress; common mental disorders; depression; suicide (including suicide behaviours and ideation) Search strategy, inclusion and exclusion criteria clearly described; narrative summary; no formal quality assessment but strengths and weaknesses for study	101 studies 66 studies used national population samples; 16 cross-national population samples; 19 regional/community samples 79 studies were in a general population, 22 in different specific populations (e.g., working population, unemployed, older adults, hospital patients) 61 European, of which 9 are in the UK; 7 from Australasia; 33 from other countries. 2 case-control / quasi-experimental studies; 30 cohort; 17 repeated cross-sectional; 28 ecological; 24 cross-sectional All included studies had ≥1000 participants	Mental health measurement tools: • SF-36 MCS (General mental health) • CES-D scale (Psychological well-being and mental health) • EURO-D (Depressive symptoms) • HSCL-25 (Mental health distress caseness) • GHQ-12 (Mental health distress) • PSS-4 (Psychological stress) • Kessler-10 (Mental health distress) • MHI-5 (Mental health distress) • SCID-I (Depression) • WHO-CIDI (Depression) Other methods: • GP / hospital records on incidence and prevalence of	Time variables (pre- and post-economic recession changes) Macroeconomic indicators: • rates of unemployment • GDP • home foreclosure rates Individual-level indicators: • employment status • psychosocial job quality and security • household income • perceived financial strain or security • perceived economy/recession stress • deprivation • indebtedness	Representative data can be obtained from national and regional population samples. In longitudinal cohort studies, the chronological sequence of exposure, outcomes and confounders affect all participants at the same time, giving stronger evidence for causality. Repeated cross-sectional designs, studies using aggregated data and ecological studies cannot give evidence for causality. Many studies had a limited time-period, which meant long-term effects could not be measured.	People unemployed (either due to job loss during recession, or prior unemployment) People in insecure work Living with debt Low socioeconomic status At risk of home foreclosure / eviction People with pre-existing mental health conditions

Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
	methodology described		mental illness • Suicide rates • Hospital records on suicide attempts Population surveys: • Unspecified national and international cohort, panel and repeated cross-sectional surveys	• housing payment problems • socioeconomic status	Important to measure and adjust for confounding factors such as seasonal variation and mental health prior to exposure.	
Glonti 2015 [7] (Any)	Systematic review Examined evidence from longitudinal studies on factors influencing resilience among the general population living in countries exposed to financial crises Searched up to October 2013 Any economic crisis/recession Outcomes: Mental health; depression; perceived stress; psychological distress; mental well-being; happiness;	22 studies in total, of which 11 included mental health outcomes in countries of interest. 11 European 5 cohort studies; 6 repeated cross-sectional	• GHQ-12 (Mental health) • PSS-4 (Stress levels) Population surveys: • Unspecified national and international cohort, panel and repeated cross-sectional surveys	Not reported	Different analytical methods could be used to explore causality and suggest dynamic modelling or structural equation modelling. Multilevel modelling could be used to explore the effect of environmental influences on mental health.	People who are unemployed or in precarious employment People on lower incomes Women's mental health was found to be worse than men's mental health pre-crises. Mental health worsened during economic crises for both men and women, some studies found the change in mental health was greater in men, but women still tended to experience worse mental health overall.

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Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
	attempted suicide. Search strategy, inclusion and exclusion criteria clearly described; narrative summary; quality of included studies assessed using an adapted version of the Quality Assessment Tool for Quantitative Studies					
Guerra, 2021 [2] (Any)	Scoping review Summaries available evidence of the impact of economic recession on mental health Articles published between 2008 and end-December 2020 Any economic crisis/recession Outcomes: depressive symptoms; anxiety disorders; suicide mortality; suicide attempts; suicide ideation	127 studies 11 prospective cohort; 3 retrospective cohort; 1 case-control; 84 time-series; 28 cross-sectional. 72 studies in all adults; 36 in working age adults; 9 in older adults (definitions ranged from adults >50 to >75 years old); 2 young adults; 3 middle-aged adults. Also 5 in children and adolescents. 80 European; 7 Australasia; 40 other countries	Mental health measurement tools: • CES-D (Depressive symptoms) • EURO-D (Depressive symptoms) • Goldberg Depression and Anxiety Scales • SCID-I (Major depressive disorder) • WHO CIDI (Anxiety and mood disorders) Other measurements: • Rates of psychotropic medication use	Not reported	There is a large quantity of available data, but it is very varied. Studies may not be generalisable since basis of each economic crisis is variable and many studies are based on 2008/2009 financial crash in housing or stock markets. The population affected by cost-of-living crisis may be different and rates of mental illness may vary. Populations at specific	Men are more vulnerable to suicide / suicide attempts Unemployed men People in insecure work At risk of home foreclosure / eviction People on low incomes People with low education People with pre-existing mental health conditions

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Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
	Search strategy, inclusion and exclusion criteria clearly described; narrative summary; no quality assessment		• Mental health service use (community or hospital) • Length of hospital admissions • Hospital records on suicide attempt rates • Suicide rates Population surveys: • National and international cohort, panel and repeated cross-sectional surveys e.g., European Social Survey; Portuguese National Mental Health Survey		risk may be different in different countries. Local welfare policies may also be different and produce different impacts	
Martin-Carrasco, 2016 [10] (Any)	Clinical Guidance Identify the impact on mental health in Europe of the economic downturn and the measures that may be taken to respond to it. Search to end 2014 Focus on economic crisis of 2007-2014	Evidence is drawn from 354 articles, but only 69 European studies are summarised in detail. Of these: 17 studies relate to psychiatric morbidity (9 repeated cross-sectional; 4 cumulative registers; 1 prospective cohort; 1 longitudinal cross-cohort; 1 clinical descriptive; 1 cross-	Mental health measurement tools: • GHQ-12 (Mental health distress) • WHO CIDI (Anxiety and mood disorders) Other measurements • Data extracted from calls made to mental health helpline (Greece) • Suicide rates	Unemployment rate	The advantage of aggregate-level data is that they reflect the environmental effects of changes in the economy beyond an individual's situation. Aggregate level data cannot allow for variation in services e.g., An economic crisis may	Men of working age (may be mediated by socioeconomic status) People who are unemployed or in precarious employment People at risk of foreclosure / eviction or living in neighbourhoods with high rates of foreclosure

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Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
	Search strategy, inclusion and exclusion criteria clearly described; narrative review; no quality assessment	sectional) 20 relate to suicide behaviour (13 time-trends analysis)	Population surveys: • National and international cohort, panel, and repeated cross-sectional surveys, including Health and Activity Lifestyle Survey (HALs); English Longitudinal Study of Ageing (ELSA)		increase suicide rates for some population sub-groups but if suicide prevention strategies are provided at the same time that benefit other population sub-groups the net result may be a zero increase.	People living with debt People with existing mental health problems People with low social capital
Saez, 2019 [8] (Spain)	Systematic review Evaluate bias in studies assessing the effect of the Great Recession (between 2008 – 2013) on health in Spain. Search up to June 2018 Great Recession Outcomes: General mental health outcomes; suicide Search strategy, inclusion and exclusion criteria clearly described; narrative summary; assessment of study bias using 8 domains was	53 studies in total, of which 32 included mental health outcomes. Study designs and populations not clearly reported, although most studies reporting mental health outcomes used data from health surveys with repeated cross-sectional design and there were fewer cohort studies; time series studies were generally used where the outcome was suicide All conducted in Spain	• GHQ-12 (Mental health distress) • Suicide rates Population surveys: • National and international cohort, panel, and repeated cross-sectional surveys	Not reported	60% of the included studies (all health conditions) were assessed as having a high risk of bias. Four main biases identified: evaluation problems, time-bias, lack of control of observed and unobserved confounders and non-exogenous definition of the onset of the Great Recession. A repeated cross-sectional design means different samples at	People who are unemployed Migrants People with low education People at risk of foreclosure / eviction

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Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
	adapted from a previously published tool (Parmer 2016)				each timepoint. Authors suggest controlling by matching subjects across surveys, stratification by analysing data from selected vulnerable groups or adjustment for confounders in a multivariate model. A better study design would be use of longitudinal data from population-based cohort studies, with repeated measures on the same individual. Many time series studies were assessed as having insufficient number of periods after the crisis and did not consider lag effects. Not all studies control for observed or unobserved confounding (e.g., long-term temporal	

Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
					effects, seasonal variation) or control for the variability in mental health outcomes that is not explained by the crisis or the confounders (which could be done by introducing random effects). Varying definitions as to the onset of the Great Recession can affect results.	
Silva, 2018 [9] (Any)	Systematic review Examine impact of economic crises on use of mental health care Search to June 2018 Outcomes: Use of mental health services Early 1990s Post-Communist Depression; Late 1990s East Asian financial crisis; 2008 Great Recession	17 studies 5 repeated cross-sectional studies; 3 cohort; 1 retrospective cohort; 1 panel study; 4 time series; 3 ecological 10 European; 1 Australia; 6 other countries	Hospital records for: • Incidence of attendance due to suicidal behaviour • Use of emergency department due to mental health issues / suicidal behaviour • Discharge from psychiatric hospitals Medical records for: • Use of mental healthcare • Use of prescription drugs National population surveys	Change in rates of unemployment Local unemployment	Hospital / medical records are dependent on the structure of services and record keeping. Most studies reported that there was no reorganisation of mental health services during the period studies, but any changes (e.g., due to austerity measures) change availability of	Women are higher users of mental health services Adults aged 35-54yrs increased use of care due to suicidal behaviour Men's use of care due to suicidal behaviour was influenced by socioeconomic factors. Authors note that people seeking care were not necessarily those most impacted by

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Author, date (Country of interest)	Review details (type, purpose, search period, economic crisis, outcomes, review quality)	Included studies (number, key characteristics)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods/other observations	Groups identified as particularly vulnerable
	Search strategy, inclusion and exclusion criteria clearly described; narrative summary; quality of studies assessed using Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies		involving structured interviews that include questions on: • Use of mental health care • Prescription drugs		services and may alter availability disproportionately for more vulnerable people.	economic crises

CES-D=Centre for Epidemiological Study Depression Scale; GDP = Gross Domestic Product; GHQ-12 = 12-item General Health Questionnaire; GP = General Practitioner; HSCL-25 = Hopkins Symptom Checklist; MHI-5 = 5-item Mental Health Inventory; PSS-4 = Short form Perceived Stress Scale; SCID-I = Structured Interview to Identify Major Depressive Disorders; SF-36 MCS = 36-item Short Form Health Survey Questionnaire Mental Component Summary; WHO CIDI = World Health Organisation Structured Interview to Identify Anxiety and Mood Disorder

Table 3. Summary of peer-reviewed primary studies

Citation (Country)	Study Details (purpose, design, mental health outcomes)	Study characteristics (source of data, details of sample, dates of data collection, analysis)	Mental health measurement tools and methods	Specific economic measures	Covariates / confounders	Author assessment of strengths and limitations of measurement	Groups identified as particularly vulnerable
Alvarez-Galvez, 2021 [12] (Spain)	Assess association between recent economic downturns and age-standardised suicide rates adjusting for social cohesion and community values (interpersonal trust, social capital, post materialist values obtained from World Values Survey) Time-series study Outcomes: Suicide	Population-level data Age-standardised suicide rates from: (1) 1980 to 1991; (2) from 1992 until 2007; (3) from 2008 to 2010; (4) from 2011 to 2017 Interrupted time-series analysis	Suicide rates per 100,000 obtained from the National Statistics Institute of Spain	From Eurostat data: • Unemployment rate • GDP growth • Social expenditure as a percentage of GDP	Social relationships data from the World Values Survey: • Interpersonal trust • Social capital • Postmaterialist values Men and women analysed separately Age standardised results presented	Methodological variations in suicide data from registries Aggregate national data used which means individual behaviour cannot be inferred	Men more at risk of suicide at all timepoints
Aretz, 2022 [13] (Netherlands/Germany)	Investigate whether the Great Recession (2007 to 2009) increased the risk of depression in older people in Europe. Panel study Outcomes: late-life depression	Data from Survey of Health, Ageing and Retirement in Europe (waves 1 – 7), conducted in Austria, Belgium, Denmark, France, Germany, Italy, Spain, Sweden, Switzerland Data from 2004 to 2017 Eligible participants were ≥50yrs in wave 1; had valid depression data in waves 1 and 2 (prior to Great Repression) and for at least	EURO-D depression symptom scale	Country-level GDP data used to identify start of recession by country Perceived area deprivation (from SHARE)	Individual level confounders: • Age • Job status • Physical activity • Cognitive functioning • Frailty • Activity of daily living • Number of chronic diseases	EURO-D was developed to specifically to measure late-life depression Use of a mental health questionnaire identifies undiagnosed depression Survey only conducted every 2 years, which limits ability to identify very short-term effects. Individual-level	People living in more deprived areas

Citation (Country)	Study Details (purpose, design, mental health outcomes)	Study characteristics (source of data, details of sample, dates of data collection, analysis)	Mental health measurement tools and methods	Specific economic measures	Covariates / confounders	Author assessment of strengths and limitations of measurement	Groups identified as particularly vulnerable
		one wave after; depression-free at baseline; did not relocate during study period 6866 participants eligible at baseline (out of 95,534); 3144 included in fixed effects model (53% female) Analysis: Binary logistic individual fixed effect (FE) models using within-estimators.			Household level confounders: • Living together with a partner • Household size • Urban/rural	confounders available (Note: This study is useful to show how a subset from cohort data can be used/derived)	
Cherrie, 2021 [14] (Scotland)	Examine how the trend in 'new' antidepression prescription rates during the Great Recession varied by regional economic conditions Longitudinal data linkage study Outcomes: Anti-depressant prescriptions	Data from the Scottish Longitudinal Study, linked to NHS service use and prescriptions for mental health conditions Eligible participants supplied data in 2001 and 2011 censuses (pre- and post-recession onset); were aged between 16 and 60 in 2011; were economically active and employed in the labour market in 2011. 86,500 participants eligible Linked to NHS data from 2009 to 2014 Analysis: Multilevel logistic	New anti-depressant prescriptions from linked NHS data	Labour market trajectories derived from annual trends in full-time employment (derived from NOMIS Official Labour Market Statistics, ONS) from 2004 to 2014 Average regional income lost per working adult due to welfare reforms	• Age • Gender • Ethnicity • Marital status • Living alone • Social grade • Carstairs neighborhood deprivation • Health selective migration prior to study period controlled for with data on Local Authority of residence in 2001 and 2011	Population representative sample used Linked data on prescribing No data on diagnosis of depression so some prescriptions may not be for mental illness Unable to control for differences between prescribers in treating depression with anti-depressants	People living in areas with low or declining levels of full-time employment

Citation (Country)	Study Details (purpose, design, mental health outcomes)	Study characteristics (source of data, details of sample, dates of data collection, analysis)	Mental health measurement tools and methods	Specific economic measures	Covariates / confounders	Author assessment of strengths and limitations of measurement	Groups identified as particularly vulnerable
		regression and mediation analysis					
Clair, 2022 [15] (UK)	Explore the impact of cold homes on mental health, the role of gender as a mediator and the effect of transitioning into a cold home Household panel study Outcomes: mental distress Note: During the study period, energy prices and housing costs were rising	Data from UKHLS 2009 to Dec 2021 Eligible participants entered the study at wave 1; ≥16yrs; had data for at least 3 waves Sample stratified into: Good mental health and lived in warm home at wave 1 (n=21,281) Borderline mental health and lived in warm home at wave 1 (n=2258) Analysis: multilevel discrete-time event models	GHQ-12 (Mental health distress) (Checked with SF-12 MCS)	Cold home measured by responses to question: "In winter are you able to keep this accommodation warm enough"	• Age • Gender • Ethnicity • Region • Employment status • Diagnosis of longstanding condition or disability • Adjusted income quartile • Highest educational qualification • Household composition • Financial situation • Household tenure • Building type • Housing payment arrears	Observed that it is possible that mental distress perceptions of temperature; that different people may experience household temperature differently	People transitioning into living in cold homes
Curtis, 2021 [16] (England)	Determine if the risk of worsening mental health was greater for people living in the most deprived areas in terms of unemployment and impact of austerity policies	Data from UKHLS waves 3 to 7, 2011 to 2017 Eligible participants were ≥16yrs; living in England; had full data on the variables of interest.	SF-12 MCS (version 2)	Geographical variables to categorise place of residence according to socio-geographic aspects (employment domain of the Index of Multiple	• Gender • Age group • Ethnicity • Living with a partner • Occupational social class	Using a sub-sample from the panel survey means it may not no longer be representative of England as a whole	People who were more deprived Living in economically disadvantaged neighborhoods Living in areas most impacted by austerity

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Citation (Country)	Study Details (purpose, design, mental health outcomes)	Study characteristics (source of data, details of sample, dates of data collection, analysis)	Mental health measurement tools and methods	Specific economic measures	Covariates / confounders	Author assessment of strengths and limitations of measurement	Groups identified as particularly vulnerable
	Household panel survey Outcomes: Trends in self-reported mental health	17,212 participants Maximum likelihood multinomial logit models		Deprivation; average income loss per person of working age due to welfare reforms; rural / urban; West Midlands/other) Indicator showing whether someone had moved to a location in a different category	• Income in the month prior to interview • Employment status • Housing tenure at wave 4 • In receipt of welfare benefits at wave 4 (other than child benefits and state pensions) • Change in socio-economic status		policies Becoming unemployed Moving onto welfare benefits
Kim, 2022 [17] (England)	Examine the impact of the announcement (April 2012) and implementation (April 2013) of the spare room subsidy ("bedroom tax") on psychological distress in social housing renters Quasi-experimental study with matched controls Outcomes: psychological distress	Data from UKHLS 2010 to 2014 for main analysis and up to 2017 for sensitivity tests. Eligible participants were living in social housing; had pre- and post- policy data; were over 16 and under state pension age; lived in England 2078 eligible participants, of which 422 were living in underoccupied housing and were affected by the policy	GHQ-12 (Mental health distress)	None	• Observed and unobserved individual- level time-invariant characteristics (e.g., immigration status and family history of illnesses) • Regional differences	Pre- and post- design and use of matching and appropriate analysis enhances ability to determine causality Other covariates not captured may confound the treatment effects of an intervention GHQ-12 is limited compared with formal mental health	People of lower socioeconomic status

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Citation (Country)	Study Details (purpose, design, mental health outcomes)	Study characteristics (source of data, details of sample, dates of data collection, analysis)	Mental health measurement tools and methods	Specific economic measures	Covariates / confounders	Author assessment of strengths and limitations of measurement	Groups identified as particularly vulnerable
		prior to April 2013 ('treatment group') and 1926 were not affected. Final matched sample = 412 treatment group and 412 controls. Difference-in-differences analysis				assessment from a trained health care professional Loss to follow-up is common in panel surveys, which may bias estimates if different between control and treatment arms. Matching may reduce representativeness of the sample Treatment status was assumed based on household characteristics prior to the intervention period; household characteristics may be vulnerable to misreporting or may change over time Other studies examine associations between welfare reforms and mental health during economic crises but not the impact of a very specific policy using a	

Citation (Country)	Study Details (purpose, design, mental health outcomes)	Study characteristics (source of data, details of sample, dates of data collection, analysis)	Mental health measurement tools and methods	Specific economic measures	Covariates / confounders	Author assessment of strengths and limitations of measurement	Groups identified as particularly vulnerable
						quasi-experimental design	
Saville, 2021 [18] (Wales)	Examine whether pre-economic crisis aggregated social capital within a region (ecological social capital) was protective against post-economic crisis depression Repeated cross-sectional survey Outcomes: self-reported treatment for depression	Data from the Welsh Health Survey (now superseded by the National Survey for Wales) from all 12 waves (2003/4–2015) Overall sample size 180,462 (minimum 12,689, maximum 15,699 per year) Analysis: multilevel regression with post-stratification estimates	Self-reported treatment for depression	Data from Living in Wales survey used to estimate pre-crisis ecological social capital for each Middle Super Output Area of Wales Classification of occupation from National Statistics Socio-economic classification	• Age band • Gender • Area population density • Occupation type	Welsh Health Survey represents a relatively large proportion of the Welsh population Self-reported treatment for depression may not be accurate	Not reported, although women had higher levels of self-reported treatment for depression at all timepoints Rates of treatment for depression increased with age up to the age of 50yrs
Thomson, 2022 [3] (UK)	Compare total and direct effects of unemployment on mental health, examining the impact of income Household panel survey Outcomes: prevalence of poor mental health	Data from UKHLS 2019 Eligible participants were all working aged adults aged 25 to 64. 45,497 participants Analysis: double-robust marginal structural modelling	GHQ-12 (Mental health distress)	Binary measure of whether someone was employed or unemployed Continuous income Binary measure of poverty (living above or below household equivalised income <60% median after housing costs)	• Age • Gender • Ethnicity • Education • Socio-economic status • Marital status • Number of dependents • Physical health • Location	Unable to include measures for other income-related factors such as wealth, savings, or debt since these were not included in all survey waves	Not reported

Citation (Country)	Study Details (purpose, design, mental health outcomes)	Study characteristics (source of data, details of sample, dates of data collection, analysis)	Mental health measurement tools and methods	Specific economic measures	Covariates / confounders	Author assessment of strengths and limitations of measurement	Groups identified as particularly vulnerable
Wickham, 2020 [19] (UK)	Examine the effect of the introduction of Universal Credit on mental health Quasi-experimental study Outcomes: psychological distress *(NB: Included due to study design despite date. Not included in reviews, identified via grey literature)*	Data from UKHLS between 2009 and 2018 Eligible participants were aged between (16 to 64yrs), had data on variables of interest, did not live in Northern Ireland, were not on disability benefit 52,187 participants Intervention group for each survey wave were participants who answered that they were unemployed; control participants were those who answered other than unemployed Analysis: Difference-in-differences analysis	GHQ-12 (Mental health distress) (Checked using SF-12 MCS)	Self-reported unemployment Data on when Universal Credit was introduced into an area where each respondent lived	• Country of residence • Age • Gender • Education status • Marital status	Natural policy experiment approach	Not reported

GDP = Gross Domestic Product; GHQ-12 = 12-item General Health Questionnaire; NHS = National Health Service; ONS = Office for National Statistics; SF-12 MCS = Short Form 12 Mental Health Component Summary; SHARE = Survey of Health, Aging and Retirement in Europe; UKHLS = Understanding Society: The UK Household Longitudinal Study

Table 4: Summary of grey literature

Citation (country)	Details (aim, study type, organisation)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods	Groups identified as particularly vulnerable
Clark, 2022 [20] (UK)	Report examining associations between insecurity and anxiety in the UK Uses data from GP records, national surveys (panel surveys and repeated cross-sectional), although some data used is cross-sectional being taken from a single year. Joseph Rowntree Foundation	• GHQ -12 • SF-12 • Warwick-Edinburgh mental well-being scale (WEMWBS)[1] • Single anxiety score Medical records: • GP recording diagnosis of anxiety from: Clinical Practice Research Datalink • The Health Improvement Network Population survey: • UKHLS • Annual Population Survey	Employment data: • Office for National Statistics • UKHLS • Annual Population Survey Housing data: • Labour Force Survey • English Housing Survey Household savings: • Wealth and Assets Survey • Family Resources Survey Social capital: • Office for National Statistics Deprivation: • Index of Multiple Deprivation	Prescribing data needs care with interpretation since the availability of drugs may vary and different prescribers may have different prescribing thresholds and the same drug may be given for different conditions Noted that UK official surveys do not always ask about both mental health and household economics in detail, may miss specific economic details and data from different surveys cannot be linked The authors report that UKHLS has 10,000s of respondents and has information on both health and economics, although there are difficulties in identifying people in insecure work or forced freelancers UKHLS allows individuals to be tracked over time to determine how different events affect mental health Overall, the authors report that official statistics and secondary sources on mental health and financial stress are easily available in the UK	Living in debt Living in rental accommodation (especially social renters) Less than £1000 in savings or expecting less than enough as a pension
Preece 2019 [11] (Wales)	Policy report / rapid review Examine the relationship between housing insecurity	Mental health measurement tools: • GHQ-12 (Mental health distress)	Landlord possession rates and orders	Although UKHLS data has been used there is limited data on housing characteristics, and it was not possible	Households with dependent children People receiving means

Citation (country)	Details (aim, study type, organisation)	Mental health measurement tools and methods	Specific economic measures	Author assessment of methods	Groups identified as particularly vulnerable
	and mental health, identify key lessons and relate to Wales Post 2008 economic crisis Rapid review: literature searched from 2008 – 2019 39 studies identified from searches, plus an unspecified number from handsearching UK Collaborative Centre for Housing Evidence	Population survey: • UKHLS	Mortgage repossession rates	to control for housing condition Authors note that data gaps around housing and mental health is not drawn specifically from Wales (evidence is mainly from Australia and England) and may not be generalisable	tested benefits Migrant groups People experiencing socio-economic deprivation People living with existing mental health problems
Office for National Statistics, 2022 [21] (Great Britain)	To examine depression in the context of rising cost-of-living Brief report describing repeated cross-sectional data collected fortnightly Office for National Statistics	Mental health measurement tool: • PHQ-8 (Depression) Population survey: • The Opinions and Lifestyle Survey	Specific questions asked during survey on e.g., housing tenure, ease of paying bills, savings etc	Authors make a point of stating that no causal link between rising cost-of-living and depression is suggested	Economically inactive because of long-term sickness Unpaid carers for 35 or more hours a week Disabled adults Living in the most deprived areas of England Young adults aged 16 to 29 years Single person household Women Living in rental accommodation

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GHQ-12 = 12-item General Health Questionnaire; PHQ-8 = 8-item Public Health Questionnaire; SF-12 = Short Form 12; UKHLS = Understanding Society: The UK Household Longitudinal Study

[1]Also used in UKHLS, although data from this questionnaire was not utilised in this study.

Table 5: Study designs and main characteristics

Study designs	Study characteristics	Examples of data sources of relevance to Wales[1]
Cohort studies	Not necessarily representative of the population Self-reported data is collected but may include data-linked with other records, including medical records Longitudinal, repeated measures, following the same individuals over time, strengthening the evidence for causality Loss to follow-up is common Not all known confounders may be available in the dataset	None identified in the evidence presented, but an example is UK Biobank
Household or individual panel surveys	Representative of the population Self-reported data is collected but may include data-linked with other records, including medical records Longitudinal, repeated measures, following the same households or individuals over time, strengthening the evidence for causality Loss to follow-up is common Not all confounders may be available in the dataset	Understanding Society: the UK Household Longitudinal Study (UKHLS) Scottish Longitudinal Study (SLS)
National and regional repeated cross-sectional surveys	Representative of the population Different sample is used for each wave Self-reported measures are typically used Cannot infer causality, although sophisticated analysis techniques may strengthen inference Not all confounders may be available in the dataset	National Survey for Wales ONS Opinions and Lifestyle Survey
Quasi-experimental / case-control using panel survey data	Design reduces confounding, especially if matched samples are derived, and allows causality to be inferred Use of a sub-set of the main sample reduces overall representativeness It may not be straightforward to derive robust exposure variables Loss to follow-up may introduce bias if losses are different between arms	Data used from UKHLS
Studies using real-world longitudinal data (e.g., from medical records)	Does not depend on self-reported data Quality depends on standards of record keeping Reorganisation of services after an event such as an economic crisis or introduction of public health intervention may introduce bias since availability may change independent of need Use of aggregate data does not capture individual behaviour or variation in service provision between population sub-groups	CRPD Hospital Episode Statistics THIN

Ecological time-series studies	Aggregated data are often easily accessible but may be of unknown quality Causality cannot be inferred	Hospital Episode Statistics ONS suicide rates

CPRD = Clinical Practice Research Datalink; ONS = Office for National Statistics; THIN = The Health Improvement Network; UKHLS = Understanding Society: UK Household Longitudinal Study.

[1]The Catalogue of Mental Health Measures provides a comprehensive summary of mental health and wellbeing data available from population-level longitudinal studies conducted in Britain (https://www.cataloguementalhealth.ac.uk/)

Table 6. Mental Health Measurement Scales

Name of measurement tool (abbreviation)	(Author(s), year)	Domains	Number of items	Target population	Time to complete	Comments
Used in UK surveys						
12-item General Health Questionnaire GHQ-12	(Goldberg et al. 1997) [23]	Presence of mental health disorders (depression, anxiety, somatic symptoms, and social withdrawal)	12	General and clinical populations	5-10mins	Used in UKHLS Survey
Short form 12 Mental Health Component Summary (SF-12) (Derived from SF-36)	(Ware et al. 1996) [24]	Psychological distress	12	General and clinical populations	2-5mins	Used in UKHLS Survey Licenced by QualityMetric
Warwick-Edinburgh Mental Well-being Scale (WEMWBS)	(Tennant et al. 2007) [25]	Mental Wellbeing	14	General and clinical populations	5-10mins	Used in UKHLS Survey and National Survey for Wales
Patient Health Questionnaire depression scale (PHQ-8)	(Kroenke et al. 2009) [26]	Presence of depression	8	General and clinical populations		Used in ONS Opinions and Lifestyle Survey Based on PHQ-9 with item asking about suicidal or self-injurious thoughts removed
Other measurement tools						
5-item Mental Health Inventory (MHI-5) (Derived from SF-36)	(Berwick et al. 1991) [27]	Anxiety and depression	5	General population	5mins	
36-item Short	(Brazier et	Psychological	35	General and	5-10mins	Developed by the

Name of measurement tool (abbreviation)	(Author(s), year)	Domains	Number of items	Target population	Time to complete	Comments
Form Health Survey Questionnaire Mental Component Summary (SF-36 MCS)	al. 1992) [28]	distress		clinical populations		RAND corporation. SF-36 v1 is in the public domain SF-36v2 is licenced by QualityMetric
Centre for Epidemiological Study Depression Scale (CES-D)	(Radloff 1977) [29]	Depressive symptoms	20	General and clinical populations	Up to 10mins	In public domain
EURO-D	(Prince et al. 1999) [30]	Depressive symptoms	12	General population ≥65yrs	5mins	Used in the Survey of Health, Aging and Retirement in Europe (SHARE)
Goldberg Depression and Anxiety Score	(Goldberg et al. 1988) [31]	Presence of anxiety and depression	18	General and clinical populations	5-10mins	In public domain
Hopkins Symptom Checklist (HSCL-25)	(Hesbacher et al. 1980) [32]	Presence of anxiety and depression	25	General practice patients	5-10mins	Widely translated and validated in multiple languages
Kessler-10	(Furukawa et al. 2003) [33]	Anxiety and depression over the past 4 weeks	10	General population	Unclear	Developed for an Australian population, validated in other populations
Short form perceived stress scale (PSS-4) (Goldberg & Hillier 1979)	(Cohen et al. 1983) [34]	Psychological stress	4	General population	5mins	Not a diagnostic instrument so there are no cut-offs.

UKHLS = Understanding Society: The UK Household Longitudinal Study