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Effects of social security policy reforms on mental health and inequalities: A systematic review of observational studies in high-income countries

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Abstract

Evidence increasingly shows that changes to social security policies can affect population mental health. Thus, in the context of rising burden of mental illness, it is of major importance to better understand how expansions and contractions to the social security system may impact on mental health of both adults and children. The aim of this systematic review is to provide a synthesis of observational literature on the effects on mental health and inequalities in mental health of social security reforms.

We conducted a systematic review of quantitative observational studies of specific national and regional social security policy changes in high-income countries and summarised the mental health effects of these policies. We searched seven electronic databases, including Medline, PsychInfo, Embase, CINAHL, ASSIA (Proquest), Scopus and Research Papers in Economics from January 1979 to June 2020. We included both objective and subjective mental health and wellbeing measures. The study quality was assessed using the Validity Assessment tool for econometric studies.

We identified 13,403 original records, thirty-eight of which were included in the final review. Twenty-one studies evaluated expansionary social security policies and seventeen studies evaluated contractionary policies. Overall, we found that policies that improve social security benefit eligibility/generosity are associated with improvements in mental health, as reported by fourteen of the included studies. Social security policies that reduce

eligibility/generosity were related to worse mental health, as reported by eleven studies. Ten studies found no effect for either policies contracting or expanding welfare support. Fourteen studies also evaluated the impact on mental health inequalities and found that contractionary policies tend to increase inequalities whereas expansionary policies have the opposite effect.

Changes in social security policies can have significant effects on mental health and health inequalities across different recipient groups. Such health effects should be taken into account when designing future social policy reforms.

Keywords

Mental health, mental health inequalities, social security, welfare reform, systematic review

Introduction

Background

Mental illness is a leading cause of disability worldwide (Vigo *et al.*, 2016). OECD estimates that one in five working-age individuals experience a mental health problem at any given time, and that one in two people will experience a mental illness in their lifetime (OECD, 2012; OECD, 2015). In addition, there is a strong socio-economic gradient in mental health as people of lower socio-economic status are more vulnerable to developing and experiencing mental health problems (Marmot *et al.*, 2010). For example, unemployed or economically inactive individuals tend to have worse mental health outcomes than those who are employed (Flatau *et al.*, 2000). Similarly, those in poverty or experiencing financial strain also tend to experience disproportionate burden of mental illness when compared to people in higher income groups (Silva *et al.*, 2016).

Welfare states can mediate the link between such adverse socio-economic conditions and population health. They provide cash transfers to vulnerable population groups and fund key public services, such as education, housing and public health policy (Eikemo and Bambra, 2008). They can thus influence the key social determinants of health – defined as ‘the conditions in which people are born, live, work and age, and the health systems they can access’ (WHO, 2020) - and are increasingly considered important macro-determinants of health and health inequalities (Bambra, 2016).

Previous research in this area shows that countries with more comprehensive welfare regimes such as those in Scandinavia have better population health outcomes than the

less generous Anglo-Saxon welfare states (Bambra, 2006; Chung *et al.*, 2013). However, health inequalities still remain widespread across most welfare states, and the broad welfare regime approach cannot explain this inconsistency (Bambra, 2011a; Mackenbach, 2012; Popham *et al.*, 2013). It is therefore becoming increasingly recognised that the examination of specific policies is required (Pega *et al.*, 2013a).

One particular set of policies representing a major role of the welfare state is social security. The primary aim of social security policies is to redistribute income in order to achieve the two-fold goals of alleviating poverty and maintaining living standards of individuals across the life course (Millar, 2009). By providing cash benefits and tax credits, social security policies can help families to offset the costs of raising children; cover the loss of income associated with life events such as unemployment, lone parenthood or disability for adults of working age; and enable older people to maintain adequate living standards once they retire (*ibid*). Social security benefits for all these groups have been subject to significant changes over the last few decades (Hillier-Brown *et al.*, 2019).

Potential mechanisms

Social security policy reforms could potentially affect mental health via mechanisms operating at both aggregate and individual levels (Lundberg *et al.*, 2010). At the aggregate level, social security policy reforms could affect mental health by influencing societal attitudes towards benefit recipients and the levels of income inequality (Wilkinson and Pickett, 2018). At individual level, changes in social security policies

could influence two key social determinants of health – income and employment - which could in turn impact on mental health via material, psychosocial and behavioural pathways.

On average, it would be plausible to expect that expansionary policies (i.e. policies which increase benefits and/or eligibility) will improve mental health outcomes – primarily because they provide additional income. Based on economic theory, such additional economic resources could improve the basic standards of living and expand individual choices in terms of consumption (including healthcare) (Grossman, 1972), and time allocation (Becker, 1965). For children, this may also mean lower parental stress, increased family resources and greater human capital – all factors conducive to good mental health (Becker and Tomes, 1986; Caserta *et al.*, 2008). Additional income could also affect mental health via psychosocial mechanisms, for example, by increasing financial security and lowering social status anxiety. However, it is also possible that additional resources will enable unhealthy behaviours such as drinking and smoking which may in turn negatively impact on mental health (Ruhm, 2005), suggesting that the overall effect of expansionary policies on mental health may not be straightforward.

Following similar reasoning, we would expect that, on average, contractionary policies (i.e. policies which decrease benefits and/or eligibility) will have negative impacts on mental health. In addition to reducing material resources, such reforms could also have strong psychosocial effects resulting, for example, from increased conditionality and negative societal attitudes and stigma which may accompany such reforms. Nevertheless,

a reduction of benefits could also have a positive effect on mental health if, for example, it makes consumption of unhealthy goods less affordable (Ruhm, 2005), or if it leads to increases in employment which has been shown to be positively associated with mental health (Modini *et al.*, 2016), albeit dependent on job quality (Henseke, 2018). On the other hand, increased employment may have negative impacts on children by reducing time for investment in child health and human capital (Becker and Tomes, 1986).

Thus, whilst we would expect for expansionary and contractionary policies to have opposing effects on mental health, the underlying mechanisms are complex and dependent on a range of moderating factors (such as individual preferences and national-level factors), suggesting that the relationship between social security policy reform and mental health is a lot more nuanced and should therefore be investigated empirically.

Why this study is needed

A growing body of literature evaluating changes to social security policies (also known as welfare reforms) now suggests that such changes can have an effect on population mental health and mental health inequalities across different stages in life. For example, expansions in social security benefits have been linked to positive self-reported mental health outcomes in both adults (Evans and Craig, 2014) and children (Cooper and Stewart, 2013). Contractions in social security, on the other hand, have been associated with increased prevalence of depression (Reeves *et al.*, 2016), suicide (Barr *et al.*, 2016) as well as greater mental health inequalities (Kokkinen *et al.*, 2015).

However, despite this growing body of evidence, to date, there has been little synthesis of how social policy reforms impact on mental health. Previous reviews in this area have either focused on wider macro-economic determinants of health (McAllister, 2018) or on social policy experiments (Courtin *et al.*, 2020; Gibson *et al.*, 2018), or were based in low- and middle-income countries (Owusu-Addo *et al.*, 2018). A recent umbrella review of social protection policies in high-income countries (Hillier-Brown *et al.*, 2019) has identified only two low-quality studies (based on their design and methodology) relating to specific policies - tax credits and unemployment benefits (O'Campo *et al.*, 2015; Pega *et al.*, 2013b) - indicating that, to date, a high quality review of a broader range of social security policies and their effects across the life course has not been undertaken. With mounting evidence of impacts of different social security policies on mental health and in the context of rising burden of mental illness, this indicates an important gap in the existing literature.

The aim of this systematic review is therefore to evaluate the impact of social security reforms, in terms of both expansion and contraction, on mental health and mental health inequalities in high-income countries. By providing robust and concrete evidence on how changes to the social security system impact on mental health across different stages of life, this review will help inform policy and research recommendations on the design of welfare systems that promote good mental health and wellbeing for all.

Methods

We conducted a systematic review of quantitative observational studies. The review was structured in accordance with recommendations from the Preferred Reporting Items for

Systematic Reviews and Meta-Analyses (PRISMA) guidelines (see Appendix 1) (Moher *et al.*, 2009).

Inclusion and exclusion criteria

Inclusion Criteria:

- Studies were included if they examined a national or regional social security change and used a quantitative observational methodology (including but not limited to: cohort, cross-sectional, longitudinal and quasi-experimental studies).
- The policy exposure of interest was defined as either i) change in social security benefit levels (generosity), or ii) change in social security entitlement (eligibility), or iii) introduction or removal of a benefits policy.
- Both objective and subjective mental health outcomes were included. Objective measures included formal diagnoses (e.g. anxiety, depression). Subjective measures included those that were measured by validated survey questionnaires or were self-reported (e.g. self-assessed mental health and wellbeing). Though not without limitations, such subjective wellbeing measures are gaining considerable traction in policy evaluation research and were thus included in our study (Dolan and Metcalfe, 2012).

Exclusion Criteria:

- Studies that did not include cash transfers (e.g. those evaluating in-kind benefits) or those that evaluated parental leave or childcare policies were excluded.
- Randomised controlled trials (RCTs) of social policy experiments and welfare-to-work interventions were excluded as they have previously been reviewed (Courtin *et al.*, 2020; Gibson *et al.*, 2018). Studies evaluating cross-sectional associations

between benefit recipients and non-recipients (i.e. not evaluating effects of a policy reform) also were excluded.

- Outcomes that focused on general health but did not include a mental health component were excluded.
- Outcomes related to health care utilisation, such as antidepressant prescription and hospital admissions, were excluded. This is because health care utilisation depends on health care access and is contextually dependent upon the design of the health care system. People with poor mental health may not access health care services so service utilisation may therefore not fully capture need.

Mental Health and Well-being

For adults, we defined mental health and well-being as general mental health (usually measured by multiple-item survey questionnaires such as the General Health Questionnaire), depression, stress, anxiety, suicide, as well as life satisfaction and happiness, therefore including both positive and negative aspects of mental health (Pilgrim, 2019). While there is no single common definition, our decision reflects the growing agreement on the definition of mental health as a broader concept that includes both positive mental health and mental health problems (WHO, 2005). For children, mental health outcomes included emotional and behavioural aspects of well-being (Ogundele, 2018).

Search strategy

We searched for peer-reviewed papers and economic working papers published in English, based in high-income countries (by World Bank definition) and published between 1st January, 1979 and 1st of June, 2020. Our search terms were informed by extensive piloting and scoping searches, and combined three major concepts comprising a range of social security policies; mental health and wellbeing outcomes; and quantitative methods (full search strategy is included in Appendix 2). Seven bibliographic databases were examined, including Medline, Embase, CINAHL, ASSIA (Proquest), PsycINFO, Scopus and Research Papers in Economics. The database searches were supplemented by reference and citation searching of the included studies, and also by hand-searching of the key journals in the subject area.

Data extraction and quality appraisal

Due to the large volume of records obtained from the searches, one researcher screened the title and abstracts, with a random 10% of the sample screened by a second reviewer. Disagreements over inclusion were discussed with a third reviewer. Data extraction and quality appraisal of each study was carried out by two reviewers independently. The following details were extracted from each study: Citation, Aim(s), Policy Reform, Design, Data source(s), Methods, Mental health outcome(s), Results and Causal mechanisms reported. A sample data extraction form is included in Appendix 3.

Study quality was appraised using the Validity Assessment tool for econometric studies (Barr *et al.*, 2010). The framework was developed specifically for econometric studies using core epidemiological principles for assessing validity, making the tool more

appropriate to use in this review than the traditional (RCT- or epidemiologically-focused) quality assessment tools. The Validity Assessment included nine component rating sections (unit of analysis; comparison approach; sample selection; number of time points of data; response bias; exogeneity of policy exposure, confounding, sample size/power and statistical methods). Overall scores ranged from 0 to 27, with studies scoring 18 or above considered as high quality. A sample form is included in Appendix 4.

Analysis and synthesis

Due to the wide variety of interventions and outcomes evaluated, the included studies were considered to be too heterogeneous for meta-analysis and were therefore summarised narratively. We grouped the studies first by the direction of policy change (i.e. expansionary and contractionary), and then by the type of policy evaluated (i.e. by different recipient population groups), presenting outcomes as reported by the included studies. Outcomes were considered as statistically significant if they were below of the conventional p-value cut-off of 0.05.

To examine the effects on inequalities, we also reported on mental health outcomes by socio-economic status (SES) if, in addition to the main exposure of benefit receipt/eligibility, the studies presented analyses by any of the following characteristics - income, wealth, poverty, education level, employment or occupational status; as well as area-level economic indicators and ethnicity (Hillier-Brown *et al.*, 2019).

Results

We identified 20,723 potentially eligible records through bibliographic database searches and an additional 34 from reference and citation searching. A total of 38 studies were included in the final review after screening. The PRISMA diagram in Figure 1 indicates the number and reasons for exclusion. The vast majority of the included studies were published in peer-reviewed journals (n=34), and the remaining studies were economic working papers (n=4). The study selection process is illustrated in Figure 1.

[Figure 1]

Study characteristics

The included studies were published between 2004 and 2020. While the majority of the studies (eighteen) came from the USA, nine studies were from the UK, five from Canada, two from South Korea, and one from Chile, Germany, Australia and the Netherlands. The study samples included working-age women (fifteen studies) and working-age adults (eleven studies), children (eight studies) and elderly individuals (six studies).

The policies analysed in the reviewed studies were largely comprised of social assistance policies and tax-credits (nineteen studies), followed by retirement policies (eight studies), benefits for families with dependent children (six studies), disability (three studies) and unemployment benefit policies (two studies). While twenty-one of these studies evaluated welfare expansions, seventeen studies focused on contractions. In both cases, policy reforms mostly consisted of changes in eligibility rules (fifteen studies) or a combination of changes in benefit eligibility and generosity (fourteen studies). A more detailed breakdown of the policies identified in the review is illustrated in Figure 2.

[Figure 2]

The reviewed studies investigated a number of different mental health outcomes, including depression (eleven studies), self-reported general mental health (ten studies), stress (three studies) and suicide (four studies). Six studies used more holistic measures of mental wellbeing, such as happiness and life satisfaction. A total of eight studies evaluated child outcomes, including behavioural problems (four studies), emotional wellbeing (two studies), hyperactivity (two studies) and aggression scores (two studies).

All, except one study that used multiple regressions (only controlling for observed confounders), took quasi-experimental approaches for policy evaluation. Such approaches included difference-in-difference analytical designs, employed by twenty-four of the included studies, followed by fixed-effects (four studies), instrumental variables (three studies) and regression discontinuity designs (two studies). The majority of the studies utilised individual longitudinal data (twenty studies), followed by repeated cross-sections (ten studies), and aggregate data (four studies). A glossary of the methodologies employed is included in Appendix 5.

Based on the assessment, the quality of the vast majority - 36 (95%) - of the included studies was ranked as high - scoring at least 18 out of 27 on the Validity Assessment Scale. This is because the majority of the studies utilised robust quasi-experimental approaches with individual level-data and large samples. All of the included studies adjusted for observed confounders, and the majority attempted to also control for unobservable participant characteristics. The validity scores ranged from 16 to 25 (out of

27). The most common weakness among the studies was lack of detail on missing data or attrition bias, absent from twenty-two of the studies (the completed Validity assessment is presented in Appendix 6).

Study findings

Full descriptions of policies evaluated by the included studies are provided in Appendix 7 and a tabular summary of the key results can be found in Appendix 8.

Expansionary policies (n=21)

Policies that were classed as expansionary were those that either increased benefit generosity, expanded eligibility or introduced a new benefit. This included expansions in in-work tax credits (including broader welfare-to-work policies) and increases in child and retirement benefits. Out of twenty-one studies focussing on expansionary policies, fourteen found positive effects on mental health, one found mixed effects and six found no statistically significant effects. Out of four studies evaluating inequalities, two studies found a reduction in mental health inequalities by education, two found no effects.

Ten studies examined expansions in In-Work Tax Credits in the USA and the UK (Table 1).

Expanding the USA Earned Income Tax Credit (n=8)

Earned Income Tax Credit (EITC) is a policy that subsidises earnings for low-wage families in the USA. Increases in both earnings-related eligibility and generosity for this

benefit were evaluated by eight studies in the review. Six of these studies focused on working-age adult outcomes (Boyd-Swan *et al.*, 2016; Braga *et al.*, 2019; Evans and Craig, 2014; Gangopadhyaya *et al.*, 2019; Lenhart, 2019; Rambotti, 2020), with the remaining two studies focusing on children (Averett and Wang, 2018; Hamad and Rehkopf, 2016).

Two of the adult-only studies evaluated the effects of state-level EITC expansions on suicide rates (Lenhart, 2019; Rambotti, 2020). The findings of these studies were mixed. In the analysis covering a time period between 1996-2016, Lenhart (2019) found that, compared to no state EITC, introducing a high-rate state EITC (of at least 10% of the federal credit) reduced the annual age-adjusted suicide rates by 3.91% ($p < 0.05$). Rambotti (2020), on the other hand, potentially due to a different analysis method and a different conceptualisation of the EITC exposure (continuous as opposed to categorical), found no significant effect of the expansion of state EITC on suicide rates in a similar time period (2000-2015).

The other four adult studies, three of which focused on low-educated women, investigated the effects of EITC expansion on indicators of emotional (Braga *et al.*, 2019) and mental health problems (Evans and Craig, 2014; Gangopadhyaya *et al.*, 2019), as well as on subjective wellbeing (Boyd-Swan *et al.*, 2016). While no significant association was found between EITC expansion and emotional problems (Braga *et al.*, 2019), significant improvements were found for the remaining mental health outcomes.

Specifically, Gangopadhyaya *et al* (2019) found that a \$1000 increase in the maximum federal EITC benefit between 1993 and 2016 was associated with a significant reduction in the likelihood of experiencing any days of poor mental health for both married and unmarried mothers by 4% and 4.7% respectively, and a reduction in the number of the number of poor mental health days by 0.25 and 0.21 days respectively ($p < 0.05$); state EITC expansions, on the other hand, were only found to be significant for married mothers whereby the likelihood of poor mental health days decreased by 10% ($p < 0.05$) and the number of such days decreased by 0.54 ($p < 0.05$).

Evans and Craig (2014) investigated the effects of a single 1993 EITC expansion and found that, while there was an improvement in terms of reducing the poor mental health days in the sample overall - by 7.5% for affected mothers with two and more children vs those with only one child ($p < 0.05$) - the majority of the mental health benefits had accrued to married women (i.e. there was a significant reduction in the number of poor mental health days by 10% ($p < 0.05$)). Similarly, although Boyd-Swan *et al* (2016) found no positive effects of the 1990 EITC expansion for the population sample overall, the subgroup analyses showed that relative to their childless counterparts, married mothers, unlike single mothers, experienced significant ($p < 0.05$) improvements in measures of subjective wellbeing, including reductions in depression by 15.7%, increases in happiness by 4.4%, and in self-efficacy by 10.1%, in this way providing further evidence for heterogeneous programme effects in terms of marital status.

Two of the EITC reform studies evaluated the effects on children's behavioural problems index (BPI) for children aged 4-14. Examining changes in EITC between 1986 and 2000,

the study by Hamad and Rehkopf (2016) identified a small short-term improvement in BPI scores, whereby for every one standard deviation (s.d.) increase in EITC payment size BPI scores decrease by 28.37 s.d. ($p < 0.05$), with evidence of slightly better outcomes among children of unmarried mothers. Averett and Wang (2018), on the other hand, focused on a single expansion of EITC in 1993, and found no statistically significant effects.

Increasing the generosity of tax credits in the UK (n=2)

Welfare-to-work policies in the UK between 1997 and 2003 expanded support for low-income families by providing more generous tax credits. The mental health impact of these policies was explored by two studies in the review. They found significant positive effects on adults (Gregg *et al.*, 2009; Harkness, 2016) and children (Gregg *et al.*, 2009).

Gregg *et al* (2009) investigated the effects of the policy changes that were introduced in 1999 on mental health of lone mothers and their adolescent children. In terms of lone mothers, the study found that, after the reform, their mental health improved by around half a point on a 0-36 scale ($p < 0.05$) as measured by the twelve-item General Health Questionnaire (GHQ-12), when compared with married mothers. The effects on life satisfaction were also significant, showing an improvement of 0.17 (on a 1-7 scale, $p < 0.05$). For adolescents, the policy change was associated with significant improvements in self-esteem and happiness by 0.29 and 0.41 points respectively ($p < 0.05$).

Harkness (2016) explored whether the relationship between work and mental health for working lone mothers had changed as a result of an extension to the above described reform package from 2003 of a further increase to benefit generosity for low-income families. The results indicate that, prior to the reform there was little relationship between work and mental health. After the reform, being in work was associated with a significant reduction in the likelihood of poor mental health for lone mothers of 12.1% ($p < 0.01$) while the effects for married mothers were not statistically significant.

[Table 1]

Increasing Child Benefits in the USA, Canada and Germany (n=6)

Six studies in the review evaluated changes to policies that provide income support for families with dependent children (Table 2). The majority of these studies were based in Canada (Daley, 2017; Lebihan and Mao Takongmo, 2018; Milligan and Stabile, 2009; Milligan and Stabile, 2011), with one in the USA (Rostad *et al.*, 2020) and one in Germany (Hener, 2016). The policy reforms under evaluation included expansions in both conditional and unconditional income transfers.

Conditional benefit transfers were investigated by three of the studies (Milligan and Stabile, 2009; Milligan and Stabile, 2011; Rostad *et al.*, 2020). All of them focused on child mental health, with one study also including maternal outcomes (Milligan and Stabile, 2011).

Milligan and Stabile (2011) exploited the variation in child benefits across all Canadian provinces resulting primarily from the expansion of the National Child Benefit Program that provided additional child benefits for families on welfare, and the associated provincial programmes in the late 1990s and early 2000s. The authors found that higher benefits improved the outcomes of children and their mothers. The results were the strongest for physical aggression - a \$1,000 increase in child benefits led to a decrease of 10% of s.d. ($p < 0.01$), and for maternal depression (also a decrease of 10%, $p < 0.01$), with the largest improvements seen among girls from low-education households, thus reducing mental health inequalities.

Milligan and Stabile (2009) evaluated the effects of introducing the National Child Benefit Supplement for low-income families in the province of Manitoba. The study found that the programme led to a significant reduction in child anxiety of 20% ($p < 0.01$) of s.d., no statistically significant effects on aggression, and that the largest improvements (in terms of both anxiety and aggression) were concentrated among girls.

The US study by Rostad *et al.* (2020) evaluated the impact of changes to the Child Tax Credit (CTC). CTC was designed to provide tax credits to low- and middle-income families in work. Introduced in 1998, the policy underwent two expansions, one in 2001 and one in 2009, when the credit was made available in excess of the tax liability for those earning at least \$10,000 and \$3,000 respectively, and thus expanded in eligibility for those with lower earnings (previously the credit amount was equal to the tax liability and only available for higher earners). The study found that, relative to no CTC, only the

2009 expansion was associated with significant reductions in child behavioural problems by 2.07 points ($p < 0.05$) (where sample mean across all years was 105 (s.d.: 15.02)), therefore demonstrating the benefits of making the programme accessible for lower-income families.

In terms of the three studies evaluating unconditional benefits, two of them investigated the effects of introducing the Universal Child Care Benefit (UCCB) in Canada (Daley, 2017; Lebihan and Mao Takongmo, 2018), and one evaluated an expansion of the Universal Child Benefit in Germany (Hener, 2016).

The two Canadian studies focused on the introduction of the UCCB in 2006, whereby a monthly cash benefit of CA\$100 was made available for each family with a child under six years of age. The key differences distinguishing the two studies stemmed from evaluated outcomes and study design. The study by Daley (2017) focused only on maternal mental health outcomes, while using data from four repeated cross-sections in the period covering 2003 and 2008. Lebihan and Mao Takongmo (2018), in contrast, focused on outcomes for both mothers and children, and exploited individual longitudinal data covering a much longer period from 1994 to 2011. In terms of the findings, Daley (2017) found that the introduction of the benefit had a positive effect on life satisfaction of all mothers in the sample (i.e. increased the probability of; being 'very satisfied' by 14%, $p < 0.01$), and a reduction in stress for single mothers (the probability of being 'extremely stressed' halved after the reform, $p < 0.01$). Lebihan and Mao Takongmo (2018), on the hand, concluded that the UCCB had no significant positive effects on the

wellbeing of mothers and their children overall, except for a slight reduction in hyperactivity-inattention among girls (by 16% of s.d., $p < 0.05$). There was also evidence of increased indirect aggression in the sample overall, which was driven by the high-educated sample (an increase of 11.3% of s.d., $p < 0.05$), indicating a narrowing of inequalities but mixed effects overall.

The German study by Hener (2016) evaluated the impact of increased generosity of the Universal Child Benefit (as well as increased tax allowances) in 1996, when the minimum amount received by each family with at least one dependent child increased from €432 to €1224. The study evaluated the reform effects on maternal life satisfaction, focusing on partnered mothers only, and found no statistically significant effect.

[Table 2]

Increasing Retirement benefits in the USA, South Korea and Chile, (n=5)

Five studies in the review examined expansionary policy changes related to retirement benefits (Table 3). While two of these studies focused on changes to earnings-related contributory benefits in the US (Desimone, 2018; Golberstein, 2015), the remaining three studies, two in South Korea (Lee and Wolf, 2014; Pak, 2020) and one in Chile (García and Otero, 2017), evaluated the impact of expanding means-tested support aimed at reducing poverty among the low-income elderly.

Golberstein (2015) exploited the effects of an unintentional policy change that took place in 1971 whereby, for a cohort of individuals, retirement benefits were double-indexed

for inflation, and thus substantially expanded in generosity. Using the instrumental variables approach (where year of birth served as an instrument for identifying the cohort receiving higher pensions) with a single cross-section of survey data, the study found that a US\$1,000 in additional social security income reduced the likelihood of depression among low-educated women by 24% ($p < 0.01$), with no significant effects for men.

DeSimone (2018) explored whether a discontinuous drop in suicides at age 62 between 1990-2014 in the US could be explained by availability of early retirement benefits. Notably, the early retirement age of 62 - lowered from 65 - was introduced in 1956 for women and in 1961 for men. Using a regression discontinuity approach with aggregate national administrative data, a significant 8% drop in suicides ($p < 0.01$) was found which was driven mainly by the larger effect in men. The author concluded that this suicide rate discontinuity was likely attributable to the early retirement eligibility as opposed to entering retirement.

The two studies from South Korea examined the effects of the Basic Old Age Pension (BOAP) on life satisfaction of the Korean elderly. BOAP was introduced as a means-tested anti-poverty programme aiming to improve the welfare and quality of life of the low-income individuals aged 65 and over. Lee and Wolf (2014) examined the effects of the introduction of the programme in 2008, whereas Pak (2020) evaluated its later expansion in 2014, when the programme was doubled in generosity and expanded in eligibility. Neither study found significant effects of this policy on life satisfaction.

Garcia and Otero (2017) similarly investigated the impact of introducing means-tested support for low-income elderly individuals. However, in contrast to the previous studies, this study focused on the individuals who had not yet retired, and thus on the mental health impact arising from changes in their expected pension wealth. The authors found some significant improvements in mental health, albeit short-term and for males only. Specifically, they found that an increase of US\$150 in expected pension wealth reduced the likelihood of feeling depressed by 10% ($p<0.05$); feeling strained/effortful by 10% ($p<0.05$); feeling sad by 14% ($p<0.01$).

[Table 3]

Contractionary policies (n=17)

Policies classed as contractionary were those that either decreased benefit generosity, tightened eligibility requirements or removed an existing benefit. This included changes to social assistance benefits, and tightening of disability, retirement and unemployment benefits. Overall, we found that contractionary policies were associated with adverse mental outcomes in eleven out of seventeen reviewed studies. Ten studies assessed effects on mental health inequalities. Of these, three found a widening of mental health inequalities, two found a narrowing of inequalities, one found mixed effects and four found no effects.

Nine studies examined reductions in Social Assistance in the USA and the UK (Table 4).

Reducing Eligibility for Social Assistance in the USA with the Introduction of Temporary Assistance for Needy Families (n=7)

Enacted through the Personal Responsibility and Work Opportunity Act (PRWORA), the US welfare reform replaced the long-standing Aid to Families with Dependent Children (AFDC) by a markedly more restrictive programme in terms of its eligibility, known as the Temporary Assistance for Needy Families (TANF). The restrictions related to TANF included work requirements, sanctions and benefit time limits.

Seven studies (Basu *et al.*, 2016; Bitler *et al.*, 2004; Davis, 2019; Herbst, 2013; Herbst, 2017; Ifcher, 2011; Rote and Quadagno, 2011) investigated the impact of this reform on mental health of mostly single mothers. Two studies relied on a 'before and after' study design to evaluate the overall PRWORA effects in the US, and the remaining five studies used a more advanced approach by exploiting variations in reform implementation over time across individual states. This is because although the federal PRWORA was approved by the Federal government in 1996, states varied in their time of implementation, and some reforms were implemented through a series of state-level waivers dating back as far as 1992 (Office of the Assistant Secretary for Planning and Evaluation, 1999).

Rote and Quadagno (2011) evaluated the effects of the reform by comparing the outcomes of welfare recipients and other poor women. Using two sets of cross-sectional data, the authors found that ten years after the welfare reform, welfare recipients had significantly more depressive symptoms than other poor women (by 0.48 on a scale 0-8, $p < 0.01$). This indicates a worsening of mental health since no significant depressive symptoms existed in either group prior to the reform. Ifcher (2011), on the other hand,

used multiple repeated cross-sections with a difference-in-difference approach, and found that, compared to those likely to be ineligible for benefits, single mothers experienced a significant increase in happiness after the reform (by 0.11 happiness points (an ordinal measure - to be interpreted roughly according to the author), thus closing almost a third of the gap in happiness between single mothers and other comparison groups over the study period). The results were strongest for those who were less educated, indicating a reduction in inequalities.

Three studies exploited policy variation across different states (Basu *et al.*, 2016; Bitler *et al.*, 2004; Herbst, 2013). No significant effects were found for the number of days depressed (Bitler *et al.*, 2004), stress and anxiety (Herbst, 2013) and for the number of days of good mental health (except for negative effects for a subgroup of unemployed, thus increasing inequalities) (Basu *et al.*, 2016). The effects on life satisfaction, on the other hand, were positive, with greater improvements for more disadvantaged (less educated) women, whose life satisfaction increased by 11% (of s.d.) ($p < 0.01$), and no significant effects for more educated women (Herbst, 2013).

The two final studies on the US welfare reform evaluated more specific aspects of the reform - parental work requirements and conditionality (Davis, 2019; Herbst, 2017). Herbst (2017) assessed the impact of welfare-reform related parental work requirements by exploiting the cross-state differences in work exemption rules for mothers with very young children (0-24 months). This variation was as a result of the PRWORA reform, which, in addition to the above described changes, also authorised the states to exempt

welfare recipients from work requirements until their youngest child reached an age limit of up to 24 months, depending on the state of residence. An Instrumental Variables approach was utilised with the policy differences across the states employed as an instrument for maternal employment. The effects of the reform were not statistically significant in terms of both maternal depression and child mental health.

Davis (2019) used policy variation across the states based on different levels of TANF conditionality and found that higher levels of conditionality led to significantly more days of mental-ill health among poor women (i.e. stringent sanctions by 1.07 days ($p<0.05$); job search requirements by 1.18 days ($p<0.01$); and welfare-to-work spending led to 0.40 days of an increase in poor mental health days ($p<0.05$)).

Reducing Social Assistance in the UK: Housing Benefit and lone parent benefit reforms (n=2)

Two studies evaluated the effects of restrictions to Social Assistance benefits in the UK - the Housing Benefit and the Lone Parent Obligation (Katikireddi *et al.*, 2018; Reeves *et al.*, 2016). Both found significant negative effects on mental health.

Reeves *et al.* (2016) investigated the effects of cuts in the Local Housing Allowance. This programme was originally established in order to provide monetary support for tenants who rent housing in the private sector in the UK. As part of the national austerity programme, the housing benefit was capped and sharply reduced in 2011. The study found that after the reform, the prevalence of depression rose by around 10% ($p<0.01$).

Compared to other areas in the UK, the increase in depression was greater in more expensive ‘high impact’ areas, such as inner London.

The study by Katikireddi *et al.* (2018) investigated the effects of increasing work-related conditionality for single parents who receive Income Support. At the time of the study, Income Support was the primary form of social security benefit payable to single parents in the UK. In 2009, single parents whose youngest child was younger than 10 years old were eligible for the benefit unconditionally. This age cut-off was reduced to 7 and to 5 years in 2010 and 2012 respectively, so that parents with much younger children had to be actively engaged in welfare-to-work activities to be eligible for the benefit. The study investigated these two increases in conditionality and found a trend of consistently worsening mental health (the pooled change in mental component scores of the twelve-item Short Form Questionnaire (SF-12) decreased by 2.13 ($p<0.05$) compared with control group 1 (lone mothers who remained unexposed during the study period), and 2.21 ($p<0.05$) compared with control group 2 (lone mothers who were continuously exposed). No significant differences were observed in terms of mental health inequalities by education level.

[Table 4]

Increased Conditionality of Disability Benefits in the UK and Canada (n=3)

Three studies evaluated the effects of tightening disability benefits (Table 5). Two of these studies were based in the UK (Barr *et al.*, 2016; Curnock *et al.*, 2016) and one in Canada (Chen *et al.*, 2015).

The two UK studies focused on policy changes related to replacing the former Incapacity benefit (IB) by the Employment and Support Allowance (ESA) in 2008. ESA was a more conditional and work-focused programme than IB, as it included a more stringent eligibility assessment protocol, the Work Capability Assessment (WCA).

The mental health effects of the assessment process were evaluated by a longitudinal ecological study by Barr *et al.* (2016). Using national administrative data for England covering 2004-2013, the study found that the new stricter disability reassessment process was associated with a significant increase in the number of self-reported mental health problems and suicides. The authors found that for every additional 10,000 reassessed in each area, there were 2,700 cases of self-reported mental health problems ($p < 0.05$) and 6 additional suicides ($p < 0.01$). These effects were more pronounced in more deprived areas, thus increasing inequalities.

Curnock *et al.* (2016) investigated the effects of transitions between the new disability benefit in the UK (ESA) and employment, as well as transitions between IB and ESA. The authors found that there was no significant difference of transitioning from the IB to the ESA in terms of mental health.

Chen *et al.* (2015) evaluated the effects of changes in disability benefits that resulted from federal cuts in 1996, when the Canada Assistance Plan was replaced by a considerably less generous programme of the Canada Health and Social Transfer (Glabel *et al.*, 2004). These cuts led to high variation in disability benefit generosity and

eligibility requirements across different provinces. The study investigated the effects on mental wellbeing of children who had a parent with a disability. The authors found that a \$1000 reduction in real disability benefits was associated with increases in 3.7 % of s.d. ($p < 0.01$) increase in hyperactive symptoms and no significant effects on emotional anxiety. Subgroup analysis by parental sex showed that the effects were only significant for children whose mother, as opposed to father, had a disability.

[Table 5]

Two studies evaluated the impact of increased conditionality of unemployment benefits in the UK (Table 6). One study focused on the Jobseeker's Allowance and one study evaluated the effects of a more recently introduced Universal Credit.

Increasing conditionality for the Jobseekers' Allowance in the UK (n=1)

Jobseeker's Allowance (JSA) was the main unemployment benefit in the UK between 1996 and 2013. In 2012, the level of conditionality and the use of sanctioning increased substantially. The mental health impact of such increase in sanctioning practices was assessed by the aggregate ecological study by Williams (2020). The key finding of the study was that following the increase in the severity of JSA sanctions, 8.09 additional people self-reported having depression and/or anxiety for every 10 additional sanctions applied per 100,000 working age population per quarter ($p < 0.01$).

Introduction of the Universal Credit in the UK (n=1)

Universal Credit (UC) is a means-tested benefit which has combined and replaced six working-age benefits in the UK, with the key aims of simplifying the social security system and reducing welfare dependency (Department for Work and Pensions, 2015). The introduction of UC has led to a new digitalised as well as a more stringent benefits system, which included increased benefit conditionality, sanctions and lower benefit levels for some claimant groups (Wickham *et al.*, 2020). First introduced in 2013, UC is being rolled-out gradually across the country, with the first recipient group to receive the new benefit being the unemployed.

Wickham *et al.* (2020) took a difference-in-difference analysis approach using nationally representative longitudinal data covering the period between 2009 and 2018. After analysing the effects of the introduction of UC on mental health of unemployed individuals, the study found that UC led to a significant increase in the prevalence of psychological distress among this claimant group, compared to those ineligible for the benefit (by 6.57 percentage (pct) points, $p < 0.01$). The authors estimated that between 2013 and 2018, the introduction of UC might have led to an additional 63,674 unemployed people experiencing psychological distress.

[Table 6]

Delaying Retirement Benefits: Australia, Netherlands and UK (n=3)

The final three studies in the review evaluated the effects of increasing the state retirement age (Atalay and Barrett, 2014; Carrino *et al.*, 2020; Grip *et al.*, 2012). Two of

these studies focused on changes in retirement age for women (Atalay and Barrett, 2014; Carrino *et al.*, 2020) whereas one study focused on changes for men (Grip *et al.*, 2012).

The first of the two studies focusing on women was based in Australia (Atalay and Barrett, 2014). The study evaluated the effects of raising the female pension age by five years over a nearly twenty-year period between 1995 and 2014. Using an IV approach, whereby different retirement age eligibility thresholds served as a proxies for retirement, the study found that retirement was associated with significant reductions in mental health problems in the overall sample (with regression coefficient of $\beta = -0.43$, interpretation not provided, ($p < 0.01$), and also a reduction in the lower income sample, concluding that increasing retirement age may have had significant adverse impacts on those affected and suggesting that inequalities may have also increased.

Carrino *et al.* (2020) evaluated the impact of a gradual increase in the state retirement age for women in the UK between 2010 and 2020. The study found that becoming ineligible for the state pension as a result of the reform had significantly increased the probability of depression among women aged 60-64 (by 6.2 pct points, $p < 0.05$). These effects were significantly more pronounced for women from lower-graded occupational groups, compared to managerial occupations, indicating a widening of mental health inequalities.

Grip *et al.* (2012) investigated the effects of a reform that postponed early retirement age by five years and reduced early pension replacement rates for male civil servants in the Netherlands. The study compared the mental health of those affected but not yet retired

(born in 1950) vs unaffected (born in 1949) two years after the reform, and found that depression rates increased by a significant 2.8 pct points among those affected. Additionally, the reform effects were found to be stronger for workers who had higher income pre-reform – thus experiencing a larger relative loss - and for married men whose partner had no pension income, indicating that the effects on inequalities had no clear direction.

[Table 7]

Discussion

The aim of our review was to investigate how changes in social security policies affect mental health and mental health inequalities. We found that out of thirty-eight reviewed observational studies, twenty-one examined policy expansions and seventeen evaluated policy contractions. There was a clear pattern of expansionary policies being associated with positive mental health outcomes - a relationship identified by fourteen out of twenty-one studies. An overall trend was also observed in the opposite direction, with contractionary policies being associated with adverse mental outcomes in eleven out of seventeen reviewed studies (with positive outcomes in two studies). In terms of inequalities, twenty-four of the included studies focused on disadvantaged populations, and only fourteen explicitly assessed subgroup effects by SES. These studies found that contractionary policies tend to increase inequalities, whereas expansionary policies have the opposite effect.

Summary of the key findings

Expansionary policies

Expansions in generosity and eligibility of in-work tax credits to incentivise work and reduce poverty was the most studied policy domain in our review. Overall, these policy changes were related to improvements in mental health outcomes - of the ten studies evaluating the policies, seven found a positive association. All studies, except for two evaluating the US Earned Income Tax Credit (EITC) reform effects on adult suicide rates, focused on the outcomes of disadvantaged mothers (single or low-educated) meaning that any improvements in mental health attributed to these policies may also reduce mental health inequalities between the most disadvantaged women and others.

Similarly, we found that expansions of benefits aimed at supporting families with dependent children have a positive relationship with mental health. Out of six studies evaluating child benefits, four found positive associations with child (and/or maternal) mental health. However, the improvements in mental health could mostly be attributed to expanding eligibility or generosity in means-tested programmes whereas the evidence regarding the introduction of universal benefits was mixed. Since expansions in means-tested programmes are by definition targeted at more disadvantaged populations, it follows that they can also reduce mental health inequalities.

The findings with regards to retirement benefit policies were mixed. Two out of five studies evaluating policy expansions found positive effects on mental health and three found no statistically significant effects. However, such differences in results could be, at least partially, attributed to heterogeneity across the studies. For example, both of the

studies that found positive effects focused on contributory retirement benefits, were based in the USA and focused on the effects on depression and suicide (Desimone, 2018; Golberstein, 2015). In contrast, the remaining three studies that investigated means-tested benefits for low-income elderly, were based in South Korea and Chile (García and Otero, 2017; Lee and Wolf, 2014), and evaluated effects on more general measures of subjective wellbeing, which suggests that the results of these studies are not directly comparable. Thus, although, it would seem that increasing means-tested benefits for the poor elderly may not be effective for improving mental health and mental health inequalities, more evidence is needed to establish more definite conclusions (e.g. studies using more similar methodologies and more homogenous outcomes).

Contractionary policies

Reductions in benefit generosity or reducing eligibility for social assistance were examined by nine studies in the review, making it the largest policy domain with regards to contractionary policies. Seven of these studies focused on US welfare reform and two were from the UK. Overall, the US studies found mixed results, with two studies identifying a negative impact on mental health (and mental health inequalities), three studies finding no effect and two studies finding a positive effect. Both of the UK studies, in contrast, found negative effects on mental health (Katikireddi *et al.*, 2018; Reeves *et al.*, 2016).

Three studies in the review examined policy changes to disability benefits. While two studies found that tightening of eligibility requirements may have adverse effects on

mental health and mental health inequalities for adult populations in the UK, the study from Canada found that disability benefit cuts for adults can also have negative mental health consequences for children.

We found very limited evidence with regards to unemployment benefits. Only two studies examined this policy domain and both were based in the UK. The findings of these studies suggest that factors such as increased benefit conditionality may have detrimental effects for the mental health of unemployed adults and therefore widen mental health inequalities.

Finally, three studies examined policy changes to retirement benefits. All of these studies focused on delays in state pension age, and all found detrimental effects on mental health. In addition, two studies also found that such reforms could increase mental health inequalities, as they tend to disproportionately affect more deprived social groups (i.e. those from lower income households and with lower-graded job occupations) (Grip *et al.*, 2012; Williams, 2020).

Findings in context

Overall, our key findings, whereby policy expansions are associated with benefits for mental health and policy contractions are linked to negative effects, are consistent with similar reviews on the structural determinants of health. A systematic review by McAllister *et al.* (2018), for example, found that more generous welfare states are associated with better mental health outcomes, whereas broad austerity measures are

associated with poorer mental health outcomes, including increased suicide rates. Similarly, an umbrella review by Naik *et al.* (2019) found that more generous welfare states lead to better population health outcomes and lower inequalities.

In terms of reviews of specific policies, our findings are in agreement with the results from the review by O'Campo *et al.* (2015) which found that increases in unemployment insurance may alleviate the negative psychological effects of being unemployed. On the other hand, our findings are in disagreement with a systematic review on tax-credits by Pega *et al.* (2013b), which found no evidence of effect on either mental or general health. However, the review focused on tax-credits for families only (i.e. excluded those targeted at individuals as well as broader welfare-to-work programmes) and included only four studies.

Our findings are also broadly consistent with a systematic review of social policy RCTs. A systematic review by Gibson *et al.* (2018) found that welfare-to-work interventions - primarily characterised by work requirements - had a small negative effect on mental health. Similarly, the systematic review by Courtin *et al.* (2020) also found that time-limited welfare-to-work interventions were associated with harmful health effects (in terms of mortality), whereas income maintenance and supplementation policies were associated with positive effects on self-rated health. However, no pooled estimates or overall conclusions were available in terms of mental health.

Additionally, our findings are in line with the broader literature on welfare states and health and health inequalities. For example, an international comparative study of eighteen OECD countries by Lundberg and colleagues (2008) found that more generous family and pension policies can lead to lower infant mortality and old-age excess mortality respectively. Similarly, the study by Beckfield and Bambra (2016) found that increases in welfare generosity over time (1970-2010) were associated with lower mortality, with strongest effects from pension benefits.

Broader research into the impacts of austerity policies implemented in countries such as the UK, Greece, Italy and Spain after the 2008 Global Financial Crisis (GFC) also found negative impacts on mental health and health inequalities associated with such contractionary policies. These countries experienced worse health effects when compared to countries such as Germany, Iceland and Sweden who opted to maintain social safety nets over austerity (Helliwell *et al.*, 2017). Similarly, Karanikolos *et al.* (2013) found that across Europe, weak social protection systems increased the health and social crisis in Europe and Niedzwiedz *et al.* (2016) found that reductions in spending levels or increased conditionality may have adversely effected the mental health of disadvantaged social groups. In contrast, studies have shown that increased social expenditure on old age pensioners in the UK after the GFC prevented health inequalities increasing in this group (Akhter *et al.*, 2018).

Our review therefore builds on this growing evidence base linking welfare policies and health by providing a rigorous synthesis of specific social security reforms, and adds to

the existing debate by showing that such reforms could contribute to – or alleviate - the heavy societal burden of poor mental health.

Evidence gaps and areas for future research

First, we found that the mechanisms linking social security changes and mental health remain unclear. Few studies in our review were explicitly designed to address these pathways. However, a plausible mechanism through which it may affect health is materially through income or financial resources (Lundberg *et al.*, 2010). Indeed, we found that out of the ten studies that did consider the mechanisms (i.e. Bitler, 2004; Boyd-Swan *et al.*, 2016; Braga *et al.*, 2019; Evans and Craig, 2014; Gangopadhyaya *et al.*, 2019; Gregg *et al.*, 2009; Grip *et al.*, 2012; Harkness, 2016; Milligan and Stabile, 2009; Williams, 2020), income was an important factor mediating the policy effects on mental health. In addition, because some of policies in the reviewed studies included a work component (i.e. tax credits), employment was identified as another important (positive) factor linking changes in social security benefits and mental health. However, while most studies explained their findings with regards to changes in material resources, there was little focus on other plausible mechanisms such as behavioural or psychosocial pathways (Bambra, 2011b).

Second, the vast majority of the reviewed studies came from the USA, UK and Canada. Our findings reflect the ongoing shift in social security policies in these countries - from unconditional provision of basic income support and towards active encouragement of labour market participation (ibid). Specifically, the vast majority of the expansionary

policies evaluated in the review included in-work tax credits, whereas most of the contractionary policies were comprised of reductions in social assistance benefits. Additionally, none of the included studies evaluated policy reforms and mental health outcomes in more generous Social Democratic or Bismarckian welfare states (Bambra and Eikemo, 2009). Our findings are therefore limited in terms of wider welfare state regime context. This indicates an important gap for future research (though it should be noted that this may also reflect a limitation of our search strategy which was restricted to English language).

Another important finding from our review is that relatively few studies included child mental health outcomes. In particular, only one of the studies evaluating social assistance policies focused on child outcomes. It is now well-established that children are especially vulnerable to poor living conditions, and that mental health in childhood has important implications for their future health, education and employment opportunities (Currie, 2009). Future policy evaluations should therefore also include child mental health outcomes.

Strengths and limitations

Our review provides a comprehensive overview of how changes in social security benefits may affect mental health in high-income countries. To the best of our knowledge, this represents the first such review to date. The review adds to the evidence base linking social determinants of mental health by examining changes in specific policies, rather than focusing on broader welfare regimes or social protection spending,

and therefore providing a unique contribution to the existing literature. However, despite our best efforts to ensure quality and comprehensiveness, the review findings should be interpreted in light of its limitations.

First, the diversity of the included studies in terms of different policy exposures, study designs and variety of mental health outcomes evaluated precluded a quantitative synthesis of results. Second, a large proportion of the included studies came from English-speaking countries, therefore limiting the generalisability of our results. Importantly, the vast majority of the reviewed studies (47%) came from the US, thus further limiting the generalisability of our results, particularly with regards to countries with state-funded health care systems and more extensive welfare systems (Hillier-Brown *et al.*, 2019). Additionally, even though the majority of the included studies were based on robust quasi-experimental approaches, our findings are based on observational evidence which is more susceptible to various sources confounding compared to RCTs. However, in the context of policy evaluation, RCTs are seldom undertaken by policymakers, often considered impractical, unethical and limited in terms of external generalisability (Craig *et al.*, 2012), which means that quasi-experiments may represent the only viable alternative for assessing causality. We also excluded health care utilisation outcomes as they depend on health care access and may not fully capture need. This is a different – albeit important – issue with a large separate evidence base that should be explored in a future review. It should be noted however, that we did include formal diagnoses and self-reports of mental illness, which may also depend on health care access and could be under-reported where health care access is insufficient, therefore

potentially biasing our synthesis of the results towards the null. Finally, our findings could be subject to publication bias whereby studies with significant results are more likely to be published than those reporting null findings. We attempted to overcome this limitation by also including unpublished economic-working papers which, though not peer-reviewed and should be interpreted with caution, represent a large and important source of evidence in the area of policy evaluation. Looking at wider grey literature sources, however, was beyond the scope of our study.

Conclusion

The aim of our review was to investigate whether changes in social security benefits have an impact on mental health and mental health inequalities of adults and children. We found that, on balance – based on thirty-eight observational studies in eight countries - policies that expand social security benefits are associated with positive mental health outcomes and lower inequalities, whereas policies that reduce or limit benefits tend to have negative effects. In particular, the reviewed evidence shows that austerity-style reductions to social security policies can have detrimental effects on population mental health, particularly for more vulnerable groups in society – groups who are also disproportionately being affected by the Covid-19 pandemic. These findings should therefore be considered when developing evidence-based policy social security policies in order to ensure that the mental health impacts of such policies are fully considered, and so that future policies promote, or at least do not harm, the mental health of the most vulnerable groups in our society.

Tables and Figures

Table 1 - Studies evaluating tax credit (welfare-to-work) expansions: characteristics and results

Table 2 - Studies evaluating child benefit expansions: characteristics and results

Table 3 - Studies evaluating retirement benefit expansions: characteristics and results

Table 4 - Studies evaluating social assistance policy contractions: characteristics and results

Table 5 - Studies evaluating disability benefit contractions: characteristics and results

Table 6 - Studies evaluating unemployment benefit contractions: characteristics and results

Table 7 - Studies evaluating retirement benefit reductions: characteristics and results

Figure 1 - PRISMA Diagram

Figure 2 - Policies evaluated in the included studies

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Tables 1 to 7

Table 1 Studies evaluating tax credit (welfare-to-work) expansions: characteristics and results

Reference, Country	Policy reform	Design, Data, Analysis	Population (age)	Outcomes	Results*	Subgroup analysis	Validity score (out of 27)
Averett and Wang (2018) USA	EITC (Earned Income Tax Credit) expansion in 1993	<i>Individual longitudinal (cohort)</i> 1979 National Longitudinal Survey of Youth (NLSY79) and the NLSY79 Child and Young Adult (NLSCYA), 1990, 1992, 1996, 1998 Difference-in-difference and fixed-effects	Children (4-5) of low-educated mothers (<13 years of education)	Behavioural Problems index (BPI)	No significant effect	<i>Subgroups by ethnicity and maternal marital status:</i> No significant difference	23
Boyd-Swan <i>et al.</i> (2016) USA	EITC expansion in 1990	<i>Individual longitudinal</i> National Survey of Families and Households covering 1987-88 (pre-reform) and 1992-1994 (post-reform) Difference-in-difference and fixed-effects	Women (16-55) who have no more than a high school degree	Subjective wellbeing measures, including depression happiness and self-esteem	No significant effect	<i>Subgroups by marital status:</i> Significant improvements for married women only: Depression: decreased by 15.7%, $p<0.05$ Happiness: increased by 4.4%, $p<0.05$ Self-efficacy: increased by 10.1%, $p<0.05$	23
Braga <i>et al.</i> (2019) USA	EITC (expansion across states 1975-2015)	<i>Individual longitudinal</i> Panel Survey of Income Dynamics, 1968-2015 Difference-in-difference and fixed-effects	Adults (22-27) exposed to EITC in childhood	A binary indicator of emotional problems	No significant effect	Not reported	23
Evans and Craig (2014) USA	EITC expansion in 1993	<i>Individual repeated-cross-sections</i> Behavioral Risk Factors Surveillance System (BRFSS), 1993-1995 (pre-reform), 1998-2001 (post-reform) Difference-in-difference and triple differences and fixed-effects	Low-educated mothers (21-40) - with a high school degree or less	Number of poor mental health days in the past 30 days	The EITC expansion reduced the number of poor mental health days by 7.5% in women with at least two children compared to those with one child), $p<0.05$.	<i>Subgroups by marital status:</i> The improvement for married women (with at least two children compared to one child) was large (10%, $p<0.05$). For single women it was not statistically significant.	23
Gangopadhyaya <i>et al.</i> (2019) USA	EITC expansion across the states between 1993-2016)	<i>Individual repeated cross-sections</i> Behavioral Risk Factors Surveillance System (BRFSS), 1993-2016 Difference-in-difference and fixed-effects	Low-educated mothers (non-elderly)	An indicator for whether the individual experienced any days of poor mental health in the past 30 days;	A \$1000 increase in the maximum federal EITC benefit is associated with a 1.6 pct point (4%); and a 2.3 pct point (4.6%) reduction in the likelihood of any days of poor mental health day in the past 30 days for married and unmarried mothers, respectively ($p<0.05$) and a reduction in the	<i>Subgroups by education level, race and age:</i> EITC expansions associated with improved mental health among nearly all subgroups, with older mothers (of 45-64 years as the sole exception)	23

				the number of days of poor mental health	number of the number of poor mental health days (by 0.25 and 0.21 days respectively, $p<0.05$); Implementation of EITC state programme: Among married mothers, the probability of a poor mental health day in the past 30 days is reduced by 4 pct points (10%) and the number decreased by 0.28 days, $p<0.01$. No effect for unmarried mothers.		
Hamad and Rehkopf (2016) USA	EITC expansion across the states between 1986-2000	<i>Individual longitudinal (cohort)</i> National Longitudinal Survey of Youth (1986-2000, collected biennially) Fixed-effects and instrumental variables	Children (4-14) of EITC qualifying mothers (in families with income <\$50,000)	BPI	Instrumental Variables results: Higher income as a result of EITC expansion predicted slightly improved BPI scores at the 2-year follow-up (per \$1,000, $\beta=-0.47$; $p<0.05$) – or -28.37 s.d. for every one s.d. increase in EITC payment size; No significant effect at 4-year follow-up. Fixed effects results: not significant when full controls are included.	<i>Subgroups by marital status:</i> Results of the instrumental Variables analysis were not reported. Fixed-effects analysis showed that children of unmarried women were marginally significantly more likely to demonstrate improved BPI scores at the 2-year follow-up (per \$1,000, $\beta=-0.57$ or by -34.41 s.d. for every one s.d. increase in EITC, $p<0.1$) compared to married women.	25
Lenhart (2019) USA	EITC expansion across the states between 1996-2016	<i>Aggregate longitudinal</i> National Vital Statistics, and Internal Revenue Service (1996-2016) Difference-in-difference and fixed-effects	Adults (aged 25+)	Suicide rates per 100,000	Compared with states with no EITC, introducing a rate of at least 10% is associated with reductions in annual age-adjusted suicide rates by 3.91%. Also, introducing an EITC state law (vs not having one) decreases suicide rates by 3.12%, $p<0.05$	Not reported	19
Rambotti (2020) USA	EITC expansion across the states between 2000-2015	<i>Aggregate longitudinal</i> National Vital Statistics, UKCPR National Welfare data, 2000-2015 Fixed-effects	Adults (age unspecified)	Age-adjusted suicide rates per 100,000	No significant effect	<i>Subgroups by gender:</i> No significant effect	18
Gregg <i>et al.</i> (2009) UK	A series of New Labour reforms in 1999	<i>Individual longitudinal</i> British Household Panel Survey 1991-7 (before) and 1999-2003 (after) Difference-in-difference and fixed-effects	Single mothers and children (aged 11-15)	<u>Mothers:</u> Mental health measured by the General Health Questionnaire (GHQ) Life satisfaction <u>Adolescents:</u> Self-esteem Unhappiness	<u>Mothers:</u> Improvement in mental health after the reforms - a reduction in the 36-point GHQ score, among lone mothers after the reforms by 0.49 points, $p<0.05$, when compared to married mothers; and a significant improvement in life satisfaction of 0.17, $p<0.05$ (on a scale 1-7) <u>Adolescents:</u> Improvements in self-esteem (reduction of 0.29 points on a scale 0-15 and happiness by 0.42 points on a 30-item scale, $p<0.05$)	<i>Subgroups by gender:</i> Self-esteem: significant improvement for boys (a decrease of 0.69 points on a 15-point scale, $p<0.05$) Unhappiness: no significant effects by subgroups	24
Harkness (2016) UK	An extension of	<i>Individual longitudinal</i>	Employed	Mental health,	Results stratified by marital status	<i>Stratified by marital status:</i>	23

the New Labour reforms, primarily by increasing generosity of tax credits	British Household Panel Survey: 1993–1998 (before), and 2003–2008 (after the reform) Fixed-effects	single mothers (age unspecified)	measured by GHQ An indicator of 'poor mental health' (binary)	<u>Lone mothers:</u> Before welfare reform, no significant relationship between work and mental health. After the reform, the probability of having poor mental health decreased by 12.1%, $p<0.01$ A fall in GHQ scores of 1.96, $p<0.01$ <u>Partnered mothers:</u> No significant change over time
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*Significant at least at 5% level

Table 2 Studies evaluating child benefit expansions: characteristics and results

Reference, Country	Policy	Design, Data, Analysis	Study population (age)	Outcome	Results	Subgroup analysis	Validity score (out of 27)
Rostad <i>et al.</i> (2020) USA	Introduction and increases in eligibility of the federal Child Tax Credit (CTC) Fixed effects	<i>Individual longitudinal (cohort)</i> National Longitudinal Survey of Youth (NLSY79) and the NLS79 Child Survey 1998–2001 (introduction), 2002–2008 (first expansion), and 2009–2014 (second expansion) Fixed-effects	Children (4-5) of mothers eligible for CTC based on an earned income threshold	BPI	Compared to no CTC, significantly fewer behaviour problems by 2.07, $p<0.05$ among children with mothers eligible to receive a CTC, but only when it was partially refundable for families making as little as \$3000 a year	Not reported	22
Milligan and Stabile (2009) Canada	Introducing the National Child Benefit Supplement for welfare recipients in the province of Manitoba in 2001	<i>Individual longitudinal (cohort)</i> The Survey of Labour and Income Dynamics (SLID) And the National Longitudinal Survey of Children and Youth (NSLCY) 1999-2000 (pre-reform), 2001-2005 (post) Difference-in-difference with fixed effects	Children (0-5) in low-education families	Physical aggression Separation anxiety Indirect aggression Anxiety	Physical aggression decreased by 21% of s.d., $p<0.01$ Not statistically significant for other outcomes.	<i>Subgroup by child's sex:</i> <u>Girls</u> Physical aggression decreased by 25% of s.d., $p<0.01$ Indirect aggression decreased by 24% of s.d., $p<0.05$ Anxiety decreased by 35% of s.d., $p<0.05$ <u>Boys</u> No statistically significant outcomes.	23
Milligan and Stabile (2011) Canada	Expansion of federal and provincial child benefits - increases	<i>Individual longitudinal (cohort)</i> NSLCY and SLID, 1994-2005	Children (0-10) and their mothers (age unspecified)	Hyperactivity-inattention, aggressive behaviour,	All education sample: Hyperactivity-inattention decreased by 6.8% of s.d., $p<0.01$ Emotional disorder-anxiety decreased	<i>Subgroups by maternal education level and child's sex:</i> <u>Low-education:</u> Indirect aggression decreased by 15% of s.d.	22

	in generosity throughout 1990s and early 2000s	Instrumental variables and difference-in-difference with fixed-effects		indirect aggression, prosocial behaviour Maternal depression	by 10% of s.d., $p<0.01$ Conduct disorder-physical aggression decreased by 10% of s.d. ($p<0.01$) Maternal depression decreased by 10% of s.d. ($p<0.01$)	Maternal depression decreased by 20% of s.d., $p<0.01$ <u>Girls</u> Indirect aggression decreased by 22% of s.d., $p<0.01$ <u>Boys</u> No significant effect	
Daley (2017) Canada	Introduction of Universal Child Care Benefit in 2006	<i>Individual repeated cross-sections</i> Canadian Community Health Survey, 2003, 2005, 2007, 2008 Difference-in-difference	Canadian mothers (18-59) with children (0-5)	Self-assessed mental health Stress Life satisfaction	Categorical variables: Increased the probability of 'excellent mental health' and Increased the probability of 'very satisfied' – not statistically significant. Continuous variables (Probit coefficients not interpreted in the study): Life Satisfaction improved: $\beta=0.15$, $p<0.01$	<i>Subgroups by marital status:</i> Single mothers: Reduced stress: $\beta=-0.28$, $p<0.05$ and reduced the likelihood of being 'extremely stressed' by 50%, $p<0.01$	24
Lebihan and Mao Takongmo (2018) Canada (excl. Quebec)	Introduction of Universal Child Care Benefit in 2006	<i>Individual longitudinal</i> NLSY79 and the NLS79 Child Survey, 1994-2005 (pre-reform) and 2006-11 (post-reform) Difference-in-difference and fixed-effects	Children (4-5) in two-parent families	Maternal depression Children: Hyperactivity, aggressive behaviour, indirect aggression, prosocial behaviour	Indirect aggression increased by 12.7% of s.d., $p<0.05$.	<u>High-education</u> Indirect aggression increased: by 11.3% of s.d., $p<0.05$ No effect for low-educated <u>Girls</u> Hyperactivity/inattention score decreased by 16% of s.d., $p<0.05$ <u>Boys</u> Indirect aggression increased by 14% of s.d., $p<0.05$	25
Hener (2016) Germany	Increased generosity of the Universal Child Benefit in 1996	<i>Individual longitudinal</i> German Socio-economic Panel, 1992-94 (before) and 1996-98 (after) Difference-in-difference	Partnered mothers (25–55)	Life Satisfaction (maternal)	No significant effect	Not reported	25

Table 3 Studies evaluating retirement benefit expansions: characteristics and results

Reference, Country	Policy reform	Design, Data, Analysis	Study population (age)	Outcomes	Results	Subgroup analysis	Validity score (out of 27)
Golberstein (2015) USA	An increase in Retirement earnings due to double-adjustment for inflation- the	<i>Individual cross-sectional</i> Assets and Health Dynamics among the Oldest Old (AHEAD) cohort of the Health and Retirement	Low-educated older adults (76-78)	Depression and a binary indicator of having been diagnosed with an emotional, nervous, or psychiatric problem	Results stratified by sex	<i>Stratified by sex:</i> <u>Males:</u> No significant effects <u>Females:</u> An additional US\$1,000 of Social Security income improves depression scores by 0.54 points, $p<0.05$; probability of having depression by 24% and a	22

	“Social Security Notch”	Study (HRS), 1993 survey Instrumental Variables				psychiatric diagnosis by 15%, $p<0.01$	
DeSimone (2018) USA	Early retirement age for men (65 to 62)	<i>Aggregate longitudinal</i> Centers for Disease Control and Prevention Fatal Injury Report, National Center for Health Statistics, 1990-2014 Regression Discontinuity	Adults (39-84)	Suicide rates (per 1,000) in each age group	8% drop in suicides, $p<0.01$	<i>Subgroups by sex:</i> <u>Men:</u> A drop in suicides of 9%, $p<0.01$ <u>Women:</u> Not significant	19
Lee and Wolf (2014) South Korea	Introducing Basic Old Age Pension: income support for low-income elderly	<i>Individual Longitudinal</i> Korean Longitudinal Study of Ageing 2006 (before) and 2008 (after) Difference-in-difference and fixed effects, random effects	Low-income individuals (65 and older)	Life Satisfaction	Not significant	Not reported	22
Pak (2020) South Korea	Expanding generosity of BOAP	<i>Individual longitudinal</i> Korean Longitudinal Study of Ageing, 2012 (before) and 2014 (after) Difference-in-difference with propensity score matching	Low-income individuals (65 and older)	Life satisfaction	Not significant	Not reported	21
Garcia and Otero (2017) Chile	Introducing a means-tested non-contributory pension	<i>Individual longitudinal</i> The Social Protection Survey, 2009 and 2012 Difference-in-difference with instrumental variables	Low-income individuals not yet retired	Feeling depressed, happy, alone, sad, tired, having lots of energy or restless sleep, and enjoying life.	Results stratified by sex	<i>Stratified by sex:</i> <u>Men:</u> An increase of US\$150 in expected pension wealth would reduce self-reported probabilities of feeling depressed and feelings of effort by 10% ($p<0.05$), feeling sad by 14%, $p<0.01$. No significant effects for females	25

Table 4 Studies evaluating social assistance policy contractions: characteristics and results

Lead Author, Country	Policy	Design, Data, Analysis	Study population (age)	Outcomes	Results	Subgroup analysis	Validity score (out of 27)
Bitler <i>et al.</i> (2004) USA	Variation in TANF (Temporary Assistance for Needy Families) and state waivers across states	<i>Individual Repeated cross-sections</i> Behavioural Risk Factor Surveillance System (BRFSS) 1990-2000 Difference in difference, and triple differences, with fixed effects	Single women aged 20-45 with and without children (0-17)	Number of days in the last month depressed	No significant effect	<i>Subgroups by education, marital status, ethnicity:</i> No significant differences.	24

Herbst (2013) USA	Variation in TANF and state waivers across states	<i>Individual Repeated cross-sections</i> Worldwide Communications Lifestyle Survey 1986-2005 Difference in difference with fixed-effects (state and year)	Single mothers (18-60)	Mental health measures of stress and anxiety (a series of subjective statements)	Results stratified by education	<i>Stratified by education:</i> <u>TANF:</u> An increase in life satisfaction of 11% of s.d. for less educated, $p < 0.01$, not significant for more educated. No effects on stress and anxiety <u>Waivers:</u> According to the author "The passage of waivers [...] did not lend itself to a clear pattern with respect to subjective well-being."	24
Ifcher (2011) USA	PRWORA (Personal Responsibility and Work Opportunity Act) and concurrent tax and welfare policy changes	<i>Individual Repeated cross-sections</i> General Social Survey, 1988-1996 (before), 1998-2005 (after) Difference-in-difference	Single mothers (18-45)	Happiness	Welfare reform increases happiness points by 0.11 in single women vs other comparison groups, p-value not reported	Stronger results for less educated: happiness increases by 0.28 (p-value not reported)	23
Rote and Quadagno (2011) USA	PRWORA and concurrent tax and welfare policy changes	<i>Individual Repeated cross-sections</i> National Survey of Drug Use and Health, 1995 (before), 2006 (after) Ordinary least squares regression	Female welfare recipients (18-49)	Depression symptoms	After welfare reform, on a scale 0-8, welfare recipients experience 0.48, more depressive symptoms than other poor women (no significant difference prior to the reform), $p < 0.01$	Not reported	17
Basu <i>et al.</i> (2016) USA	TANF and waivers - variation in implementation across states	<i>Individual Repeated cross-sections</i> BRFSS, 1993-2012 Difference-in-difference-in-difference and synthetic control	Single mothers (18-64)	Days per month of good self-rated mental health	No significant effect	<i>Subgroups by employment status:</i> Worse mental health outcome for the unemployed: Unemployed: a reduction in good mental health days by 3.2% (95% CI: -5.4, -1.0), $p < 0.05$ Employed: Not significant	25
Herbst (2017) USA	Variation in PRWORA-related parental work requirements across states	<i>Individual cross-sectional</i> Early Childhood Longitudinal Study, 2001 cohort Instrumental Variables	Mothers eligible for welfare (single or low-educated) (age unspecified) Children (age 5)	<u>Mothers:</u> CES-D depression Self-reported depression <u>Children:</u> Externalising behaviours, child happiness, worrying and shyness	No significant effect	Not reported	20
Davis (2019) USA	Variation in TANF conditionality across states	<i>Individual Repeated cross-sections</i> BRFSS, 2000-2015 Fixed-effects	Mothers (18-65)	Number of days of mental-ill health	Small negative significant effects of increased conditionality on number of days of poor mental health: Stringent sanctions: 1.07 (95% CI: 0.09, 2.05), $p < 0.05$ Job search requirements: 1.17 (95% CI: 0.29, 2.07), $p < 0.01$ Welfare-to-work spending: 0.40 days (95% CI: 0.04, 0.76),	Not reported	21

Reeves <i>et al.</i> (2016) UK	Local Housing Allowance benefit cuts	<i>Individual repeated cross-sections</i> Annual population survey, 2009-2013 Difference-in-difference with fixed-effects	Housing benefit (HB) recipients (16-69)	Self-reported "depression, bad nerves or anxiety"	p<0.05 There was a marked increase in the prevalence of depressive symptoms among HB recipients vs non-recipients – an increase of 1.8 percentage (pct) points, (95% CI: 0.010, 0.027), p<0.01 which translates to a 10% increase and suggests that approximately 26,000 (95% CI: 14,000, 38,000) additional HB recipients reported depression after the reform	<i>Subgroups by area:</i> High impact regions: depression increased by 3 pct points Low impact: an increase of 1 pct points 95% CI or p-values not reported	22
Katikireddi <i>et al.</i> (2018) UK	Restrictions in eligibility for Income Support	<i>Individual Longitudinal Understanding Society</i> , 2009-2013 Difference-in-difference with fixed-effects	Single mothers receiving income support	Depression (Mental Component Summary (MCS) of SF-12)	The SF-12 MCS scores decreased by 2.13, (95% CI: 0.10, 4.17), p<0.05 compared with control group 1, and 2.21, (95% CI: 0.30, 4.13), p<0.05 compared with control group 2).	<i>Subgroups by education level:</i> No significant difference	25

Table 5 Studies evaluating disability benefit contractions: characteristics and results

Reference, Country	Policy	Design, Data, Analysis	Study population (age)	Outcomes	Results	Subgroup analysis	Validity score (out of 27)
Barr <i>et al.</i> (2016) UK	Introduction of stricter disability benefit assessment – Work Capability Assessment	<i>Aggregate longitudinal</i> DWP, ONS, Quarterly Labour Force Survey, 2004-2013 Fixed-effects	Working age (18-64)	Suicide rates Self-reported mental health problem rates (per 100,000)	Each additional 10,000 reassessed in each area was associated with an additional 6 suicides (95% CI: 2, 9), p<0.01 2,700 cases of self-reported mental health problems (95% CI: 548, 4,840), p<0.05	<i>Subgroup analysis by area deprivation level:</i> Both mental health problems and suicides increase with lower income (see the study for full results)	21
Curnock <i>et al.</i> (2016) UK	Introducing a new disability benefit with tighter eligibility requirements	<i>Individual longitudinal</i> Understanding Society, 2009-2013 Difference-in-difference with propensity score matching	Working age adults (16-64 males; 16-59 females)	Depression measured using MCS of SF-12	No statistically significant differences in mental health were associated on average with transitions from IB to ESA compared with those who remained on IB	Not reported	23
Chen <i>et al.</i> (2015) Canada	Cuts in disability	Cuts in disability benefit generosity	Children (4-15) living in two-parent families	Emotional anxiety Hyperactive symptoms	A \$1000 reduction in benefits led to an increase in hyperactivity by 3.7 % of s.d.,	<i>Subgroups by parental sex:</i> Mother with a disability:	24

benefit generosity and/or eligibility across ten provinces	and/or eligibility across ten provinces Difference-in-difference with fixed-effects	(18-65) of low-education with a parent who has a disability	p<0.01.	A \$1000 benefit reduction led to a 6% and 4 % s.d. (p-values not provided) increases in hyperactivity and emotional anxiety. No significant effects for children with a father with a disability
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Table 6 Studies evaluating unemployment benefit contractions: characteristics and results

Reference, Country	Policy	Design, Data, Analysis	Study Population (age)	Outcomes	Results	Subgroup analysis	Validity score (out of 27)
Williams (2020) UK	Increased conditionality of the Job Seeker's Allowance	Aggregate longitudinal Quarterly Labour Force Survey and National Administrative data, 2010-2012 (Q3) (before) and 2012 (Q4) – 2015 (after) Fixed-effects	Adults (16-64)	Self-reported anxiety and/or depression	Following the reform, the sanctions coefficient increased by 1.19 per 100,000 working age population - for every 10 additional sanctions per 100,000 working age population per quarter the rate of anxiety and/or depression is 8.09 per 100,000 (95% CI: 3.67, 12.50), p <0.01.	None reported	21
Wickham <i>et al.</i> (2020) UK	Introduction of the Universal Credit (UC) (for the unemployed)	Individual longitudinal BHPS and Understanding Society, 2009-2018 Difference-in-difference with fixed-effects	Unemployed adults (18-64)	Psychological distress - binary and continuous measured by GHQ-12 Depression measured by SF-12	The prevalence of psychological distress in the intervention group relative to the comparison group increased by 6.57 pct. points (95% CI: 1.69,11.42), p<0.01; the average score on the GHQ-12 scale increased by 1.28 points (0.61, 1.95), p<0.01 and the average score on the SF-12 MCS decreased by 1.45 points (-2.58, -0.32), p<0.05. Based on the increase in prevalence, they estimate that between 2013 and 2018, the introduction of UC might have led to an additional 63,674 (95% CI: 10,042, 117,307) unemployed people experiencing psychological distress.	Subgroups by age, sex or education No significant differences	25

Table 7 Studies evaluating retirement benefit reductions: characteristics and results

Reference, Country	Policy	Design, Data, Analysis	Population (age)	Outcomes	Results	Subgroup analysis	Validity score (out of 27)
Atalay and Barrett (2014) Australia	1993 Pension Reform - raised the female state-pension age by 5 years (over a 20 year period)	Individual repeated cross-sections The Australian Bureau of Statistics National Health Surveys for 1995, 2001, 2004/05 and 2007/08 Instrumental variables	Women (60-64)	Mental health (a composite measure of anxiety, stress and mood disorders)	Retirement reduces mental ill-health: $\beta = -0.431$, p<0.01), implying that delayed retirement is detrimental for mental	Subgroups by income and marital status: For lower half of household income distribution sample: not significant Not reported for higher half For single women: $\beta = -0.655$, p<0.05. Not	19

					health	reported for married	
Carrino <i>et al.</i> (2020) UK	Raising women's state pension age (for up to six years over 10 years) since 2010	<i>Individual longitudinal</i> Understanding Society , 2009-2016 Difference-in-difference	Women (60-64)	Depression (GHQ-12) Mental health component of SF-12	Delayed retirement increases the probability of experiencing depression by 1.99 GHQ-12 points, $p<0.05$	<i>Subgroups by occupational grade:</i> Increasing health inequality by occupational grade. Delayed retirement leads to a 12 pct. point increase in the probability of depressive symptom scores) for women in lower-grade occupations ($p<0.05$) and no effects for those in managerial occupations	24
Grip <i>et al.</i> (2012) Netherlands	2006 Pension Reform which postponed early retirement by 5 years and reduced replacement rates for civil servants	<i>Individual cross-section</i> Panel survey (unspecified) and administrative data, 2008 survey wave Regression discontinuity	Male public workers (not yet retired, aged 53-54)	Depression (CESD-8)	Depression rates were 2.8 pct points higher among the affected group compared to the control group ($p<0.05$)	<i>Subgroups by initial health status, pension contribution years, contribution amount, marital status and partners' retirement income status:</i> Initial health status: stronger negative effects for those with no bad health ($p<0.05$) Number of years contributed and income status: stronger negative effects for higher-status ($p<0.05$). Stronger for married and for those whose partner has no pension income ($p<0.05$)	19

Highlights

- Social security systems have experienced major reforms over the past few decades
- First systematic review on the effects of social security reforms on mental health
- Found that expansions in social security benefits improve mental health outcomes
- Reductions in social security support lead to adverse mental health outcomes
- This is important for developing evidence-based policies for post Covid-19 recovery