London School of Economics and Political Science

Ageing in the age of debt: household debt and mental wellbeing among people aged 50 years and older

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Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I declare that my thesis consists of 64 865 words.

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Abstract

This thesis is concerned with the relationship between household debt and the mental wellbeing of people aged 50 years and older in England, elsewhere in Europe, and the US. This topic is prompted by the substantial levels of household indebtedness seen today in western countries, which have increased more rapidly than average incomes. Concurrently, the over-50 population has grown substantially, making it likely that there will be more older adults holding some form of debt in the future. For these reasons, the mental wellbeing implications of debt among older adults should be taken seriously. However, in current research, household debts are rarely considered to be socioeconomic determinants of the mental health of ageing populations.

This thesis investigates the links between debt and mental wellbeing in three distinct but connected papers. The three papers all focus on people aged 50 years and older, all analyse mental wellbeing outcomes, and all use forms of household debt as main predictors. But each paper provides additional and novel evidence from different viewpoints. The thesis took a quantitative approach and used regression and sample weighting methods throughout.

The first paper analyses the English Longitudinal Study of Ageing (ELSA). The paper explores the extent to which different household mortgage and non-mortgage debt measures predict depressive symptoms and quality of life scores in England. Non-mortgage debt, particularly when substantial considering the available assets of the household, has a robust link to both mental wellbeing outcomes. Mortgage debt is linked to lower quality of life, whereas no association is observed between this debt type and depressive symptoms. Similar associations, albeit smaller in magnitude, are observed in longitudinal settings; people had lower mental wellbeing after they acquired non-mortgage debts and better mental wellbeing after they got rid of their debts.

The second paper uses the same dataset and focused on non-mortgage debt. The paper investigates the moderation of an individual level contextual factor – employment status – in the link between debt and mental wellbeing. This paper looks at moderation from population inference and intervention-focused perspectives. Population inference analysis shows that, while people in England with debts have lower mental wellbeing

(more depressive symptoms and lower quality of life) in all employment status categories, the mental pain linked to debts is stronger for people who are jobless (retired or not working). In the analysis, from an intervention perspective, observational data is analysed within the framework of a target trial. This type of analysis suggests that an intervention of getting rid of debts may reduce depressive symptoms only among people who are jobless. Getting rid of debts may improve the quality of life of all subgroups examined.

The third paper analyses three harmonized longitudinal surveys, consisting of adults aged 50 and older from 21 European countries and the US. It investigates whether the link between non-mortgage debt and depression is observed across time and space, and whether this association is moderated by country-level factors. People with household non-mortgage debt have higher odds of depression – net of differences in other socioeconomic variables – in all countries. But this association is particularly strong in countries with poor personal discharge legislation and low levels of indebtedness, both of which indicate stronger social stigma related to debt. Within countries, there is also some weak indication that debts become more depressing in poor economic times, measured by the country-level unemployment rate. In almost all countries, the link between debt and depression is also observed when comparing people's odds of depression in times when they were in debt to the times when they were debt-free.

Altogether, these results stress that household debt is an important while nuanced socioeconomic determinant of poor mental wellbeing among adults aged 50 and older. Policy measures, such as integrated debt and mental health services, are needed to alleviate the mental health burden in older adults with non-mortgage debts, particularly among people in disadvantageous labour market situations and with few available assets. Subsequent intervention studies that aim to assess the mental health effects of debt relief may benefit from targeting people who are out of the labour market.

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List of Acronyms

BNPL Buy Now Pay Later credit

CES-D The Center for Epidemiologic Studies Depression Scale

DRO Debt Relief Order

ELSA The English Longitudinal Study of Ageing

HRS The Health and Retirement Study

IPTW Inverse probability treatment weighting

NINA No income no assets

OECD Organisation for Economic Co-operation and Development

ONS Office for National Statistics

SHARE The Survey of Health, Ageing and Retirement in Europe

SWB Subjective well-being

UK United Kingdom

UN United Nations

US United States

WHO World Health Organization

Chapter 1

1 Background

This thesis is concerned with the relationship between household debt and mental wellbeing among people aged 50 years and older in Europe and the US. The thesis consists of a background section, a literature review, an introduction to empirical papers, the three papers and a conclusion chapter. While the three papers presented in this thesis are all essentially concerned with the same relationship – debt and mental wellbeing – they do provide independent and non-overlapping contributions to the literature.

This is a paper-based thesis. The first paper demonstrates the nuanced relationship between different measures of indebtedness and two mental wellbeing outcomes. This paper provides novel contributions by a focus also on positive mental wellbeing and older adults in England. The second paper describes the relationship between debt and mental wellbeing among people in different labour market situations. The second paper is also concerned with the potential effects of an imagined target trial in which people with non-mortgage debt get rid of their debts. The third and final paper investigates how household debt manifests itself in depressive symptoms in countries with different sociolegal and economic landscapes. The more detailed contributions of these papers are explained in a later chapter.

Some cautions regarding terminology. The people aged 50 and older are later referred to simply as ‘older adults’. Age after 50 years is referred to as ‘later life’. However, this thesis does not conceive of this age group as a monotonic group of people, nor does it aim to reinforce any type of age group-related stereotypes. The heterogeneity of this population group, consisting of people in different circumstances and age groups, is acknowledged, discussed and investigated. The term debt refers, in this thesis (as explained later), to household debt – not public, business or other forms of debt. However, this thesis acknowledges the heterogeneity of this concept, consisting of loans with different qualities.

The motivation for this thesis arises from three major parallel trends. The first is the substantial increase in the availability of loans in the United Kingdom (UK) and elsewhere in Europe and the United States (US) in the past 50 years. The second is population ageing, as the title of this thesis was chosen to underscore, implying that there will be a higher number of people aged 50 and older and holding some form of debt. The third is the desire of policymakers to take population mental wellbeing implications into consideration in their policies. A more detailed introduction to these three trends is provided in the next section.

This paper-based thesis contains, in addition to the three papers mentioned above, three background chapters – this motivation chapter, a literature review chapter and introduction to the papers - and a conclusion chapter.

1.1 Motivation

The level of household debt has increased substantially in the UK. In 1987, the total household debt was three-quarters of the average annual income (Harari 2018). This figure was almost double, standing at 1.3 times the annual income, in the first quarter of 2020, before the onset of the global COVID-19 pandemic (Office for National Statistics 2020). This means that the amount of household debt has increased more rapidly than the average income.

The aggregate statistics on household debt are, to a large extent, attributable to mortgage debt, that is, debt used to acquire a home. However, the availability of other, non-mortgage, debts, acquired for other types of consumption, has increased substantially in recent years (Harari 2018). Before the onset of the COVID-19 pandemic, it is estimated that nearly half of British households had some non-mortgage debt (Office for National Statistics 2019). As shown in Figure 1.1, European countries have witnessed parallel trends (OECD 2021), but the average levels of household debt are particularly high in the UK.

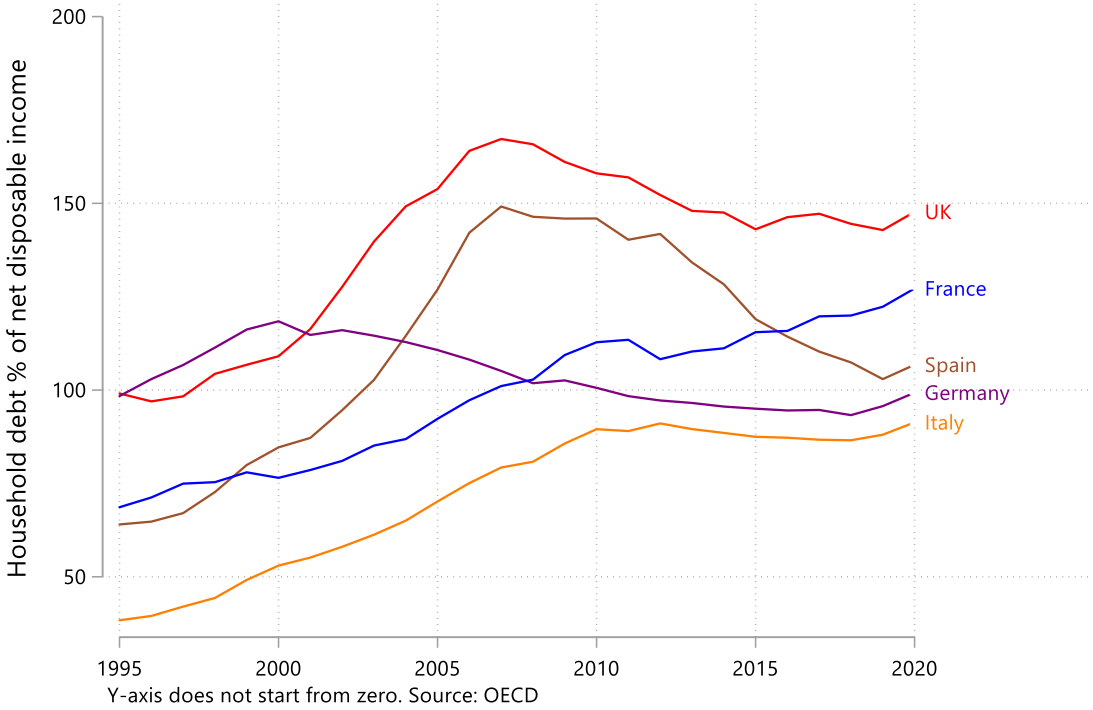


Figure 1.1 Household debt as a percentage of net disposable income in selected European countries. Source: OECD (2021)

What are the causes and consequences of such massive levels of indebtedness? In the UK and the US, scholars have repeatedly claimed that the growth in household debt has been partly caused by stagnating wages, and the high economic inequality in these countries (Iacoviello 2008, Mian and Sufi 2015, Turner 2017) (see (Zinman 2015) for a review). The growth in debt has, the argument goes, been necessary for an acceptable standard of living for the middle class and economic growth in countries with high economic inequality.

This "loans-for-wages" (Barba and Pivetti 2008) model, however, carries significant risks for the people involved and society at large. Some of the society-level risks associated with massive levels of household indebtedness have already materialized. It is argued that the increasing levels of household indebtedness contributed to the onset of the Great Recession (Mian and Sufi 2015), the slow economic recovery since then (Turner 2017, Spooner 2019, Mian, Straub et al. 2020) and the political turbulence of the 2010s in the UK and the US (Gyongyosi and Verner

2020). This thesis does not analyse these causes or consequences. Rather, the thesis analyses the potential individual harms associated with household debt. In particular, it focuses on the implications of debt for mental wellbeing, a topic that has received much less attention in policy discussions.

Debt among people aged 50 and older, and its link to mental wellbeing, is worth investigating. Although older adults have debt obligations less often than their younger counterparts, the proportion of older adults still paying for their mortgage or non-mortgage debt is far from negligible.

In Europe, the country variation in the share of households with some debt is substantial (shown in Figure 1.2). Estimates derived from the Household Finance and Consumption survey in 2017 suggest that around 40% of people aged 55 to 64 have some form of debt (mortgage or non-mortgage) in the Euro area (Household Finance and Consumption Network 2020). In the Great Britain, Wealth and Asset Survey, estimates suggest that about a third of people aged 55-64, and a sixth of people aged 65 or older, have some financial debt (other than mortgage and home-equity loans) (Office for National Statistics 2019). More recent estimates, derived from the Financial Lives Survey in 2020, suggest that about a quarter of adults aged 55-64 in the United Kingdom have mortgage debt, while these estimates are less than 10% in the older age groups (Financial Conduct Authority 2021).

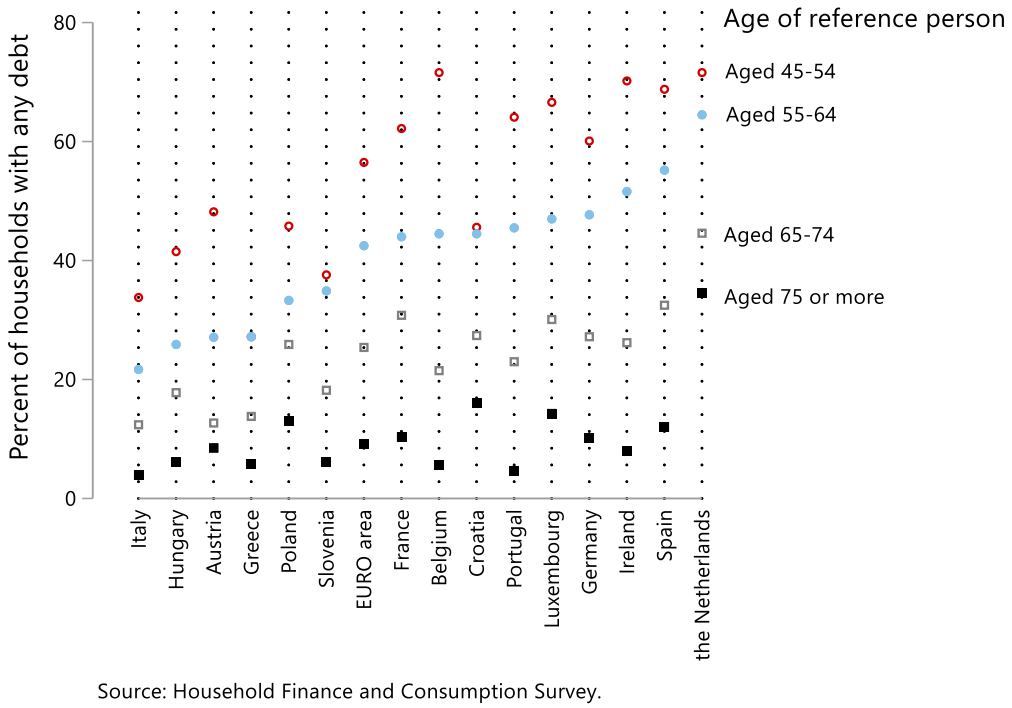


Figure 1.2. Percent of households by age of reference person with some household debt in selected European countries. Source: Household Finance and Consumption Survey in 2017 (Household Finance and Consumption Network 2020)

Population ageing is a demographic phenomenon in which the median age of the population increases. This increase is the result of a decreasing birth rate, a decreasing death rate, a combination of the two, or compositional changes in migration (Rechel, Grundy et al. 2013). Population ageing implies that, even in a scenario in which the average levels of indebtedness no longer increase, it is likely that there will be more older adults holding some form of debt in the future.

In the UK, the population over 50 years of age will grow considerably. In 2008, there were some 21 million adults aged 50 and older in the country (of which 17.5 million lived in England), 34% of the total population. In 2018, this figure increased to 25 million older adults, 37% of the total population (21 million and 37%, respectively, in England). A decade later, in 2028, these figures, it is projected, will further increase to 27.6 million, 40% of the population (23.2 million and 38%, respectively, of the population in England)(Office for National Statistics 2019). As shown in Figure 1.3, the

UK is not alone in these massive demographic changes which concern a large number of western countries (Rechel, Grundy et al. 2013).

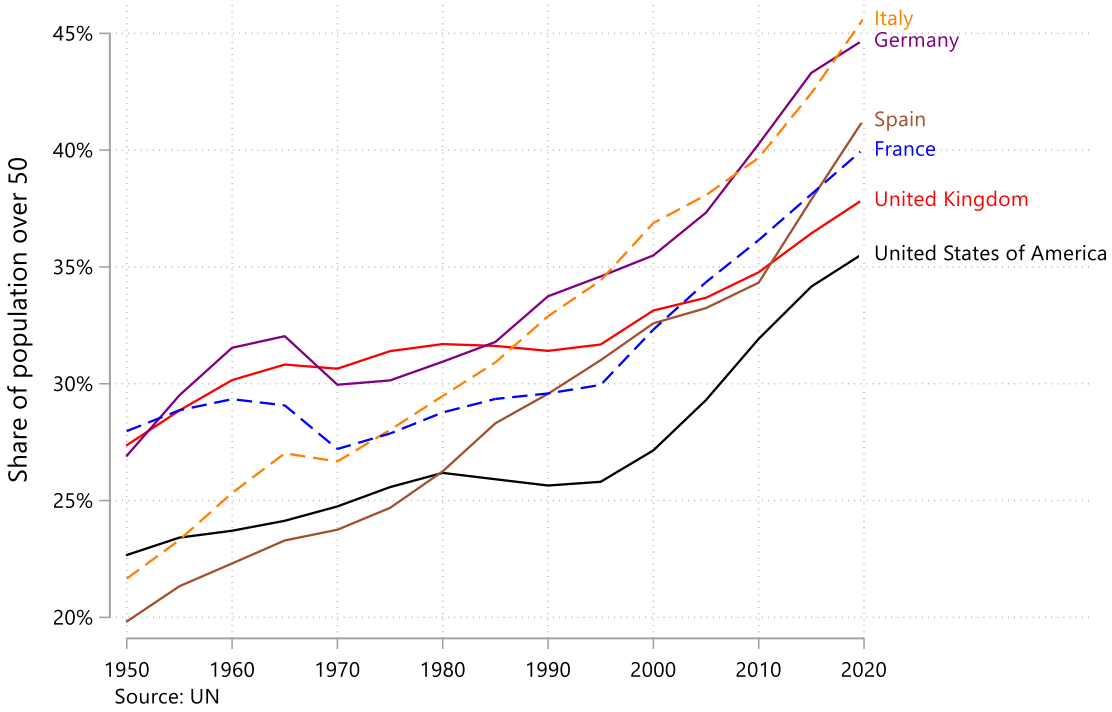


Figure 1.3. Population aged 50 years or more as a percentage of total population in selected European countries and the United States. Source: United Nations World Population Prospects (United Nations 2019).

Population ageing emphasises the importance of studying the second part of our lives. Assuming a constant rate of the 2018 mortality, men aged 50 in the UK are expected to live 34 more years (Office for National Statistics 2019). Their aged-matched female peers are expected to live three years longer than that. For policymakers keen to improve mental wellbeing, the determinants of mental wellbeing in these years are of importance. In an era of massive household indebtedness, household debts may be social determinants of mental wellbeing among people aged 50 and over, with important policy implications.

A third trend making this thesis timely is the increasing interest in (mental) wellbeing as a policy objective beyond traditional economic or health indicators such as gross domestic product, poverty or life expectancy. It is now a widely held view that wellbeing, while often ill-defined, is an intrinsic goal for public policies. Mental

wellbeing measures are necessary metrics for assessing the effects of such policies. An often-cited example of this development is New Zealand, a country whose government introduced a "Wellbeing Budget" in 2019 (Mintrom 2019). Mental wellbeing is now a commonly used metric of the success of social and economic policies. In the UK, examples of mental wellbeing as an intrinsic policy goal include the Office of National Statistics (ONS) Measuring National Wellbeing (MNW) programme and the 'What Works' Centre for wellbeing. International examples include the OECD's 'Your Better Life' index, WHO's 'Health 2020' monitoring framework – an expert group on wellbeing – and Sarkozy's Fitoussi Sen Stiglitz Commission.

Within the mental wellbeing academic community, it is now a widely shared view that what makes a "good life" in later life is more than the absence of mental and physical illness. Consequently, numerous mental wellbeing measures have emerged to measure evaluative, eudaemonic and affective aspects of wellbeing, to complement the disease-orientated approaches to good ageing (Dolan, Layard et al. 2011). One such measure is used in this thesis.

For these reasons, this thesis focuses on debt among people aged 50 years and over. This population group consists of a diverse group of people, in particular in terms of their mental wellbeing. The level of people's mental wellbeing reflects differences, not only in their predispositions and current circumstances, including possible levels of household debt, but also in their life histories (Milne 2020). The level of wellbeing, the evidence indicates, fluctuates over one's life course, in particular after the age of 50. This thesis acknowledges this heterogeneity and the fact that the dynamics of mental wellbeing and ageing in later life are complex. While debt may be an important determinant, this does not imply that all people with debt have poor mental wellbeing.

The rest of this background chapter proceeds as follows. Next, the key concept – household debt – is discussed. After that, the context of the study is provided, with a focus on inequalities as causes and consequences of debts, and the link between the welfare state and debts. Then, the mental wellbeing outcomes of this thesis are discussed.

1.2 Household debt

Household debt is a liability needing repayment by a household or its members to a creditor (OECD 2021). Debt is a relationship with the defining feature being a debtor's obligation to pay to the creditor a sum often agreed upon at an earlier date. A household is understood to consist of one or more people, often a family, who live together in the same dwelling. However, this thesis uses household debt as an umbrella term for all debts unpaid by people, not including debts from business debt, government debt and other debt not held directly by people. This thesis does not focus on these other forms of debt. In line with the literature in this area, the thesis often uses the term household debt interchangeably with personal debt or simply debt; when the term carries a different meaning, it is noted.

Debts differ in their monetary value but also their interest rates, repayment periods, collateral, possibilities for debt collection actions, creditors, debt maturities and the role of debt guarantors. This thesis refers to these differences as the *quality of debt*. There are numerous types of household debt that differ in their quality. The thesis makes a broad distinction between two broad debt types, a mortgage (housing) and a non-mortgage (non-housing) debt.

Mortgage debts are linked to real property. Mortgage debts are often characterised by large quantities owed, by being secured (with the house or apartment as collateral), and by having a longer repayment period with lower interest rates than non-housing debts. In contrast, non-mortgage debt, a term sometimes used interchangeably with financial, unsecured, consumer, non-housing or credit debt, typically entails debts smaller in value. Non-mortgage debts typically have shorter repayment periods and higher interest rates. This category is, however, diverse in content, consisting, for example, of consumer debts, medical debts, student debts or debts from unpaid bills.

Where do debts come from? Dwyer (2017) provides a useful conceptual model. The debtor always has a creditor, which Dwyer locates in the state vs market continuum[1]. The state is a distinct creditor, having better opportunities for debt collection actions (to whom people often owe "priority debts"). The origin of debt, the

[1] The author argues that another dimension could be added for informal debt providers.

author argues, can then be placed within the “prospective credit offer” and “retrospective debt obligation” axis. In the former, a household’s debt originates from an explicit arrangement which a debtor applies for. If granted, the debtor then receives a certain sum of money or goods in exchange for an obligation to repay that sum (with interest) to the creditor at a later date. In the “retrospective debt obligation”, by contrast, households become indebted via a passive process in which bills, for example for heating, are left unpaid. While this thesis is unable to distinguish the origins of debts in this level of detail, this model put forward by Dwyer provides valuable insights. The model helps researchers to understand different types of debt and to consider potential policy measures to tackle problems arising from debts (discussed in the concluding chapter of this thesis).(Dwyer 2017).

While the concept of debt is intuitive – amount to be paid – the significance of debt goes much deeper than this. Household debt is a far from straightforward social determinant of mental wellbeing. Scholars have described debt as an ambivalent social relationship between debtor and creditor (Hodson, Dwyer et al. 2014). Debts may have different meanings, causes and consequences for people in varying contexts and individual circumstances. For some, taking on debts indicates optimism and opportunities, while for others, debts are connected to despair. This double-edged nature implies that debts are social exposures like no others (Hodson, Dwyer et al. 2014).

Scholars have attempted to address this double-edged nature of debts by conceptualising and measuring problem debt or “over-indebtedness”. There is no widely shared conceptualisation of these terms, confusing the policy debate about household debt (Betti, Dourmashkin et al. 2007, European Commission 2008). Problem debt, or over-indebtedness, refers to a wide range of situations. It is often perceived that problem debts are no longer, or were not in the first place, useful financial tools but rather undesirable from economic, social or psychological viewpoints.

Three types of more specific conceptualisations of debt problems have been typified (Betti, Dourmashkin et al. 2007). An administrative definition of problem debt refers to situations in which formal institutions, such as courts or credit rating agencies, consider a person to be “over-indebted” or defaulted. A subjective definition refers to the extent to which people subjectively assess their debts to be a “burden”. An objective definition defines debt as burden or a problem based on objective indicators such as the

number of debt accounts, debt amount, debt-to-income, debt payment-to-income or late payments.

Previous investigations have found that, while these dimensions of debt problems – administrative, subjective and objective – are over-lapping, the indicators based on these dimensions may classify different individuals as "having problem debt" (Betti, Dourmashkin et al. 2007, Keese 2012). The measures are often used in combination. For example, the definition used in the Wealth and Asset Survey by the Office of National Statistics uses a combination of subjective and objective measures (Office for National Statistics 2019).

This thesis does not focus on these specific concepts of problem debt and thus does not use categorical debt problem or over-indebtedness variables. Rather, the interest of this thesis is in household debts from a wider viewpoint. The thesis focuses on objective debt and "debt burden" measures, measuring the amount of debt.

There are several reasons for not focusing exclusively on problem debt in this thesis. First, categorical debt problem variables are based on thresholds, while neglecting the fact that there are varying degrees of debt problems. It is challenging to determine the threshold after which debts transform from a useful financial tool to a psychological problem. The concept of problem debt is difficult to operationalise because there are no widely accepted definitions of such terms (Betti, Dourmashkin et al. 2007). Second, subjective problem debt is a problematic concept when investigating its link to mental wellbeing. People with lower mental wellbeing, or with certain personality traits, may perceive their debt burden over-pessimistically (Bridges and Disney 2010, Keese 2012). Third, the view taken in this thesis is that the double-edged nature of debts cannot be fully addressed by measures that attempt to differentiate problem debt from "useful" debt. The reason for this is that the double-edged nature is an inherent feature of debts; debt may be useful from an economic viewpoint, for example, to overcome transient economic difficulties, but the repayment may simultaneously cause psychological distress (Hodson, Dwyer et al. 2014). Fifth, the data used in this thesis does not contain the needed variables to replicate the measures often used, for example, by the ONS.

Nevertheless, to clearly understand previous findings, the nuances in the concept of problem debt are important to keep in mind. Investigators have used problem debt

measures inconsistently in their studies. The three dimensions of debt problems – administrative, subjective and objective – are also beneficial when considering potential multidimensional consequences of debts. Different conceptualisations of debt problems illustrate the ways in which debts may affect all areas of personal life, including economic situation, subjective experience and legal status.

1.3 Policy context of household debts

To understand debt as social determinant of mental wellbeing more deeply, it is crucial to keep in mind that the causes, consequences and the experience of indebtedness is embedded in the given societal level context. It is the social context that creates the social norms, legal environment and economic circumstances around debt (Sweet, DuBois et al. 2018), all of which may ultimately determine the mental manifestations of debt. Previous research on debt and health has been criticized in this respect. It has been argued that previous studies have treated debt simply as an additional socioeconomic "risk factor" while neglecting contextual influences (Sweet 2018). The research has neglected, the argument goes, the institutional contexts of debt, the lived experiences and how these lived experiences are a result of ideologies and institutional arrangements (see (Dwyer 2017, Sweet 2018, Sweet, DuBois et al. 2018)). This matters for two reasons. First, treating socioeconomic or behavioural variables as separate "risk factors", without acknowledging their upstream determinants, may shift responsibility to the individual. Framing "debt as a personal risk factor" (Sweet, DuBois et al. 2018) in empirical investigations may reinforce the stigma and shame related to debt, discussed later in this chapter. Second, this type of individualistic "risk factor" approach may miss optimal societal level interventions, including larger structural changes.

Sweet et al (2018) summarise the need for an in-depth review of the context of indebtedness: *"without explicating the political economic underpinnings of consumer debt, current epidemiological studies risk reifying debt as an attribute of individuals that is immune to external forces and is decontextualized from its actual embedding in culture and policy."* Understanding why household debt – as a social determinant of mental wellbeing – occurs may provide a fruitful approach when identifying effective

policy solutions. For this reason alone, the wider links between debt and power structures and the welfare state are discussed below.

Debts and inequality

Debt is a form of social relationship with distinct power dynamics. The debtor-creditor dynamic is ancient, as a form of moral obligation, but, it is argued, has been intensified, quantified and monetised in recent decades (Graeber 2012). The debt relationship is characterised by the relationship between debtor and creditor, a bond built upon the notion that obligations are to be fulfilled in the future. To facilitate this notion, strong social norms relating to debts and their repayments have emerged (Dwyer 2017). A key feature of these norms, for the debtor, is the repayment obligation and the potential consequences of violating this obligation. People not fulfilling their obligations to pay debts are deemed to be untrustworthy, fear of which may trigger distress for debtors. Therefore, indebtedness or debt problems may carry stigma (Keene, Cowan et al. 2015), that is disapproval and discrimination in various settings. Stigma is the central element of the individual-level theory about why debt may cause lower mental wellbeing discussed later in this thesis.

Access to credit is undoubtedly a cornerstone of modern societies and economic growth, but it is inherently linked to inequalities within them. Economics and Sociology scholars have described a two-way relationship between inequality and household debt. Rising inequality is argued to be a cause of the substantial level of household debt seen today (Iacoviello 2008). The reasons for this are that, the argument goes, economic inequality has increased the surplus assets available to be loaned, at the top of the wealth distribution (Kumhof, Rancière et al. 2015, Mian, Straub et al. 2020), and, at the same time, increased demand for such loans to compensate for the stagnated incomes at the lower end of the distribution (Iacoviello 2008).

Debt is also a financial vehicle that exacerbates existing inequalities. Two important mechanisms contribute to this (Caplovitz 1963, Mian and Sufi 2015, Turner 2017). First, poorer households are more likely to experience critical income losses via, for example, job loss, health issues, or changes in family status that disrupt their debt repayments. At the same time, these households carry significantly fewer wealth buffers that would allow them to self-insure against such income shocks. Second, debt markets

consist of versions of "poverty penalties", meaning that households in more disadvantageous circumstances, and groups that are discriminated against, are offered lower quality debt (Davies and Finney 2020). Low-income households are flagged as a market segment by credit scoring and offered high-interest and short-term debt products. This is partly because of their lower incomes and higher propensity to experience income shocks, disrupting their debt payments, and, partly because low-income households may not have the resources or options to find and negotiate the cheapest debt offer (Dwyer 2017).

This means that people with different underlying circumstances face profoundly different lived experiences of debts; a household with economic difficulties is more likely to experience threatening payment notices, extra costs arising from late payments, and bailiff orders. For secured households, debts may, by contrast, support further asset building (Maroto 2021). In this context, Mian and Sufi (2015) argue that debts are the "anti-insurance"; *"this is a fundamental feature of debt: it exposes enormous losses on exactly the households that have the least*". This is not to say that debts are not needed, or useful, for low-income households, but rather that the experience of indebtedness is inseparable from the power structures of society (Dwyer 2017).

Against this backdrop, it is surprising that inequality scholars have long ignored the role of credit markets when interrogating the major social and economic inequalities seen today (Maroto 2021). But some exceptions exist. For example, Wilkinson and Pickett have gone as far as to claim that household debt may be a mediating variable in the correlation between income inequality and health found in cross-country comparisons (Wilkinson and Pickett 2018). However, this thesis does not go into this debate on debt and economic inequality. Nevertheless, it is worth reiterating that debt, as any social determinant of wellbeing, does not exist in a vacuum, but rather interacts closely with the underlying social hierarchies in society.

Household debt and the welfare state

What is the relationship between the welfare state and household debt? Does the welfare state compensate for the unequal nature of debt markets? Understanding the ways in which the welfare state intervenes in the debtor-creditor relationship is critical for a

study on debt and mental wellbeing. Papers one and two of this thesis are based on the English context. This context is described in more detail in the introduction sections of these papers.

An often-made argument is that household debts are a substitute for the welfare state, in general, and social security and social investment policies, in particular. Debts are financial tools that are to be used to self-insure against income shocks and for social investments such as education, while paid back in better times. In the US context, for example, Prasad (2012) argues that increasing access to debts (and their discharge) emerged as a substitute for traditional collective social policies. Debts were needed to sustain consumption and a minimum standard of living in this country of high-income inequality. A wide availability of debts was also needed to resolve potential demands to expand the welfare state. Similar credit/welfare-state tradeoff arguments have been made by numerous authors with some nuances. Soederberg (2014) describes this regime as "debtfare" in which the "poverty industry", including credit expansion, replaced wages and public welfare for the poor. Montgomerie and Büdenbender (2015) posit, in the UK context, that movement towards private asset-based welfare – a model of reliance on private assets, particularly housing, as means of social security – "intensified household indebtedness". Empirical evidence often shown to support these arguments co-occurs with the "neoliberal turn" of welfare states and increasing levels of household indebtedness.

Indeed, in contrast to European contexts, credit access is used as a substitute for state-provided income support programs in the US, and to some extent in the UK. Loans for higher education is an example of these differences. However, the credit/welfare state hypothesis does not fit within the European context, where a more complementary relationship between household debt and the welfare state exists. In Europe, households have more (mortgage) debt in Northern Europe, where a more extensive public welfare provision exists, compared to Southern European contexts, where households are less in debt. Recent work has thus provided more nuanced stories (Comelli 2021, Wiedemann 2021). For example, Wiedemann (2021) argues that the interaction between credit access and the welfare state solves the substitute/complement debate: "*the ways in which welfare states distribute benefits and credit regimes provide access to credit affect how individuals address social risks and, as a consequence, shape patterns of*

indebtedness". Leaving this debate aside, the welfare state can interact in complex ways with household debt, either by encouraging or preventing it, and by shaping the experience of debts discussed below.

Specific social policies do contribute unintentionally to indebtedness. Of particular relevance here is, in the UK, the country context this thesis focuses on, the roll-out of universal credit, which, recent data shows, has pushed many households into debt problems (Drake 2017). Another dimension through which the welfare state shapes the experience of household debt is the fact that the welfare state is a major creditor of "priority debts", with more extensive tools for debt-collection actions than private market lenders. How the state, as creditor, treats people with debts, and what measures it uses for its debt collection, thus have a major impact on lived experiences of debts.

Finally, welfare states do intervene intentionally in credit-debtor relationships. Welfare states have put forward measures to prevent, alleviate and discharge social risks arising in an era of high household indebtedness (Eurofound 2020). The degree to which these social policies are in place varies substantially between countries, described in more detail in paper three. The differences in how the legal system treats people with debts – the possibilities for debt discharges, the types of debt collection allowed and the timing of such procedures – do not align with traditional welfare state typologies (Wiedemann 2021). In fact, it is frequently argued that in more liberal types of welfare states, namely the US and the UK, a more debtor-friendly debt collection system is in place (Hoffmann 2012).

1.4 Mental wellbeing

Two outcome variables of this thesis measure depressive symptoms and subjectively assessed quality of life. These two outcomes fall under a broader concept of wellbeing, briefly discussed below. In this thesis, the term *mental* wellbeing is used to refer to these two outcomes. This is to emphasise the subjective and affective nature of the two measures, rather than objectively assessed wellbeing or welfare.

Mental wellbeing is a multifaceted concept. While the broad concept of wellbeing – the state of being or doing well in life" according to the Oxford English dictionary (1989)– is intuitive, there is no widely shared, precise definition. The

proposed definitions of wellbeing often include some of the following statements: wellbeing is more than just an absence of ill-health; wellbeing is not a dichotomous or one-dimensional state, but rather continuous and multidimensional; wellbeing fluctuates; resilience, the capacity to manage stress, feeling of self-worth, functioning, purpose and confidence are integral parts of mental wellbeing; mental wellbeing includes good work capacity; mental wellbeing is a subjective state, not unobservable for a third party (Diener 2000).

The OECD (2013) proposes a broad definition of wellbeing as "*good mental states, including all of the various evaluations, positive and negative, that people make of their lives, and the affective reactions of people to their experiences*." Another influential, simple definition provided by Rayn and Deci (2001) is that mental wellbeing is "*optimal psychological functioning and experience".* In public health circles, wellbeing is often used interchangeably with the term mental health. For example, the WHO (2014) defines mental health as "*a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community."*

The academic interest in wellbeing has expanded considerably in recent decades. This is partly thanks to important theoretical contributions, to the increasing appreciation of its value as an intrinsic policy outcome, and to developments in measuring the concept (OECD 2013). However, there is considerable variation in the conceptualisation, terminology and measurements of wellbeing. The reason for this variation is that social and health sciences have approached questions about wellbeing quite independently.

A strand of research worth noting here is quantitative research on subjective wellbeing (SWB). This literature has focused on the ways in which people self-evaluate their lives in general, on their capabilities for self-fulfilment, and on their feelings and subjective experiences. In the SWB literature, three viewpoints of wellbeing have been typified (Dolan, Layard et al. 2011, OECD 2013). First, the evaluative perspective on mental wellbeing is a subjective global assessment of life. This type of approach is often applied in large surveys that invite people to rate their happiness or satisfaction with "life in general" or in specific subdomains of life, such as job, health or satisfaction with one's financial situation (Dolan, Layard et al. 2011).

The second approach, affective wellbeing, focuses on people's experiences of positive and negative feelings. Affective wellbeing is linked to specific periods during which one can experience a range of positive and negative emotions with varying intensity, frequency and co-occurrence (Dolan, Layard et al. 2011). There are numerous suggested subdomains of negative affect, including anger, fear, anxiety and sadness (Schimmack 2008). This thesis uses a measure of one of these domains, depressive mood.

In the third, eudemonic, approach the significance of wellbeing goes deeper than affect and self-evaluation. Eudemonic wellbeing emphasises perceived meaning and purpose in life, functioning and realisation of one's potentiation (Waterman 1993). This approach, combining psychological and humanist literature, has sometimes been labelled as human "flourishing". The eudemonic approach includes domains such as control over one's life, optimism for the future, life goals and virtues. The second outcome measure of this thesis, the CASP-19 quality of life score, includes elements of eudemonic and affective aspects of wellbeing (Hyde, Wiggins et al. 2003).

This thesis analyses two mental wellbeing outcomes, one originating from the epidemiological research tradition, a measure of affective wellbeing, and another from the social gerontological research tradition, conceptualised as a hybrid wellbeing measure. These specific measures are discussed next.

Depressive symptoms

Depression is the experience of abnormal periods of sadness and loss of interest and energy. These periods are more severe and longer than normal mood fluctuations, an integral part of healthy life (World Health Organization 2014). Numerous quantification exercises of the burden of diseases have put depression as one of the greatest public health challenges of the 21st century. Depression is a leading cause of disability worldwide (Institute for Health Metrics and Evaluation (IHME) 2018). Around one in ten adults in the UK reported mild to moderate symptoms of depression in the UK before the onset of the COVID-19 pandemic, surveyed in the time period from July 2019 to March 2020 (Office for National Statistics 2020). After the onset of the pandemic, this figure increased substantially.

Depression causes substantial human suffering not only to the people affected but also to their families. Depression is thus undesirable as such, but there are also instrumental arguments for preventing and treating depression. Depression incurs costs for health and social care (Zivin, Wharton et al. 2013), reduces work ability and productivity (Lerner and Henke 2008), and decreases the number of years people are expected to work in ageing societies (Pedersen, Thorsen et al. 2019). Depression is linked to a higher risk of mortality (Wei, Hou et al. 2019) and diseases such as cardiovascular diseases (Penninx 2017), although it is difficult to establish whether depression causes other ill-health conditions.

Why do some people suffer from depression and others do not? It is not easy to establish individual-level causes of depression. The scientific knowledge on the development processes of depression is constantly evolving, but the current predominant view is that both individual pre-disposition and environmental factors matter in the development of depression. Genetic and personality-related predisposition may determine the extent to which environment-related factors, such as traumatic experiences or prolonged stressful life situations, trigger a depression (Colodro-Conde, Couvy-Duchesne et al. 2018). While an individual "cause" of depression can rarely be identified, there is a substantial body of evidence to support the notion that socioeconomic circumstances influence the development of depression (World Health Organization 2014).

Rather than using measures of clinically assessed depression, this study focuses on depressive symptoms as a proxy variable for an underlying depressive condition. This thesis takes advantage of a widely used measure of depressive symptoms, a version of the Center for Epidemiological Studies Depression (CES-D) scale. The original CES-D scale, consisting of 20 items and derived from earlier depressive symptoms measures, was developed in 1977. The original aim of the scale was to measure the severity of depressive symptoms in the general population (Radloff 1977). This thesis uses a revised 8-item scale developed for large surveys in which in-depth assessment of depression is not feasible (Turvey, Wallace et al. 1999).

Quality of life

The second outcome used in the first and second papers of this thesis is a measure of quality of life. Quality of life is often used as a synonym for wellbeing or "successful ageing". The term originates in medical and social gerontological literature, but a variety of different approaches to quality of life exist. Perspectives on quality of life are often divided into societal level, which is outside the scope of this thesis, and individual-level indicators (Bowling and Windsor 2001).

As described in Higgs et al (2003), there is much debate on whether quality of life is measurable in the first place, and whether it is an objective or subjective state, in the second. There are debates around the items quality of life includes, for example, whether quality of life should be measured as a general concept or a field-specific concept, whether the measure should be defined by the person involved or by a health professional. These debates arise, it is argued, from the ill-defined and under-theorized nature of the concept (Hyde, Wiggins et al. 2003). Consequently, numerous competing measures of quality of life have been developed (Haywood, Garratt et al. 2005), making comparisons across studies under the heading "quality of life" difficult.

In medical-related literature, quality of life has traditionally been viewed through a bio-medical lens with which "successful ageing" is proxied by an absence of illness or by the extent to which ill health prevents activities in daily life. Measures of this (also known as "internal") model of quality of life include, for example, "activities of daily living" scores or a health-related quality of life score. These measures are often used as broader outcomes to assess the effectiveness of interventions set in health and social care (Bowling 2014). This biomedical view has been criticized on many fronts, for example, for being overly narrow, more of a problem rather than theory-driven, focusing on internal rather than environmental factors that determine the illnesses and limitations, including implicit normative assumptions about the quality of life of people with permanent ill-health conditions or limitations, and operating "within a philosophy of 'lack'" (Higgs, Hyde et al. 2003).

Consequently, a more holistic tradition of quality of life has emerged to promote the view that desirable life and ageing is more than the absence of illness. In a holistic, multidimensional approach, the absence of ill-health is not the defining feature of quality of life (although it may be a component of it). The conceptualisation used in this thesis follows this multidimensional and broad tradition of quality of life. This thesis

defines quality of life via an expanded 'need satisfaction model'. According to this model, quality of life is the subjective "degree to which human needs are satisfied" (Hyde, Wiggins et al. 2003). These needs are universal, non-hierarchical, related not only to survival but to non-material aspects of life, including the eudemonic aspects of wellbeing (Maslow 1962, Hyde, Wiggins et al. 2003).

This thesis uses a multi-item CASP score as a measure of this conceptualisation. The score consists of four areas of "higher needs", namely control, autonomy, self-realisation and esteem. Control refers to the extent to which one can effectively operate in one's circumstances, autonomy refers to freedom from undesirable interference, self-realisation refers to reflexive needs, and pleasure refers to affective need. According to the developers of the score, these domains were derived from a variety of disciplines and are to be treated as non-hierarchical and conjoined (Hyde, Wiggins et al. 2003). Criticisms of the score include representing a top-down approach in which the elements of quality of life have been defined by experts, rather than the research subjects themselves (Bowling 2014). Nevertheless, the measure was developed to address calls to include a more comprehensive measure of the good life in later life. The score goes over and above traditional health-centred variables such as limitations on active daily living, often included in epidemiological cohort studies (Higgs, Hyde et al. 2003). Versions of the CASP score have been adapted to numerous large, population-based surveys. These include, but are not limited to, the British Household Panel Survey, the Irish Longitudinal Study on Ageing, Whitehall II and the GAZEL Cohort Study. A large body of research has accumulated from these surveys regarding the differences in quality of life and its determinants.

1.5 Socioeconomic determinants of mental wellbeing

This thesis examines the link between debt and mental wellbeing through the social epidemiological lens. Thus, a short overview of the social epidemiological research tradition are in place. Social epidemiology investigates how health-related outcomes are distributed across different segments of society with the aim of exploring – and explaining – the extent to which social factors, that is, factors "above one's skin", link to people's health and wellbeing (Berkman, Kawachi et al. 2014). This is a normative

approach in that better mental wellbeing is desirable and that reducing unfair inequalities is the ultimate goal of research, which is taken into account when planning research questions. This thesis follows this tradition with the aim of producing evidence that will be useful for improving mental wellbeing outcomes and reducing unfair inequalities in these outcomes.

It is fair to say that the UK has been a forerunner on socioeconomic determinants in health and wellbeing. The Black Report, published in 1980, showed that there were considerable differences in death rates among British according to their social class (Black 1980). This report was one of the first to show that differences in health outcomes existed throughout all the social groups, a *social gradient* in health. While the policy recommendations suggested in this report and subsequent influential reports were left unaddressed, they demonstrate the academic interest in social determinants of health in the UK.

Since the Black Report, an enormous body of academic evidence has been gathered to demonstrate that socioeconomic factors link not only to mortality, but also to mental health and wellbeing outcomes in the UK and elsewhere (Marmot, Friel et al. 2008, Berkman, Kawachi et al. 2014). People with lower incomes, unfavourable labour market positions, lower levels of education, or from more disadvantaged neighbourhoods, tend to have lower mental wellbeing (World Health Organization 2014). Previous studies have similarly shown that older adults – people aged 50 years or more – with lower levels of education, or lower incomes or economic difficulties have a higher risk of low mental wellbeing (Ladin, Daniels et al. 2009).

Much of the social epidemiological research has focused on indicators derived from occupational class, education and income, while labelling these measures as "socioeconomic status" or position (Galobardes, Shaw et al. 2006). This literature is criticized for neglecting in-depth considerations of what the chosen indicators represent, and what the theoretical framework underlying these measures is. It is not often clear what the given social exposures are measuring and whether they are social exposures that could be modified (improving education) or only proxies of social hierarchies in a society. The critique is also related to the fact that the societal processes that produced the chosen measures are often left out of the analyses (e.g. (McCartney, Bartley et al. 2019)), leaving the impression that social determinents are personal risk factors rather

than a product of power structures in society, a limitation discussed above. This thesis aims to take these criticisms seriously by looking at household debt as an indicator of households' social and economic circumstances, arising ultimately in inequalities in debtor-creditor relationships, discussed above.

Chapter 2

2 Literature review: Household debt and mental wellbeing

This chapter reviews the current evidence on debt and mental wellbeing. The chapter reviews past studies on the topic, discusses potential explanations for the relationship, and finally considers the dynamics through which debt may influence mental wellbeing. What follows is not, however, a review of this literature conducted following systematic review principles. This is because several systematic reviews are available elsewhere (Fitch, Hamilton et al. 2011, Richardson, Elliott et al. 2013, Turunen and Hiilamo 2014, McCloud and Bann 2019). Nevertheless, the aim here is to provide a balanced picture without selective reporting of the studies. The studies cited in the following were identified from three sources: previous systematic reviews (Fitch, Hamilton et al. 2011, Richardson, Elliott et al. 2013, Turunen and Hiilamo 2014), subsequent studies citing these reviews, and individual ad hoc searches in scientific databases and search engines.

2.1 Household debt and mental wellbeing - existing evidence

The literature on debt and mental wellbeing has expanded significantly in recent years, in accordance with the rising use of debt. One of the first investigations into debt and mental wellbeing-related outcomes was reported by Hatcher (1994), who investigated people with a history of suicidal behaviour and their debt status. The study found that over a third of the people entering a psychiatric hospital in the UK due to attempted deliberate self-poisoning reported experiencing "problem debts" (Hatcher 1994). Subsequent studies converge in concluding that people with debts tend to have worse mental wellbeing outcomes than people without debts. However, the existing body of studies allows for several interpretations. These interpretations – explanations of the found associations – are discussed in detail in the next section.

Numerous mental wellbeing and health measures have been linked to debts. Blomgren et al found that their administrative over-indebtedness measure predicted a higher risk of work disability due to mental ill health diagnosis in Finland (Blomgren, Maunula et al. 2017). Another register study found that debts to enforcement agencies

were linked to 2.5-fold odds of suicide in the Swedish population (Rojas 2021). Meltzer et al found, in a representative English cross-sectional study, that people with debt, and with more than one debt account in particular, had a substantially higher risk of reporting suicide ideation (Meltzer, Bebbington et al. 2011). Sweet et al reported that, in the US, the ratio of high financial debt to available assets was linked to higher perceived stress (Sweet, Nandi et al. 2013). Studies link debts to crude measures of life satisfaction and happiness (Tay, Batz et al. 2017, Coste, Henchoz et al. 2020), to physical health outcomes, including mortality (Dobbie and Song 2015, Argys, Friedson et al. 2016) and pain (Warth, Puth et al. 2019, Frech, Houle et al. 2021), and psychosocial outcomes such as loneliness (Loibl, Drost et al. 2021).

However, these studies are highly heterogeneous in their debt measures and study designs. Cross-sectional studies, some of which consist of nationally representative samples, have found that people with debts tend to have lower mental wellbeing than those without, after adjusting for other socioeconomic variables (Jenkins, Bhugra et al. 2008, Jenkins, Fitch et al. 2009, Meltzer, Bebbington et al. 2010, Meltzer, Bebbington et al. 2011, Meltzer, Bebbington et al. 2013, Sweet, Kuzawa et al. 2018). Register-based studies, which overcome misreporting and non-response concerns, have also observed these associations (Blomgren, Maunula et al. 2016, Blomgren, Maunula et al. 2017, Rojas 2021). Longitudinal studies, in which the same people are interviewed multiple times over time, alleviating further concerns about unobserved confounding, have been able to replicate this association within individuals, albeit in a smaller magnitude (Berger, Collins et al. 2016).

The observed association between debt and mental wellbeing is not similar for all the debt measures. Studies have used a variety of different debt measures (including dichotomised debt measures), differentiated various types of debts and their amounts, calculated debt burden measures, produced longitudinal debt trajectory groups, and used measures of "over-indebtedness" or "problem debts". For example, exploiting a longitudinal sample from Germany, Keese and Schmitz used mortgage and consumer debt to income ratio as an indication of debt burden and found that both predict worse mental health scores. A longitudinal study conducted in Chile by Hojman et al (Hojman, Miranda et al. 2016) found that unsecured debt burden, measured as debt service burden relative to income, was linked to depressive symptoms, but secured debt, by contrast,

was not. The link between non-mortgage debts and mental wellbeing outcomes is thus consistent across studies (Brown, Taylor et al. 2005). In contrast, studies conflict about the link between mortgage debt and mental wellbeing outcomes (Hojman, Miranda et al. 2016). There is also some indication that the length of the debt may matter. Sun and Houle (2018) found, in the US, that the people who held constantly high amounts of debt had the highest number of depressive symptoms. However, there has been no systematic evaluation of the performance of different debt burden measures in predicting mental wellbeing outcome.

Studies investigating debt and mental wellbeing have been conducted in numerous country contexts, for example, in the UK (Gathergood 2012), Malaysia (Cai, Yusof et al. 2021), China (Gong, Zhang et al. 2014), Sweden (Rojas 2021) and the US (Berger, Collins et al. 2016). Within countries, evidence exists among general and specific population groups, for example, in children (Berger and Houle 2016, Berger and Houle 2019), military personnel (Bell, Nelson et al. 2014, Bryan and Bryan 2019), university students (Cooke, Barkham et al. 2004) and cancer survivors (Dean, Schmitz et al. 2018), all of which report some associations, but most of these are based on cross-sectional comparisons. Some studies have attempted to investigate whether the association is stronger among some subgroups than others. For example, Berger et al (Berger, Collins et al. 2016), analysing a longitudinal US sample, report that the association between short-term debt and depressive symptoms is driven by strong association by the age group 51-64, compared to younger study populations. Dunn and Mirzaie (2012)analyse gender differences is stress arising from debts and report that women report more stress from their debts than men, net of differences in debt amount. However, no consistent patterns emerge across studies regarding moderating factors.

Debt and mental wellbeing in older adults

The association between debt and mental wellbeing has been observed among older study populations. One of the earliest studies to look at older adults was by Drentea and Reynolds. The authors found, when analysing panel data on older adults (mean age 56) from Miami-Dade, USA, that the association between debtor status and mental health outcomes – depression, anxiety and anger – was independent of income, household assets, education or occupational status. In their analysis, the fear of never paying off

debt mediated the association between debt and mental health outcomes. (Drentea and Reynolds 2012)

Several studies have replicated this finding that debt status and mental health correlate in people aged 50 or more. The Health and Retirement Study, a representative and longitudinal study of people aged older than 50 in the US, is often used for such analyses. A panel study by Alley et al (2011) found that mortgage delinquency was linked to a significantly higher depression score (Alley, Lloyd et al. 2011). Lau and Leung reported that a higher household loan to value was associated with an increased risk of clinically significant depressive symptoms in a longitudinal setting (Lau and Leung 2011). Cross-sectional evidence on consumer debt is provided by Gillen et al (2017), who found that debt status had a link to a higher depression score (Gillen, Zurlo et al. 2017).

Although these investigations have broadened understanding regarding the link between debt and mental health among older adults, they focus on the very specific US context and mainly a single data source (that is, HRS). However, some studies on older populations from outside the US context exist, set in China (Song, Wang et al. 2020), Belgium, France and Germany (Hiilamo and Grundy 2018), Japan (Kaji, Mishima et al. 2010) and Korea (Han and Hong 2011), all of which report associations between their debt measures and mental wellbeing outcomes.

Several papers focusing on people aged 50 years of age have provided important nuances to this relationship. For older adults, the origin of their debts may be related to their offspring. Welsemann et al found that having child-related education debt among 50-year-old US respondents was linked to a lower number of depressive symptoms but higher amounts of this debt to higher depressive symptoms (Walsemann, Ailshire et al. 2019). This study was novel in showing that the debts incurred by younger study populations may indirectly affect their ageing parents. Another important, recent, contribution is by Wolfe et al , showing that the link between unsecured debt and psychiatric disorders is not explained by negative wealth shocks among a sample of people aged 50-59 in the US (Wolfe, Baker et al. 2021).

2.2 Why is household debt linked to mental wellbeing?

The consistent finding across studies is that, before and after considering for other socioeconomic and demographic variables, people with debt tend to have lower mental wellbeing. Several papers indicate that people aged 50 years and older are no exception (Drentea and Reynolds 2012). This association does not come as a surprise to people working with the issue. In the UK, a debt charity reported that the majority of its clients had been affected by mental health problems (Citizens advice 2014). A survey commissioned by another debt charity reported that debt problems are linked to significant sleep problems (StepChange Debt Charity 2014).

However, establishing the reasons behind this association is difficult. The reason for this is that the observational, and mainly cross-sectional, nature of the available studies implies that causal conclusions are difficult to draw. In the major bulk of studies, the order of the variables and potentially shared other causes of the two variables, that is, confounding variables, remains invisible to the investigators. The current evidence on the association between debt and mental health thus allows three obvious and believable interpretations, namely confounding, reverse causality and causality. To assess the credibility of the conclusions made in previous studies, it is important to interrogate these three explanations in detail.

A number of plausible, and often unmeasured, confounding factors can cause both lower mental wellbeing and indebtedness, and thereby introduce the observed association between the two. An often-speculated example of such a confounding factor is excessive risk-taking, a personality trait linked to an elevated risk of mental health problems and indebtedness (Gathergood 2012, Keese 2012). Another example is disruptive life events, such as accident, divorce or physical illness, that may lead to both indebtedness and poor mental wellbeing. While observational studies cannot rule out the role of confounding fully, some attempts have been made to understand their role. For this task, the investigators have used longitudinal study designs that focus on within-person variation in mental wellbeing outcomes over time. This study design, using each person as his/her own control, allows investigators to indirectly rule out all time-invariant characteristics that do not vary over time. Evidence from these types of analysis suggests that the cross-sectional association between debt and mental wellbeing

outcomes are often explained, to a large extent, by some other unobserved factors. These studies, nevertheless, report that time-constant confounding does not fully explain the observed association between debt and mental wellbeing outcomes (Gathergood 2012, Berger, Collins et al. 2016). However, studies with within-individual variation study designs have not been able to rule out *time*-varying factors that may cause both indebtedness and mental wellbeing problems.

The observed relationship may reflect reverse causality, a process through which those with worsening mental wellbeing take up more loans or leave debts unpaid. There are numerous examples of how an inverse relationship might arise: when people try to cover their mental health medical bills or treatment costs with loans; when depression influences their ability to cover debt payment (Leykin, Roberts et al. 2011); when people with mental health issues become unable to work due to their illness, and thus have debt problems; and when some mental health problems, such as bipolar disorders, induce impulsive behaviour (Richardson, Jansen et al. 2018, Richardson, Jansen et al. 2019). A large social epidemiological literature exists showing that mental health difficulties do predict various forms of subsequent economic difficulties, including unemployment, work disability, lower incomes, and school dropout (e.g. (Goodman, Joyce et al. 2011)). Few studies have examined the potential bi-directional relationship between debt and mental health variables. A longitudinal study by Ten Have (Ten Have, Tuithof et al. 2021) examined this bi-directional link between debt and common mental disorders. However, the study found more convincing evidence for the explanation that debt causes common mental disorders than the other way around.

The final explanation is that debt does indeed cause lower mental wellbeing. Several studies exist with the explicit aim of establishing whether measures of debt are causally linked to mental wellbeing (Gathergood 2012, Hojman, Miranda et al. 2013). Three types of study design have been used to assess the extent to which the association reflects a causal process in which debt causes mental health problem outcomes: confoundment control type studies, instrumental variable type approaches and quasi-experimental studies.

First, adjusting for other variables in regression models, confoundment control studies are often used to examine the role of confounding as an explanation for the observed relationship. Almost all studies on debt and health outcomes include some

variables in addition to debt in their regression models (Richardson, Elliott et al. 2013). This indicates, one could argue, that these investigators have the (at least implicit) aim of assessing the evidence for causal explanation. These investigations show that a number of sociodemographic and physical health variables do not fully explain the observed relationship. However, less studies exist with a longitudinal approach to such an analysis of debt and mental wellbeing (Richardson, Elliott et al. 2013).

The second type of approach used to assess the extent to which debt causes worse mental health is an instrumental variable approach. With the instrumental variable approach, researchers aim to uncover a causal link via a third variable which should affect mental wellbeing only via its link to debt (Baiocchi, Cheng et al. 2014). For example, Hojman et al (2013) exploit geographical differences in credit supply in Chile as an instrumental variable. The authors claim causal evidence that their over-indebtedness measure – a debt financial service ratio above a certain cut-off point – increases depression symptoms with a substantial effect size (Hojman, Miranda et al. 2013). While using different datasets and instruments, other authors using instrumental variable techniques have arrived at a similar conclusion that a causal link exists (Gathergood 2012, French and McKillop 2017). Lastly, experimental study designs can be used to assess the extent to which debt worsens mental wellbeing. While no randomised controlled trials exist, some quasi-experimental evidence is available. An example of such an analysis is provided by Ong et al., who found that an unanticipated debt relief programme significantly reduced the risk of anxiety in Singapore (Ong, Theseira et al. 2019).

Altogether, it is likely that all three explanations discussed above – confounding, reverse-causality and causality – clarify some degree of observed, often cross-sectional, association between debt and mental wellbeing outcomes.

2.3 How can household debt influence mental wellbeing?

It is reasonable to assume that at least a small causal link exists between debt and mental wellbeing. But what type of debt, and how can it affect mental wellbeing? In empirical research, the pathways through which debt links to mental wellbeing outcomes are difficult to tell apart. The ways in which debts affect people are likely to

be complex, context dependent and interactive with other factors. The contribution of different mechanisms often remains speculative, but a small number of studies examine the specific potential mechanisms (Gathergood 2012, Drentea and Reynolds 2015). The mechanisms are discussed here by dividing them into four greatly overlapping sets: stress related to debts, social elements of debts, behavioural responses and lack of resources.

Stress related to debts

Stress-related processes are the most frequently cited pathway through which debt may influence mental wellbeing. Stress is traditionally defined broadly as "a response of the organism to conditions that, either consciously or unconsciously, are experienced as noxious" (Pearlin, Menaghan et al. 1981). However, some disagreement exists about the specificity and usefulness of this concept (Kagan 2016). In a number of studies, debts are conceptualised through the lens of the stress process theory put forward by Pearlin et al (1981). This theory built on three conceptual building blocks: the source of stress (stressful life events and chronic strain, and their interaction), mediating factors (for example, coping and social support) and manifestations of stress (for example, depressive symptoms outcomes) (Pearlin 1989). Debts and debt problems are often fitted into this framework as a source of daily chronic strain that affects one's perceived control over one's life (mastery) and perceived self-worth (self-esteem). The link from stress to health outcomes as manifestations of stress is reviewed in detail elsewhere (O'Connor, Thayer et al. 2021).

The stress related to debts may vary by the debt type, amount and purpose. For example, Dwyer et al have suggested that, in young adults, access to credit card and education debt may serve as psychological resource to increase mastery and self-esteem (Dwyer, McCloud et al. 2011). The reason for this is that debt may be perceived as a form of investment for the future. In some circumstances, debts, as means of current consumption, may also help to bridge economic difficulties. Taking on debt may alleviate the stress of events that affect one's finances, described, for example, in a qualitative investigation by Ibrahim et al 2021 (Ibrahim, McHugh et al. 2021).

However, these positive effects may be overshadowed by longer term negative effects once the debts are to be paid (Dwyer, McCloud et al. 2011). Regular

repayments, repayment difficulties, repayment reminders and potential debt collection actions cause feelings of not being in control of one's life (Drentea 2000, Drentea and Lavrakas 2000), introducing a stress response.

Debts, when perceived to be problematic, influence one's self-esteem. Fear of being unable to fulfil one's obligation may influence self-worth (Sweet 2018). Debts are often held over a long period of time, meaning that these emotions may persist for a long period and thus manifest in a form of depression, for example. A social element of debts worth noting here is the role of the creditor. The creditor may instigate payment reminders, threats of court action and finally debt collection action, which may be extremely stressful and traumatic events. The mental health effects of debt collection actions, or the role of debt collectors in triggering mental health responses to debt problems, are an understudied area.

Social elements of debt

Stigma is an important social element of unpaid debts. Stigma, defined as "the situation of the individual who is disqualified from full social acceptance'' ((Goffman 1963): preface), is a commonly cited concept in studies on debt, particularly debt problems, and mental wellbeing outcomes. Stigma is known to be an important factor in poorer mental wellbeing (Mak, Poon et al. 2007) and a suggested pathway from debt problems to depression (Gathergood 2012).

Why do societies stigmatise people with unpaid debt? While not originally suggested in the context of debt, Phelan et al propose three functions of stigma (Phelan, Link et al. 2008): "(1) exploitation/domination, (2) enforcement of social norms and (3) avoidance of disease". This framework is useful for analysing stigma related to indebtedness. First, debt is inherently linked to the social hierarchies in a society; put bluntly, poor debts are targeted at poor people and discriminated groups. Stigmatizing people with unpaid debts thus serves the purpose of dominance, and of enforcing prominent social hierarchies, in those societies (Sparkes 2020). Second, the stigma of debt functions to implement repayment norms. From this perspective, stigmatizing people who are not able to fulfil their commitment functions as a discouragement from leaving debt unpaid. Third, the stigma of unpaid debt is a form of "disease avoidance". People with unmanageable debts are avoided and excluded in many ways. The most

concrete examples are debt payment entry records that prevent debtors from gaining access to subscription-based services, including, but not limited to, internet subscription or apartment rental. Furthermore, qualitative investigations, discussed below, report how people with unmanageable debts fear being socially excluded. People with debt problems may be avoided by their friends and family members who may be afraid that they will be asked to donate or lend money to help out with debt problems. In the later life context, this may lead to loneliness (Loibl, Drost et al. 2021).

Behavioural responses

A potential pathway through which debt may link to mental wellbeing is behavioural responses to stress. Some of the behavioural coping mechanisms for stress arising from debts may influence mental wellbeing. Several authors have reported that debts link to eating disorders, and alcohol or drug dependencies (Drentea and Lavrakas 2000, Grafova 2007, Nelson, Lust et al. 2008, Keese and Schmitz 2014). These disorders may then influence mental wellbeing. However, it is likely that reverse causality may, at least partly, explain these observed associations. Moreover, debt has been linked to insufficient amounts of sleep and sleep problems (StepChange Debt Charity 2014, Warth, Puth et al. 2019) , which are causal factors in mental health problems.

Resource constraints caused by debt

Finally, debts limit the availability of economic, social and time resources. Debts incur economic costs to households. These costs may be associated with high interest rates, fees for unpaid debts, low credit scores and debt-collection actions, such as wage distrainment, evictions or home repossession. The economic resources devoted to managing debt may be taken from necessary spending on other purchases and services.

Moreover, debt difficulties can be an indirect source of fewer economic opportunities. Poor credit ratings may prevent people from purchasing telephone/internet subscriptions, securing a job or acquiring a rented apartment. All these factors, in turn, can cause economic hardship and lower mental wellbeing. For example, Sweet finds, in a US-based sample, that skipping consumer purchases and necessities due to debts was linked to elevated levels of depressive symptoms (Sweet 2020).

Debt also consumes non-economic resources, which Mahony and Pople call various forms of "debt premium" (Mahony and Pople 2018)[2]. The authors describe how sorting out debts and their payment incurs significant time. Time spent on worrying and sorting out debts means less time spent on other activities such as social interactions.

Qualitative evidence on the mechanisms through which debt links to mental wellbeing

While these discussed channels are much overlapping and interconnected, they provide a useful model to assess the plausibility of a potential causal link. Here, several qualitative investigations have provided support for each of these pathways.

Thompson (2015) analysed the experiences of people with debt problems in Manchester. In this qualitative study, the author reported that the study participants "attributed their psychological difficulties to debt over and above other problems" and described how the participants were "plagued by negative thoughts and worries, sometimes to the extent of being unable to sleep or to concentrate on daily tasks, and of feeling constantly 'on edge'". Debt problems were perceived as constant stressors and caused fear of being "disconnected", echoing the social nature of unpaid debts. Thompson described how embarrassment was common among people with debt problems, and debt problems changed the narrative of being a (credit) worthy person. (Thompson 2015) Thompson's findings support the stress responses to debt problems and the experienced stigma of unpaid debt. Nevertheless, it is worth iterating that the analysis focused on people with serious debt problems, which is a small fraction of people with debts.

Insightful qualitative investigations also include a study by Purdam and Prattley on older women's debt problems in the UK (Purdam and Prattley 2020). The authors' interviews during debt support meetings revealed that, similarly to the work by Thomson, secrecy and shame were linked to debt problems. Shame led to avoidance of dealing with debt problems. In the interviews, the authors report, a recurrent theme was a fear of debt collection actions, including, for example, eviction. In this study, interviewees reported that debt problems were linked to their health and relationship quality.

[2] pages 98-102

An important qualitative investigation from the US context is provided by Sweet et al (2018). They report that the narratives of people with debt problems often include feelings of shame and personal responsibility for their debt problems. However, the authors point out, these feelings were shaped by "neoliberal ideology", societal norms through which the health effects of debts operate. This is an important finding in that the stress arising from debt is not self-evident but is instead shaped by social norms, as discussed above.

In sum, recurrent themes arising from these qualitative investigations are shame and stress related to debt problems. These investigations support the causal hypothesis, although the papers also highlight the reoccurrence of other stressful life situations, such as divorce, with debt and mental health problems.

2.4 Summary of previous evidence

As shown above, debt and poor mental wellbeing co-occur, but there are important nuances in this relationship. The link between debt and mental wellbeing is likely due to three reasons: some other factors cause both debt and poor mental wellbeing, decline in mental wellbeing leads to indebtedness, and debt causes poor mental wellbeing. The mechanisms for the latter explanation include stress, social stigma and lack of resources. While the role of these mechanisms is difficult to tell apart, several qualitative explanations support their role.

Chapter 3

3 This thesis

This thesis interrogates the relationship between debt and mental wellbeing in older adults. The empirical part of the thesis consists of three papers. All three papers investigate the link between debt and mental wellbeing measures among older adults. However, each of them provides an independent and non-overlapping contribution to the literature. In broad terms, the key contribution of the first paper is on measurement, the second on individual level moderation and the distinction between population and counterfactual inference, and the third on cross-country differences. The three papers are self-standing. This implies that some repetition is unavoidable in terms of the description of the literature, data sources and variables used. The research questions, data sources, variables, methods and contributions of the papers are summarised in Table 3.1. These are discussed next.

1.1 Research questions and contribution

This thesis begins with an analysis of the English context and different debt burden measures. The first paper, titled "Debt matters? Mental wellbeing of older adults with household debt in England", addresses three main research questions:

1. To what extent do different debt burden measures and debt types predict two mental wellbeing outcomes – depressive symptoms and quality of life?
2. To what extent do changes in debt measures over time predict changes in mental wellbeing outcomes?
3. Does getting rid of debt and acquiring new debts during the study period have a symmetric link to changes in mental wellbeing measures?

Furthermore, in supplementary analyses, the paper investigates whether the relationship between debt and mental wellbeing is also evident in a subsample of people reporting to be single or partnered, and whether the relationship differs among people above vs. below state pension age.

These questions are important for a more nuanced understanding of the debt-mental wellbeing link. No previous studies have investigated different debt burden measures and mental wellbeing measures among older adults in the English context. The contribution of the paper is in providing considerations of the most applicable measurements of debt burden among older adults. Furthermore, a key novelty of the paper is the focus on two complementary mental wellbeing measures simultaneously. Previous studies have focused exclusively on affective (e.g. depressive symptoms) or evaluative (subjectively assessed life satisfaction) wellbeing measures, with little focus on comprehensive and eudemonic mental wellbeing measures. This is a serious limitation because focusing on specific aspects of mental wellbeing may hide a more nuanced relationship between debt and mental wellbeing. Finally, while some longitudinal studies on the topic exist, no previous studies have investigated potentially asymmetric effects of getting rid of and acquiring new debts on mental wellbeing. Investigating asymmetry in change estimates indicates whether a standard within-individual focus hides some important patterns in the association.

The second paper builds on the findings of the first paper. The paper, titled "Heterogeneity in the debt and mental wellbeing link among older adults – combining population inference and target trial frameworks" focuses on non-mortgage debt. This is because, as the evidence of the first paper indicated, the link between mortgage debt and mental wellbeing is less clear. The paper makes a clear distinction between population inference and intervention-type inference. From the former perspective, the paper questions the extent to which the association between debt and mental wellbeing differs by labour market status in the older adult in England. From the latter perspective, the paper seeks to investigate, by contrast, the effect of a target trial of debt on mental wellbeing and how this effect differs by labour market status in the older adult population in England.

The second paper contributes to the literature both in terms of conceptual approach and knowledge about the relationship between debt and mental wellbeing. In the research on social determinants of mental wellbeing, the conceptual differences between population description and intervention-focused aims are, it is argued, often confused (Kaufman 2019). In contrast, this paper embraces the difference between the two and discusses their differential policy implications. From the intervention

perspective, it makes the aimed causal estimate clear by building a non-randomised pseudo-trial. It helps to conceptually illustrate the parameters of interest, often unclear in previous work, for the reader. A contribution of the paper in terms of substance knowledge is the interest in differential associations of debt and mental wellbeing by employment status. There is little discussion about potential differential association by employment status. This is a serious limitation because neglecting potential heterogeneity of an association and effect may lead to ineffective policy implications. Again, two mental wellbeing outcomes – depressive symptoms and quality of life score – are used in this paper to provide a comprehensive picture of the relationship.

The third and final paper then takes a cross-country perspective on household non-mortgage debt and mental depression. The paper introduces three hypotheses of contextual moderations, merges three datasets and investigates the relationship between debt and depression in 21 European countries and the US. The research questions of the third paper are: to what extent is the association between debt and depression consistent across time and place, and which types of countries are better at mitigating the depression linked to debts? In particular, the paper investigates whether country-level variables measuring social norms, economic environment or sociolegal environment matter for the extent to which non-mortgage debts link to depression.

The third paper contributes to the literature on two fronts. First, this is the first study to investigate the consistency of the association between debt and depression across time and space. When associations are observed consistently across space and time, the associations are less likely to be due to chance alone. This is the first study to provide evidence on debt and depression among older adults in a number of the countries not previously investigated. The second contribution of this cross-country research is to shed light on potential contextual level moderation of the association. Considering the social dimensions of debt discussed above, it is reasonable to suspect that contextual factors matter in the extent to which debt links to depression. This is the first study to investigate social norm, institutional and economic decline hypotheses in the association between debt and depression. It thus contributes to the literature by suggesting subsequent studies with a stronger causal study design in which contextual factors may mitigate the depression burden linked to debts.

1.2 Data sources

The main data source for the thesis is the English Longitudinal Study of Ageing (ELSA). In addition, the third paper uses data from the Health and Retirement Study (HRS) and the Survey of Health, Ageing and Retirement in Europe (SHARE). These data sources are described in the papers. The data acknowledgements are provided in a later section. Thus, a brief introduction follows.

ELSA is an observational cohort study of people aged 50 years or more living in England (Banks, Blake et al. 2019). The study commenced in 2002-03 as a companion study to the Health and Retirement Study in the US. ELSA was introduced in the context of a wider interest in the health, economics and policies of ageing populations. The study provides a wide range of multidisciplinary data on health, economics and social factors. ELSA is a longitudinal study, that is, the same participants are reinterviewed every two years. Because of the ageing of the original cohort, refreshment samples were added regularly to maintain the representativeness of the study. The original sample was drawn from the respondents of the Health Survey of England (HSE). HSE is yearly cross-sectional survey of the general population in England conducted to monitor their health.

ELSA is an innovative and unique study on many fronts. The study is ex-ante harmonised with HRS, it contains a range of multidisciplinary data, it is a long and consistent longitudinal study allowing investigation of within-individual variation, and it is openly available to the research community to allow further exploration and replication of key findings. Nevertheless, ELSA shares the limitations of the self-reported surveys, including a low number of minority groups, attrition and non-responses. ELSA was chosen as a main data source for this thesis because of its target population (English population aged 50 years and over), wide range of needed variables (debt, mental wellbeing and sociodemographic variables), longitudinal nature (allowing investigation of within-individual changes), availability (being accessible to researchers) and harmonisation with similar datasets, particularly HRS and the Survey of Health, Ageing and Retirement in Europe (SHARE).

The third paper of this thesis uses data from ELSA, HRS and SHARE. In short, HRS and SHARE are companion studies of ELSA with fairly similar collected data,

target population and strengths. HRS is longitudinal observational study of the US population aged over 50 years (Sonnega, Faul et al. 2014). SHARE is cross-national longitudinal observational study of people aged 50 years in 28 European countries and Israel (however, data on only 20 countries in Europe in SHARE was used in the paper) (Börsch-Supan, Brandt et al. 2013). In SHARE, the ways in which the sample was drawn differs by country because the most suitable sampling frames were selected in each country. These three datasets were chosen to allow reliable comparison with ELSA given the ex-ante harmonisation. All these studies have been approved by numerous ethical boards and consent was obtained from each participant, described in their cohort profiles (Steptoe, Breeze et al. 2012, Börsch-Supan, Brandt et al. 2013, Sonnega, Faul et al. 2014).

The thesis uses variables derived directly from these surveys. For debt, it uses derived variables measuring household-level debt. Mental wellbeing variables are previously used and validated scales, namely CASP-19 scale, CES-D depression scale and EURO-D depression scale. The variables used are described in detail in the papers. In addition, in the third paper, data on several contextual variables were derived from openly available sources.

1.3 Methods

Several considerations on the methodological approach selected in this thesis follow. The thesis takes a quantitative perspective. Qualitative data was not collected for this thesis. However, such research is crucial to provide a more comprehensive understanding of the dynamics of debt and mental wellbeing not revealed in quantitative investigations alone. Thus, studies using qualitative research methods were reviewed, cited and used to formulate the research questions and discuss the findings. Nevertheless, qualitative data was not appropriate for addressing the research questions at hand and were thus outside the scope of this thesis.

The thesis conducts secondary analysis using observational data. The thesis relies on collected, well documented, and widely used data sources, as explained above. Collecting primary data was deemed unfeasible due to resource and time constraints.

Longitudinal data collection is resource and expertise intensive. Collecting primary data was unfeasible because of the substantial time span needed for longitudinal data.

The thesis analyses the observational data with both descriptive and regression modelling methods. The rationale for descriptive methods, such as means and weighted means and differences, is to describe the sample and the population. These methods are important for questions regarding the scale of the issue (level of debt and mental wellbeing, in this thesis), and differences in the variables of interest in the population groups. Descriptive questions have critical policy and research implications, discussed in the conclusion chapter of this thesis. The first paper describes sample means and differences in mental wellbeing by debt measures. In this paper, no weights are used, making the inference to sample, rather than the population. The second paper uses weights, and provides inference to a well-defined population, that is, people aged 50 years and older in England. The third paper describes the level of depression and debt and their association by countries while using weights to make the sample more representative of the target population.

Regression modelling is used to investigate the relationship between debt and mental wellbeing measures while adjusting for other factors. The first paper uses linear regression models with varying techniques to assess the role of other characteristics. The second paper uses an inverse probability of treatment weighting approach and aims to mimic a target trial. In the third paper, analysis is carried out using logistic regression models.

Some considerations regarding the approach to causality are in place. The causal questions are queries of "what if" scenarios, for example, what the people's level of mental wellbeing would have been had they not had debt, and vice versa. The observational nature of the data used in this thesis implies that the lives of the people involved were not manipulated in any deliberate means for research purposes. This limits the credibility of any strong causal claims, that is "what if" typeclaims, from the data. For a study of debt and mental wellbeing, removing the exposure, that is, debt, for example, via a massive debt forgiveness programme, would be ideal for a causal study design. However, while debt eradication programmes are being undertaken elsewhere (Kluender, Mahoney et al. 2020), the economic resources needed for such a programme were not available. Another factor limiting the ability of this thesis to make causal

claims is the fact that, to the best of my knowledge, no “natural” experiments regarding the role of debt occurred during the period the main data sources were collected. Therefore, the study does not contain any manipulation of the lives investigated. The analyses of this thesis rely only on “natural” variation in both debt, mental wellbeing and other variables.

The approach taken in this thesis is that causal knowledge builds on a body of studies, rather than a single analysis. A single study using observational data is rarely sufficient to claim causal evidence. In this thesis, the analytical models are based on subject-matter knowledge of the relationship between variables. Confounding-control techniques are used to block the role of observed confounding factors and move the interpretation towards causal inference. However, all analyses presented here rely on assumptions about the role of unmeasured (time-varying) confounding. This is to say that there should no variables that vary over time, that cause both debt and mental wellbeing and that simultaneously are not measured. This is often an unrealistic assumption.

It is sometimes claimed that observational data with a confounding control approach via regression, for example, does not provide sufficient evidence for a causal conclusion. However, this thesis follows previous advocacies that this claim is too strong (VanderWeele 2021), but caution is still needed in the interpretation of the findings. Observational evidence is often needed when assessing suitable candidates for more solid causal study designs.

Table 3.1 Summary of the empirical chapters

Title	Research questions	Data	Outcome measures	Key predictors	Method	Contribution
Debt matters? Mental wellbeing of older adults with household debt in England	To what extent do household mortgage and non-mortgage debt measures predict mental wellbeing – depression symptoms and quality of life?	ELSA	Depressive symptoms (CESD-8 score continuous) and quality of life (CASP-19 score)	Household mortgage and non-mortgage debt; dichotomous and quartiles based on debt amount measures.	Linear regression models with and without person fixed effects Asymmetric fixed effect model	Role of different debt measures. Subgroup analysis. Within-individual analysis. Novel context
Heterogeneity in the debt and mental wellbeing link among older adults – combining population inference and target trial frameworks	To what extent does the association between debt and mental wellbeing differ by labour market status in the older adult population in England? To what extent does the effect of getting rid of debt on mental wellbeing differ by labour market status in the older adult population in England?	ELSA	Depressive symptoms (CESD-8 score continuous) and quality of life (CASP-19 score)	Household non-mortgage debt (yes vs. no)	Survey estimation and propensity score weighting techniques.	Improves understanding of individual contexts of debts. Clear distinction between descriptive and causal questions
Household non-mortgage debt and depression in older adults in 22 countries – what is the role of social norms, institutions and macroeconomic conditions?	To what extent is the debt-depression association generalisable across heterogeneous European countries? Does the association vary in any meaningful fashion	ELSA, HRS and SHARE.	Binary version of depressive symptoms (CESD-8 and EURO-D scores with cut-off points)	Household non-mortgage debt (yes vs. no)	- Logistic regression models. - Fixed effect logistic regression models.	Testing whether the associations are reproduced in new contexts Investigation of potential country level variables.

	between and within countries over time?				- Regression models.	

Chapter 4

4 Debt matters? Mental wellbeing of older adults with household debt in England*

*****a version of this article is published as Hiilamo, Aapo. "Debt matters? Mental wellbeing of older adults with household debt in England". SSM - Population Health 12 (2020): 100658.

Abstract

Background: A record number of older individuals have household debt, but little is known about possible links between debt and their mental wellbeing. This study examines the extent to which different aspects of household indebtedness predict mental wellbeing among this population.

Methods: A sample of 17,091 individuals (72,700 observations) aged 50 and over in England was derived from waves 1-8 of the English Longitudinal Study of Ageing. Mental wellbeing was assessed using two outcome measures: number of depressive symptoms (CES-D 8) and quality of life (CASP-19 score). The predictors of mental wellbeing were examined using fourths of non-zero overall debt amount, debt-to-income and debt-to-non-housing wealth ratios as alternative measures of debt burden. Linear regression models estimated the associations between mortgage and non-mortgage debt measures and mental wellbeing while adjusting for observable socioeconomic confounding factors. Individual fixed effect models were used to control for all time-constant factors among a longitudinal subsample.

Results: Individuals in the highest debt-to-wealth fourth were particularly at risk of lower mental wellbeing, that is, a higher number of depressive symptoms and lower quality of life. After covariate adjustment, non-mortgage debt predicted lower mental wellbeing on both measures, but mortgage debt was only linked to lower quality of life. Among the subsample who experienced *changes* in high non-mortgage debt levels, a small association between these changes and mental wellbeing outcomes were observed. Asymmetric within-individual estimation showed that both getting rid of and acquiring new debts during the study period predicted symmetrically (small) increases and decreases, respectively, in mental wellbeing.

Conclusion: These findings indicate that, among older individuals in England, non-mortgage debt status is linked to poor mental wellbeing. High, non-mortgage, debt-to-wealth ratios may help identify risk of mental wellbeing issues in older people with debts.

4.1 Introduction

In the past 20 years, the United Kingdom (UK), like many high-income countries during the same period, has witnessed a substantial rise in levels of household indebtedness. Household debt as a proportion of income almost doubled in the UK between 1980 and 2008, when debt levels reached their most recent peak (Harari 2018). Three important drivers of this increase include economic growth, increasing demand for credit as a coping mechanism to compensate for stagnated incomes, and widening availability of various debt products for all socioeconomic groups, which sociologists call "democratization of debt availability" (Barba and Pivetti 2008, Dwyer 2017, Rona-Tas and Guseva 2018). It is estimated that about one third of UK adults had some residential mortgage and half had some form of financial credit/loan in 2017 (Financial Conduct Authority 2017, Harari 2018). This phenomenon is not restricted to younger people; according to the Wealth and Assets Survey conducted between 2016-2018, a record four million adults over 54 years of age have financial debt in the UK (Office for National Statistics 2019).

In the current policy discourse, household indebtedness tends to be treated mainly as an indicator of macroeconomic vulnerability, but other risks associated with household debt burden at the individual level, such as its effects on mental wellbeing, are much less frequently discussed. Research focusing on young and middle-aged populations indicates that indebtedness may jeopardise the mental wellbeing of people in repayment difficulties or in "problem debt", that is, a state in which households are facing substantial financial difficulties due to their debts (Harari 2018, Office for National Statistics 2019). Unsecured debts and debt problems have a robust link to a higher risk of various adverse mental health outcomes including depression, suicidal ideations, sleep problems and other common mental disorders (Fitch, Hamilton et al. 2011, Richardson, Elliott et al. 2013, Turunen and Hiilamo 2014). There is convincing preliminary evidence that unsecured debts and debt problems may have causal effects on mental disorders among the young and middle-aged (Gathergood 2012, Hojman, Miranda et al. 2013, Lee 2019, Ong, Theseira et al. 2019).

However, very little is known about indebtedness and mental health among those aged 50 and over in England. Like their younger peers, older people may be

economically and emotionally susceptible to the negative consequences of indebtedness. Pensioners, in particular, may have limited opportunities to increase their income to pay off debts, and great feelings of shame and failure for not being able to fulfil their obligations (Purdam and Prattley 2020). Drawing on the English Longitudinal Study of Ageing, this paper aims to fill this research gap. It investigates the extent to which different aspects of indebtedness predict low mental wellbeing – depressive symptoms and low quality of life – among older individuals in England.

The English context is interesting for a study on household debt in later life. The UK's welfare state has been described as "liberal" with a limited public welfare provision and asset-based welfare (Lowe, Searle et al. 2012), and the UK has implemented austerity measures relating to various aspects of its welfare provision since 2010 (although pensioners have remained less touched by these measures), pushing lower income households into more unsecured lending to cover their basic living expenses (Dagdeviren, Balasuriya et al. 2019). The limited public welfare provision is somewhat "compensated" for by easy access to credit and, for those heavily in debt, comparatively advanced debt discharge legislation, which, some legal scholars argue, is more debtor-friendly than in many European countries (Hoffmann 2012). The number of people going through personal insolvency is, nevertheless, low, (The Insolvency Service 2019) but these institutional structures may reflect a more understanding attitudinal environment for those in debt than in other countries with less debtor-friendly legal systems.

This study makes three contributions. First, it provides evidence regarding the mental wellbeing of older individuals with household debt in England, which is an under-researched, and ever-larger, population segment. Second, this study investigates the extent to which the association between debt and mental health depends on the debt measures chosen, and suggests which measures may be the most appropriate when identifying indebted older adults with mental wellbeing issues. Third, unlike previous investigations in this field, this study exploits the longitudinal dimension of the data by investigating whether getting rid of and acquiring new debts during the study period has asymmetric effects on mental wellbeing.

The paper focuses on adults aged 50 years and older. This cut-off point is somewhat arbitrary but was selected to allow a heterogenous and representative study

population in terms of the labour market, family and health status of the people investigated. Furthermore, the cut-off point of 50+ is driven by data availability, that is, the sampling choices of the data used. However, the potential differential association by age group is explored in this paper. In additional analysis, the statistical models are replicated for samples of people above and below the state pension age.

Debt in later life and its measurements

Before reviewing the evidence on links between debt and mental wellbeing, it is necessary to consider some financial and social dimensions of debts in the later life context. Debt can be conceptualised through an economic lens in which the purpose of debt is to balance consumption over time, which, under certain assumptions, should have a positive effect on one's "welfare" (Zinman 2015). It is a *financial device* to be used when one's current savings or incomes are insufficient for desirable purchases or for urgent payments. However, debts may sometimes act also as financial arrangements of despair or survival, rather than desire. People may be forced to take on loans, for example, to cover their essential needs, such as rent, council tax, water, electricity, gas and health care, to compensate for income loss due to welfare sanctions or to help family members with their expenses (Sweet 2018, Dagdeviren, Balasuriya et al. 2019).

Debts also function in these ways for older people, who may use them to maintain their current level of consumption or cover unexpected payments without selling physical assets, when facing decreasing incomes due to, for example, retirement transition or disability. However, debts also have distinct features in later life. The traditional life-cycle model of saving posits that individuals take larger loans during key life-stages in which they have lower consumption power and higher consumption needs but are expected to have a stable repayment ability in the future (Modigliani 1966). Larger debts in later life are in contradiction to this framework, in which later life is a phase of dis-saving and reliance on accumulated wealth from earlier in life. Having a substantial debt burden in later life might be problematic, and a signal of economic difficulties in earlier life-phases, given that incomes are no longer increasing and may be expected to decrease in the future.

An alternative, sociological, conceptualisation considers debt an imbalanced and distinct *social arrangement* between a creditor and a debtor (Hodson, Dwyer et al.

2014, Dwyer 2017, Sweet, DuBois et al. 2018), characterised by a future repayment obligation, and failure to discharge this obligation can cause increased stigma, stress and debt collection actions. Having debts implies that a household always has a creditor and some prospective restrictions to future cash flows. Stress may arise from these restrictions – from the feeling of obligation in this social arrangement or due to debt payment difficulties and (fear of) debt collection actions. Qualitative studies from the UK and elsewhere have reported substantial feelings of stigma, failure and hopelessness among individuals with debt problems (Goode 2012, Sweet 2018, Sweet, DuBois et al. 2018, Purdam and Prattley 2020). The attitudes towards those with debt problems may not be understanding. Unmanageable debt burdens may also harm social relations, including partnership stability (Dew and Yorgason 2010, Dew 2011). For older adults, it can be speculated, being in debt may cause additional feelings of shame due to their failure in not being able to fulfil their obligations in the later parts of their life and an increased risk of conflict within families or with potential guarantors.

The distinct financial and social dimensions of debt make it a "double-edged sword" (Hodson, Dwyer et al. 2014). Debts may provide financial resources for desirable purchases or urgent payments when needed, on the one hand, but they may also cause potential social stress, stigma, shame, despair and economic difficulties, on the other (Hodson, Dwyer et al. 2014). This contradictory nature of debt makes it hard to measure and analyse in quantitative research because it is not evident how and when to make the distinction between useful/manageable and stressful/unmanageable debt. There is a risk of diabolising all debts without considering the underlying heterogeneity, and coming to misleading conclusions and implications.

When studying the mental health implications of indebtedness, the key challenge is therefore to detect when debt is a potential source of stress and burden. There is no agreement on the most suitable measures of indebtedness for this purpose (Betti, Dourmashkin et al. 2007), and previous studies have used varying measures (Turunen and Hiilamo 2014). Unlike other socioeconomic markers such as income, amount of household debt does not provide a clear hierarchy. In fact, a simple debt amount measure can, for different households, capture opposite dimensions – either *repayment ability* or *repayment inability*. For example, the absolute value of household mortgage debt typically correlates positively with assets and income, meaning that more affluent

households have higher average absolute amounts of mortgage debt (Dwyer 2017). This is because creditors offering secured loans, mainly mortgages, with fair conditions require stable baseline *repayment ability* from borrowers. An approach often used to measure repayment ability is debt measures calculated from debt-to-income ratios. The idea of these measures is that having high monetary amounts of debt may not be a burden when one's income is sufficient to cover their repayments without financial strain.

Measurement of debt burden becomes particularly challenging among older individuals and pensioners. As discussed in the social epidemiological literature on measurement of socioeconomic status (SES) in later life (Grundy and Holt 2001), the SES measures often used for young and middle-aged populations may not be well suited to older populations, which may also be the case for debt burden. In particular, the extent to which debt-to-income measures are able to capture the mental burden of debts in later life is not evident. The reason for this is that older people may have low incomes but high non-housing assets, which may be used to maintain consumption after working life and, if needed, to repay debts. An alternative way of measuring debt burden, although less often used, is debt-to-(non-housing) wealth ratio measures. These, one can argue, may be more appropriate in the later life context because, for older individuals with low incomes, having high levels of non-physical assets may alleviate the potential financial strain and stress related to debt repayments. This study furnishes early evidence relating to these questions by investigating the association between debt and mental health while testing this association separately with debt amount, debt-to-income and debt-to-wealth-based measures of indebtedness levels.

Previous evidence on debt, mental health and wellbeing

A number of cross-sectional and longitudinal studies have found that having debts, debt problems, having a number of different debt accounts, or the amount of debt are, independent of other socioeconomic variables, linked to various adverse mental health outcomes. These outcomes include, for example, perceived stress, overall depression, sleep problems, suicidal behaviour and disability retirement due to mental illness (Meltzer, Bebbington et al. 2013, Richardson, Elliott et al. 2013, Turunen and Hiilamo 2014, Hojman, Miranda et al. 2016, Blomgren, Maunula et al. 2017, Warth, Puth et al.

2019). The link between unsecured debt or self-assessed debt burden and mental health outcomes is also robust in longitudinal studies focusing on within-individual variation over time, although the association is somewhat attenuated compared to cross-sectional studies (Gathergood 2012, Keese and Schmitz 2014, Berger, Collins et al. 2016). In contrast, the association with long-term secured debt (mainly mortgage and student loans) is less evident (Berger, Collins et al. 2016, Dunn and Mirzaie 2016, Hojman, Miranda et al. 2016, McCloud and Bann 2019).

Although these observational, mostly cross-sectional, associations between debt and mental wellbeing may be partly due to confounding or reverse causality, there is evidence to indicate that debt problems cause, to some degree, worsening mental health (Gathergood 2012, Hojman, Miranda et al. 2013, Leung and Lau 2017, Lee 2019, Ong, Theseira et al. 2019). For example, Gathergood (2012), exploiting exogenous variation in local housing prices, aimed to estimate the causal effects of self-assessed debt problems on mental health (Gathergood 2012). This study also adds some indication of the key mechanism through which debt may lead to worsening mental health; the effects were lower in areas with higher bankruptcy and repossession rates, which suggests that social norms and the debt stigma could play an important role. Other authors have speculated that the mechanism linking debt to poor mental health involves shame and stress due to repayment and a sense of hopelessness (Meltzer, Bebbington et al. 2011, Drentea and Reynolds 2015, Frankham, Richardson et al. 2019).

However, this existing literature has three important limitations that this study aims to address. First, little is known about indebtedness and mental health among older adults in England. While studies focusing on the later life context have found a relationship between debt and adverse mental health outcomes, they are set in other countries and in distinct socioeconomic contexts (Kaji, Mishima et al. 2010, Drentea and Reynolds 2012, Zurlo, Yoon et al. 2014, Gillen, Zurlo et al. 2017, Hiilamo and Grundy 2018). For example, Drentea and Reynolds, analysing a longitudinal sample from the US, report that dichotomous debt status (having vs. not having debt) predicts a higher number of symptoms of depression, anxiety and anger after controlling for prior mental health and other socioeconomic variables (Drentea and Reynolds 2012).

Second, there has been no systematic investigation of different measures of debt burden as a predictor of mental wellbeing. The social epidemiological research has used

highly varying subjective and objective debt (burden) measures. The debt measures used have ranged from severe over-indebtedness (e.g. debt payment default entry records) to dichotomous debt status or self-assessed debt burden (Turunen and Hiilamo 2014) with only a few studies testing the robustness of their findings with alternative debt measures (Berger, Collins et al. 2016). However, given the contradictory nature of indebtedness, and its complex relation with the other socioeconomic factors discussed above, different debt measures may yield varying conclusions.

Third, an important unexplored issue is the potentially asymmetric effects of getting rid of and acquiring new debts on mental wellbeing. For example, the life satisfaction literature has suggested that falls in income make more difference to subjective wellbeing than increases in income (e.g. (D'Ambrosio, Jäntti et al. 2019)). One might suspect that getting rid of debts may not be the reverse of the effect of acquiring new debt on mental wellbeing. The reason for this is that getting rid of and acquiring new debts are rather different processes; the first may provide immediate benefits for mental wellbeing due to the relief at being able to fulfil financial commitments, whereas the second might not immediately cause mental strain given the improved resources and potential help to overcome short-term financial difficulties provided by new credit. Ignoring these potential asymmetric effects could hide important patterns and cause somewhat misleading estimates in the traditional within-individual investigations used previously in this field.

This study

By taking advantage of the English Longitudinal Study of Ageing, this paper furnishes evidence regarding several aspects of the debt and mental wellbeing association among older individuals in England. First, it investigates the extent to which household mortgage and non-mortgage debt measures predict mental wellbeing – depression symptoms and quality of life – after adjusting for demographic and socio-economic confounding factors. It then moves on to exploit the longitudinal dimension of the data by investigating the extent to which these associations are evident when all time-constant factors are controlled for. In this within-individual setting, the paper also investigates whether there is any consistent evidence of asymmetric effects of getting rid of and acquiring new debt during the study period on mental wellbeing. In both the

between-observation and within-individual approaches, the associations are tested with measures based on total debt amount, debt-to-income and debt-to-non-housing wealth. This provides guidance on the most appropriate measures of debt for subsequent studies on this issue among older individuals.

4.2 Methods

Sample

The sample for this study was derived from the English Longitudinal Study of Ageing (ELSA), an ongoing household longitudinal survey, with approximately biennial data collection and using mostly computer-assisted personal interview survey mode (Banks, Blake et al. 2019). The focus is on ELSA data from waves 1 – 8, conducted between 2002 and 2017. The major advantages of the ELSA data are a long follow-up period, allowing investigations on within-individual variation over time, and a rich set of socioeconomic and health-related measures. The target population of ELSA is the household population aged 50 years or more in England. Individuals without a known address or living in an institution at baseline are excluded, which implies that those with most significant debt difficulties may be excluded from the sample altogether due to, for example, an eviction or imprisonment. The ELSA study has been approved in ethical reviews and consent from participants was obtained. The details of the study design are documented in greater detail in the cohort profile (Steptoe, Breeze et al. 2012).

The dataset for the present analysis was constructed from the survey and derived variables provided by the Institute of Fiscal Studies (n=18,528 individuals). The inclusion criteria for this study were being aged 50 and over (number of individuals excluded=443) and having no missing values on selected variables (excluding a further 994). The main sample selection is described in Supplementary Figure S1. After these exclusions, the main sample consisted of 17,091 individuals with 72,700 observations for the number of depressive symptoms models and 15,745 individuals with 60,950 observations for the quality of life models (see below).

Outcome variables for mental wellbeing: depressive symptoms and quality of life

The two outcome measures were the number of depressive symptoms and quality of life, which together provide a complementary picture of mental wellbeing. Focusing on depression is important due to its enormous public health and economic burden but not sufficient alone for the purposes of this study. Following WHO's conceptualisation of (mental) health (World Health Organization 1946), focusing only on the absence or prevalence (or severity) of illness provides a narrow view of health and wellbeing. It assumes that mental health, or quality of life in general, is similar for all individuals free of diagnosable mental disorders. Studying quality of life, in contrast, highlights positive aspects of mental wellbeing.

This study measures depressive symptoms with a well-established version of the Center for Epidemiologic Studies Depression Scale (CES–D 8), which is a self-rated measure based on the presence (yes/no) of eight selected depression symptoms much of the time during the past week (Radloff 1977). These items were: feeling depressed, feeling that everything was an effort, restless sleeping, feeling happy (reverse coded), feeling lonely, enjoying life (reverse coded), feeling sad and being unable to get going very often. These items were summed to a depression measure ranging from 0 to 8 with a higher score reflecting a higher number of depressive symptoms. This measure was treated as a continuous score, and those with any missing values in these items were treated as missing.

Quality of life was defined as the subjective "degree to which human needs are satisfied", using the multi-item CASP-score as its operationalisation (Hyde, Wiggins et al. 2003). The score was constructed from 19 items regarding different aspects of wellbeing in the later life context (see Supplementary Table S1 for the questions on each item). Each item had four response options (never, not often, sometimes and often), which were then coded so that a higher score reflected a higher quality of life and summed, giving a potential range of 0 to 57. The measure and its theoretical and statistical properties are described in detail in previous articles (Hyde, Wiggins et al. 2003, Hyde, Higgs et al. 2015). As the score was obtained from a self-completion questionnaire rather than in-person household interview, the sample size for CASP-19 models was slightly lower than in CES-D 8 models due to non-response.

Debt measures

Debt was measured at benefit unit level, that is, a single person or couple and potential dependent children[3], (i.e. total debt of the benefit unit). Two forms of debt were differentiated in accordance with previous findings that they may bear a different relation to mental wellbeing (Hojman, Miranda et al. 2016): mortgage debt (defined as the primary mortgage debt) and non-mortgage debt. The non-mortgage debt category included credit card debt, informal debt and other financial debt.

Debt variables were treated as categorical to ease interpretation, to handle skewness and to examine potential non-linear effects (e.g. higher debt amount/burden having a non-linear association with mental wellbeing). In all debt measures, the first category consisted of those without any given debt, which served as a reference category. Those with some debt were then divided into fourths of non-zero values.

Four sets of models were fitted with different debt measures. The first set used debt measures based on their (price index adjusted) monetary amount at the benefit unit. This first set of measures aims to capture the *amount effect* while ignoring the potential repayment ability. The second set of models used debt-to-total income ratio quartiles. These aim to capture the *repayment ability effect* of the debts. The third set of models included debt to total gross non-housing wealth (benefit unit level) ratio quartiles, aiming to capture the *overall burden effect* of debts. For those with zero gross non-housing wealth or zero income, their value was replaced by the lowest non-zero value in the data, in order to be able to calculate ratios. Lastly, separate models were also constructed using a binary debt variable, 'has some mortgage debt', and a separate binary variable, 'has some non-mortgage debt'. Both debt types, mortgage and non-mortgage, were included simultaneously in all models.

For debt variables and other monetary variables (see details below), the derived variables provided by IFS were used, but those observations with imputed debt values to complete missing information (no bracket information) were not included in the analyses.

Control variables

[3] The definition used by the Department for Work and Pensions for official statistics. In ELSA "A dependent child is defined as a person aged 17 or under who earns less than £5000 per year"

All regression models included controls for possible demographic and socioeconomic confounders. It was anticipated that a high debt burden may be associated with low socioeconomic status from earlier life-stages, which could also be a causal factor for low mental wellbeing. Socioeconomic control variables included the respondent's education at first observed wave or, if missing, then obtained from subsequent waves (the highest qualification obtained: 1 - no qualifications or primary level [less than O-level or equivalent]; 2 – secondary education [O-level or equivalent]; 3 –post secondary [higher than A-level], treated as categorical) and price-index-adjusted log of benefit unit OECD-modified equivalised, net of tax income (to allow a natural log transformation, for those reporting zero income, income was replaced by the lowest non-zero amount observed in the data). A categorical employment status variable closely following the ILO employment definition was also included: employed, self-employed, seeking work, sick and not seeking work, retired and unoccupied.

In addition, the sociodemographic controls included sex, continuous age (top coded to 90) and age squared (to allow a non-linear association with ageing), categorical marital status (1 married, civil partnership or cohabiting, 2 single or never married, 3 widowed and 4 divorced or separated) and the number of household members (coded as 1, 2, 3 and 4 or more and treated as categorical variable). In addition, wave dummy variables were included in all models.

Analytical strategy

After providing descriptive statistics, the empirical analyses consisted of two regression approaches, between-observation and within-individual, to model the extent to which different measures of debt predict mental wellbeing. Descriptive and regression analyses were conducted without weights.

In the first approach, in parallel with many previous studies on debt and mental health, a standard linear regression model with within-couple/individual clustered standard errors was used. The mental health outcome y_{it} (CES-D 8 or CASP-19), observed for individual i in the wave t [=1 …. 8], was predicted using the following model:

(1)

$$y_{it} = \beta_t wave_t + \beta_2\ non\_mortgage\_debt_{it} + \beta_3\ mortgage_{it} + f_\theta(age_{it}) + \beta_k covariates_{it} + \varepsilon_{it}$$

where $\beta_1 wave_t$ is wave specific intercept (also known as wave fixed effects) for each of the ELSA waves to capture period fluctuations in mental wellbeing. $\beta_2\ non\_mortgage\_debt_{it}$ and $\beta_3\ mortgage_{it}$ are the main coefficients of interest representing the estimated associations of given non-mortgage and mortgage debt variables with mental wellbeing outcome. $f_\theta(age_{it})$ is the effect of ageing as a quadratic function ($f_\theta(age_{it}) = \beta_3\ age_{it} + \beta_4 age_{it}\text{^}2$). Moreover, $covariates_{it}$ includes observed time-constant (education and sex) and time-varying sociodemographic and -economic covariates. The error terms ε_{it} are assumed to be independent and identically distributed across clusters (i.e. benefit units) and to follow normal distribution with mean of 0 and variance σ^2; their covariances between waves within a cluster are left unspecified but allowed for in estimating standard errors of the estimated coefficients.

The second approach moved to exploit the longitudinal nature of the data and investigated the associations *within-individuals*. In this approach, the potential omitted variable bias, arising from unobserved time-constant missing confounding variables correlated with both outcome and predictors, is controlled for by using each person as his/her own control. A parameter α_i for each individual is added to capture all time-constant person-specific effects as a fixed unknown parameter that is assumed to be constant over time (Rabe-Hesketh and Skrondal 2012):

(2)

$$y_{it} = \beta_t wave_t + \beta_2\ non\_mortgage\_debt_{it} + \beta_3\ mortgage_{it} + f_\theta(age_{it}) + \beta_k covariates_{it} + \alpha_i + \varepsilon_{it}$$

where all variables are identical to equation 1 (except for the covariates, as discussed below) but a fixed time-constant person-specific term α_i is added, and error terms are assumed independent across all i,t. The parameters of interest are estimated using within-individual transformation (Wooldridge 2016), that is, the model does not estimate α_i but incorporates it by computing deviations from person-specific means of

all variables at the second level (i.e. individuals). Similar to the approach above, cluster standard errors were utilised using the benefit unit identification number.

Adding the person fixed effects has several implications. First, all time-constant observable variables (education and sex in the current study) are dropped altogether, and their parameters are not estimated. This is because their effects are fully controlled for by the design when including person fixed effect terms. Second, the estimated coefficients of $debt$ and all other remaining time-varying variables are calculated using information only from individuals with some within-individual variation over time in these explanatory variables. Therefore, only debts that change in the follow-up period are taken into consideration to estimate parameters of interest. Focusing on within-individual variation means that the sample analysed is effectively smaller. The longitudinal subsample used in the within-individual model excluded individuals with only one observation (3,124), yielding a sample of 13,967 individuals with 69,576 observations for the number of depressive symptoms models and 12,364 individuals with 57,569 observations for the quality of life models.

When interpreting models with and without person fixed effects, it is essential to note that these two settings provide answers to two different questions, neither of which is intended to be strictly causal in nature in this paper. The normal linear regression compares the levels of mental wellbeing in observations with debt to the levels of mental wellbeing in other observations with no debt (or higher or lower levels of debt when quartile measures are used), after adjusting for the observable differences in other characteristics between the observations. The main limitation of this approach is that some important unobserved differences between the observations might not be controlled for (Allison 2009). In contrast, the within-individual approach compares the levels of mental wellbeing of individuals in the period(s) when they have debt (or have high debt burden) to the levels of mental wellbeing of the same individuals in the period(s) when they are debt free (or have low debt burden when quartile measures are used), after adjusting for time-varying observable differences between the periods.

4.3 Results

Descriptive findings

The descriptive statistics of all observations, regardless of wave, are shown in Table 4.1. Most of the observations included in the analysis were without mortgage debt (83%), and most were without non-mortgage debt (73%). However, these figures withheld the fact that a substantial proportion of the longitudinal study population had debts at some point. Shown in Supplementary Table S2, some 30% and 53% of the longitudinal subsample had mortgage and non-mortgage debt types, respectively, at least once during their study period. Nevertheless, almost all participants in the longitudinal sample also had at least one observation in which they did not report having non-mortgage (90%) and mortgage debt (91%). Mortgage debt seemed more stable over time than non-mortgage debt; conditional on a person at some time point having mortgage debt, 61%, on average, of his/her observations were with mortgage, whereas this figure for non-mortgage debt was 53%. Some 30% of those who are observed with mortgage debt at any point in the longitudinal subsample had this debt at all observed points.

The people with household mortgage or non-mortgage debt had higher incomes and higher education qualifications but lower gross non-housing wealth, and were more likely to be employed than those without any debt (Table 4.2). However, many of these differences were reflected partly by the fact that those with debts were much younger. There was substantial overlapping between the two debt types; over half (55%) of those with mortgage debt also had non-mortgage debt, while some 35% of those with non-mortgage debt also had mortgage debt. Nevertheless, the people with household mortgage debt had higher income, education level and gross non-housing wealth, and were more likely to be employed than the people with household non-mortgage debt.

Individuals with some mortgage debt had a lower number of depressive symptoms than those without this debt but a similar quality of life score. In contrast, non-mortgage debt was linked to lower mental wellbeing when compared to those without any non-mortgage debt. However, in Figure 4.1, these dichotomous debt measures hid a more nuanced relationship between different levels of debt and mental wellbeing. The debt *amount* fourths indicated that those with low levels of debt amount

(either debt type) had worse mental wellbeing than those with higher amount of debt. However, the opposite picture emerged with alternative debt – *debt-to-income* and *debt-to-wealth* – measures; there were J-shaped relationships between the debt-to-wealth fourths (and debt-to-income to a lesser extent) and mental wellbeing. The lowest debt-to-wealth fourths were linked to higher mental wellbeing. In contrast, the highest fourth were linked to substantially lower mental wellbeing scores when compared to the 'no debt' category. This similar picture was evident for both debt types (non-mortgage and mortgage) and both outcomes (number of depressive symptoms and quality of life).

The three alternative measures of debt burden were overlapping but also classified somewhat different individuals to the highest fourth, which may explain the patterns observed above (Supplementary Tables 3 and 4). For example, the highest non-mortgage debt-to-wealth fourth was characterised by more disadvantageous labour market positions, smaller debt amount and almost zero non-housing wealth (the median debt-to-wealth ratio was 19). In the highest debt-to-income quartile, the median ratio between non-mortgage debts and yearly income was around 0.54, and people in this group were more likely to be employed and had higher incomes than those in the highest debt-to-wealth quartile group. In the highest debt amount fourth, the median amount of non-housing debt was the highest at around £13,000 but the individuals in this fourth had higher incomes and education qualifications than those in the highest fourths of the other two debt measures.

Table 4.1. Descriptive statistics of observations (in any wave) in the full sample and longitudinal subsample

	Full sample		Longitudinal subsample	
	All observations	All observations	First observation	Last observation
	n	%	%	%
Sex				
Male	32,423	45	45	45
Female	40,277	55	55	55
Age group				
50-55	10,326	14	35	6
56-60	13,177	18	18	13
61-65	13,062	18	14	18
66-75	21,517	30	23	33
76-	14,618	20	11	32
Mean		66	62	70
Mortgage debt amount quartiles				
No debt	60,253	83	74	88
First non-zero quartile	3,118	4	6	3
Second	3,108	4	7	3
Third	3,110	4	6	3
Fourth	3,111	4	6	3
Any	12,447	17	26	12
Non-mortgage debt amount quartiles				
No debt	52,757	73	63	78
First non-zero quartile	4,986	7	10	5
Second	4,994	7	8	6
Third	4,981	7	9	5
Fourth	4,982	7	10	6
Any	19,943	27	37	22
Education				
Low	32,221	44	46	46
Intermediate	19,434	27	26	26
High	21,045	29	28	28
Household size				
1	18,119	25	20	29
2	41,578	57	54	57
3	8,334	11	14	10
4 or more	4,669	6	11	4
Employment status				
Employed	20,130	28	39	19
Self-employed	5,221	7	9	6
Seeking work	579	1	1	1
Sick and not seeking	3,280	5	6	4
Retired	38,824	53	37	65
Unoccupied	4,666	6	8	5
Marital status				
Married or cohabiting	50,682	70	73	66
Single/never married	3,598	5	5	5
Widowed	11,301	16	12	19
Divorced or separated	7,119	10	10	10

Mental wellbeing				
Mean CES-D 8		1.46	1.52	1.59
Mean CASP-19		41.7	42.3	40.7

Table 4.2. Descriptive statistics of observations (in any wave) by household debt status.

Household debt	No debt	Mortgage debt	Non-mortgage debt
Some mortgage debt %	0	100	35
Median mortgage debt £	0	28,377	0
- Mean	0	51,479	18,226
Some non-mortgage debt %	0	55	100
Median non-mortgage debt £	0	383	2,588
- Mean	0	4,696	6,094
Mental wellbeing			
Median number of depressive symptoms (CES-D 8)	1	1	1
- Mean	1.43	1.34	1.61
Median Quality of life (CASP-19)	43	43	42
- Mean	41.97	41.93	40.69
Age, income and assets			
Median age	69	57	60
- Mean	69	59	61
Median yearly income £	14,052	19,692	16,455
- Mean	17,510	22,994	19,056
Median gross non-housing assets £	40,149	21,514	14,240
- Mean	143,524	137,004	100,205
Sex %			
Male	44	48	46
Female	56	52	54
Education %			
Low	48	30	39
Intermediate	24	33	32
High	28	37	30
Household size %			
1	29	12	17
2	59	51	55
3	8	22	17
4 or more	4	15	11
Employment status %			
Employed	18	59	44
Self-employed	5	13	10
Seeking work	1	1	1
Sick and not seeking	4	4	7
Retired	66	18	32
Unoccupied	7	5	6
Marital status %			
Married or cohabiting	66	82	76

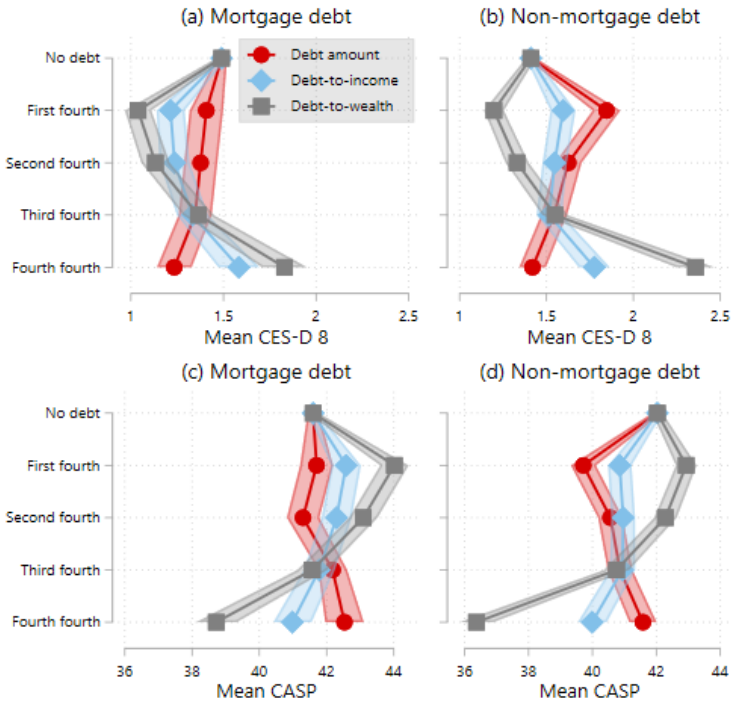


Figure 4.1. Unadjusted mean levels (and their 95 confidence intervals corrected for clustering) of mental wellbeing by different mortgage (panels a and c) and non-mortgage debt (panels b and d) measures.

Between-observation associations between debts and mental wellbeing

The covariate adjusted between-observation associations between these different debt measures and mental wellbeing are shown in Figure 4.2 (number of depressive symptoms) and Figure 4.3 (quality of life). The coefficients of other sociodemographic and -economic variables, which were in line with previous findings, are shown in the supplementary materials (Supplementary Table 9). Observations with some non-mortgage debt had a higher number of depressive symptoms on an 8-item scale (unstandardised coefficient b of any non-mortgage debt [95% confidence interval] = 0.26 [0.22 – 0.31]) compared to the observations without this debt, net of their differences in observable socioeconomic characteristics. The sizes of these coefficients were similar in magnitude to having the lowest education level vs. secondary education (b=0.28 [0.22 -0.33]) but substantially lower than the coefficient of unemployed vs. employed (b=0.96 [0.74 – 1.19]). The estimate for the association between mortgage debt and the number of depressive symptoms was around zero (b=0.02 [-0.04 – 0.08]).

Similar results were obtained when focusing on quality of life (scale 0 – 57), but mortgage debt was linked to a marginally lower quality of life (b=-0.44 [-0.76 – -0.12]).

For both outcomes, a higher fourth of debt amount did not show any added effect beyond that obtained using dichotomous debt status for predicting mental wellbeing. The steepest gradient in the coefficients was found using the non-mortgage debt-to-wealth fourths as a debt measure. The seemingly beneficial role of a small amount of mortgage or non-mortgage debt on mental wellbeing found in the unadjusted comparison above was reversed (or attenuated to zero in mortgage debt) when observable confounder variables were adjusted for.

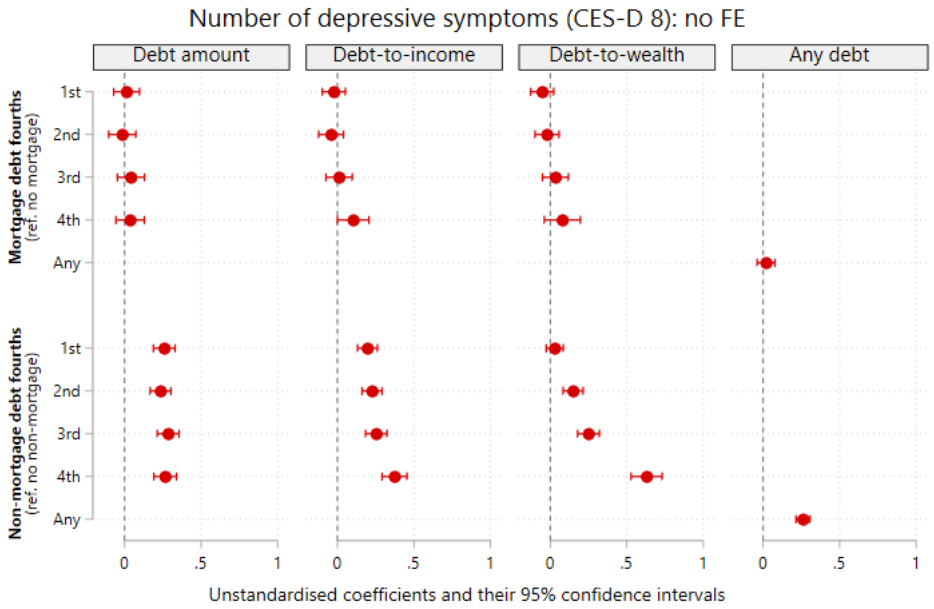


Figure 4.2. Results from linear regression models without person fixed effects for the associations between household debts and number of depressive symptoms (CES-D 8). Results from four regression models with different debt measures are presented: 1. debt amount quartiles (first subgraph) 2. Debt-to-income quartiles (second subgraph) , 3. Debt-to-wealth quartiles (third subgraph) 4. dichotomous debt variables (fourth subgraph). SE corrected for clustering within individual/the first reported couple. Estimates and their standard errors are shown in supplementary table S5.

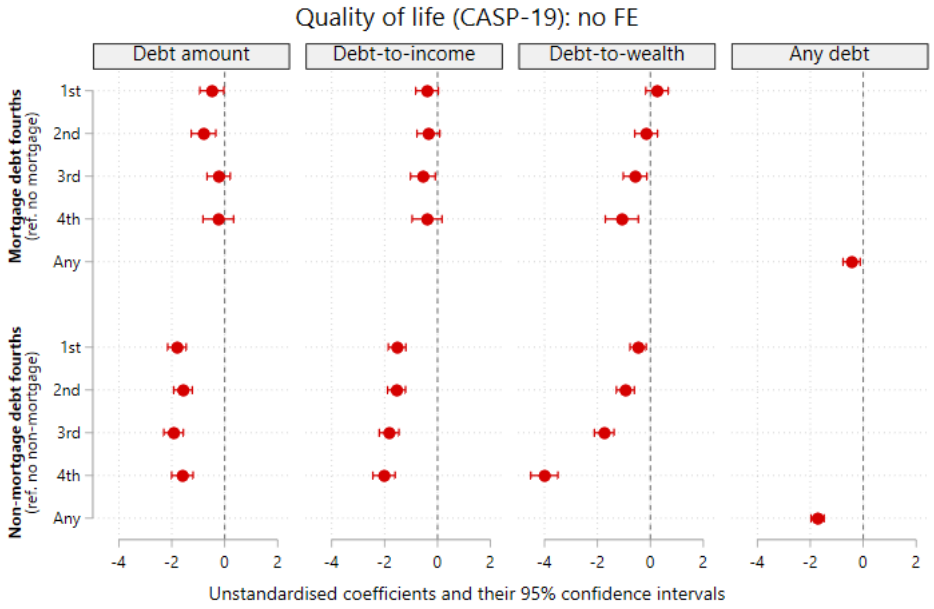


Figure 4.3 Results from linear regression models without person fixed effects for the associations between household debts and quality of life (CASP-19). Results from four regression models with different debt measures are presented: 1. debt amount quartiles (first subgraph) 2. Debt-to-income quartiles (second subgraph) , 3. Debt-to-wealth quartiles (third subgraph) 4. dichotomous debt variables (fourth subgraph). SE corrected for clustering within individual/the first reported couple. Estimates and their standard errors are shown in supplementary table S6.

Within-individual associations between debts and mental wellbeing

Figure 4.4 (number of depressive symptoms) and Figure 4.5 (quality of life) present the results when person fixed effects were added to the models. The within-individual associations of the non-mortgage debt measures, many of which were not different from zero at the 95% confidence level, were much smaller in magnitude than the ones obtained from the linear regression without person fixed effects. Net of time-varying observable covariates, individuals had only a marginally higher number of depressive symptoms (b=0.06 [0.02 – 0.09]) and lower level of quality of life (b=-0.29 [-0.43 – -0.15]) during the periods in which they had non-mortgage debt compared to the periods when they did not. In line with the standard linear models, mortgage debt predicted only a lower quality of life (b=-0.35 [-0.57 – -0.14]), while its estimate for depressive symptoms was around zero (b=0.00 [-0.05 – 0.05]).

For both outcomes in this within-individual approach, the fourths of non-mortgage debt-to-wealth measures had the steepest gradient in the coefficients. The magnitude of the top quartiles was substantial. For example, the fixed effect estimate of the top quartile of non-mortgage debt (b=-0.92 [-1.24 – -0.60]) was higher than the positive coefficient of retirement (b=0.43 [0.23 –0.63]) on quality of life. Similar to standard linear regression models, all debt amount fourths produced coefficients of a similar size to the dichotomous debt versions.

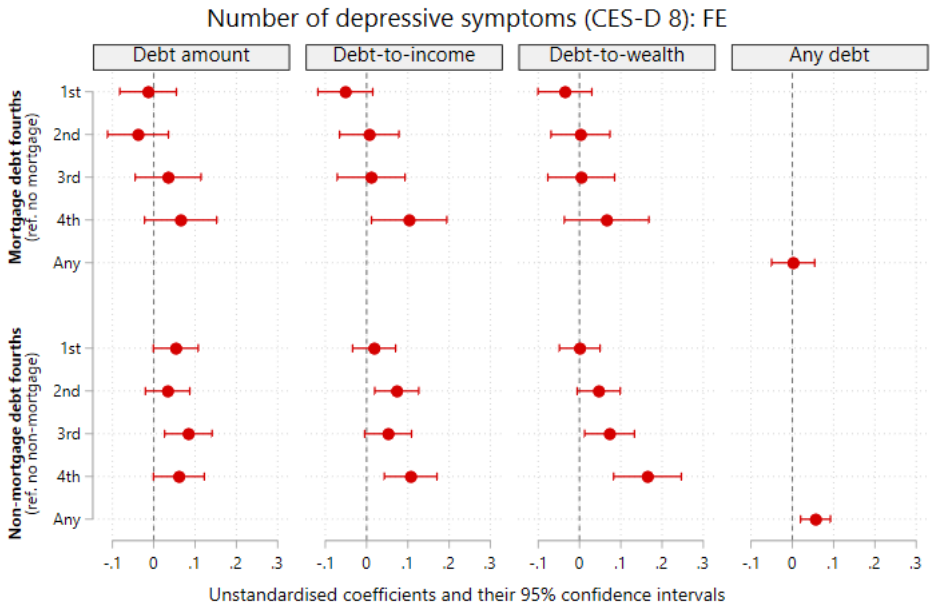


Figure 4.4 Results from linear regression models with person fixed effects for the associations between household debts and number of depressive symptoms (CES-D 8). Results from four regression models with different debt measures are presented: 1. debt amount quartiles (first subgraph) 2. Debt-to-income quartiles (second subgraph) , 3. Debt-to-wealth quartiles (third subgraph) 4. dichotomous debt variables (fourth subgraph). SE corrected for clustering within individual/the first reported couple. Estimates and their standard errors are shown in supplementary table S7.

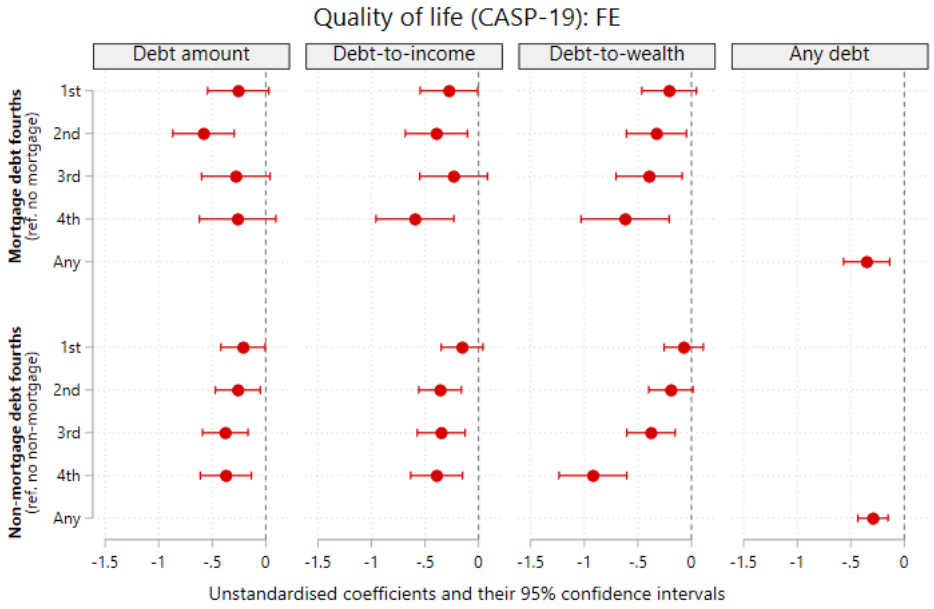


Figure 4.5 Results from linear regression models with person fixed effects for the associations between household debts and quality of life (CASP-19). Results from four regression models with different debt measures are presented: 1. debt amount quartiles (first subgraph) 2. Debt-to-income quartiles (second subgraph) , 3. Debt-to-wealth quartiles (third subgraph) 4. dichotomous debt variables (fourth subgraph). SE corrected for clustering within individual/the first reported couple. Estimates and their standard errors are shown in supplementary table S8.

Asymmetric effects of paying off and acquiring debts?

The estimated parameters from the within-person models above, when testing a binary version of debt, compared an individual's mental wellbeing when in debt compared to other, *previous* and/or *subsequent*, observations of the same individual when not in debt (Wooldridge 2016). The assumption was that the negative mental wellbeing effects of acquiring debts are the reverse of the positive mental wellbeing effects of getting rid of debts. However, asymmetric effects are plausible given that, in later life, paying off and acquiring new debts are rather different processes. The data analysed here contained both kinds of transition, which may cause misleading estimates in the fixed effect approach or hide some interesting asymmetric patterns (Allison 2019).

Therefore, the potential asymmetric effects were tested in extended within-individual models, which are described in detail in the supplementary materials. In short, no consistent evidence of asymmetric effects was found (Table 4.3). The models showed that getting rid of non-mortgage debt during the study period was linked to an improvement (0.35 [0.18 – 0.52] for quality of life and -0.06 [-0.10 – -0.02] for depressive symptoms) and acquiring new debt predicted deterioration in mental wellbeing (-0.20 [-0.39 – -0.00] and 0.05 [-0.00 – 0.10], respectively) with no consistent evidence of asymmetric effects.

Table 4.3 Estimates from asymmetric fixed effect linear regression models, using a binary debt status, 'has some mortgage debt', and binary debt status, 'has some non-mortgage debt'.

	Depressive symptoms	**Quality of life**
	Higher is more depressed	Higher is better
Mortgage debt		
Positive change (acquiring debts)	-0.02	-0.28
95 % CI	[-0.11 – 0.08]	[-0.67 – 0.12]
Negative change (getting rid of debts)	-0.01	0.36**
95 % CI	[-0.06 – 0.05]	[0.13 – 0.60]
Non-mortgage debt		
Positive change (acquiring debts)	0.05+	-0.20*
95 % CI	[-0.00 – 0.10]	[-0.39 – -0.00]
Negative change (getting rid of debts)	-0.06**	0.35***
95 % CI	[-0.10 – -0.02]	[0.18 – 0.52]
Number of observations	69,576	57,569
Number of individuals	13,967	12,364
+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001. 95% confidence intervals are adjusted for clustering within-individual and household.		

Additional analysis

In additional analyses, the robustness of these findings was examined in four ways. First, stratified models were conducted for subgroups below and above the State Pension Age (SPA). In waves 1 to 4 of the study, SPA was 60 for women and 65 for men, and from wave 6 onwards, the changes to SPA were taken into account. Some 79% of those above the SPA were retired, while this figure was 13% for those below. These additional models were conducted to examine whether there was important moderation by age category. For older people and pensioners, debts may be linked to a higher mental burden due to their limited ability to increase their income and possibly greater feelings of shame, whereas, for middle-aged adults, possibilities to increase income may decrease stress arising from debts. However, the stratified models were unable to provide evidence for this hypothesis (Supplementary Table 10, columns 1-2). The debt-mental wellbeing associations did not differ in a systematic fashion between people below and above the state pension age.

Second, the models were adjusted for a categorical measure of limiting long-standing with categories of none, not limiting long-standing illness and limiting long-

standing illness. Although a long-standing illness may also appear after the outcome, it can cause lower mental wellbeing and also indebtedness because of its health care costs, income losses or extra costs of disability. Nevertheless, adjusting for the measure of limiting long-standing illness, for which data were available in waves 2-8, attenuated slightly the between-observation estimates but did not affect the within-individual estimates of the debt variables (Supplementary Table 10, column 3).

The third set of additional models focused on subgroups of people without partners and people with data on partner's employment status. Partner's employment status is another important source of potential confounding, causing both indebtedness and lower mental wellbeing. However, similar associations were observed for the subsample without partners and for the partnered subsample while adjusting for partner's self-reported employment status (Supplementary Table 10, columns 4-7).

Lastly, an apparent explanation for the steep gradient in the coefficients of debt-to-wealth quartiles is that these measures were absorbing the effects of wealth, rather than debt. In the within-individual models, this is to say that the associations were due to negative wealth shocks, not due to actual changes in the debt levels. Therefore, the models were replicated while adjusting for logarithm measures of gross non-housing and housing wealth (Supplementary Table 11). These sensitivity models showed that the substantial within-individual association of the highest debt-wealth quartiles was not driven by wealth shocks alone, although the estimates were slightly attenuated (for example, in the within-individual association of the highest non-mortgage debt-to-wealth fourth with depression symptoms were b=0.16 before and b=0.11 after adjusting for gross wealth measures).

4.4 Discussion

This paper has considered several aspects of indebtedness and examined to what extent these aspects predict two mental wellbeing outcomes – number of depressive symptoms and quality of life – among older individuals in England. In the first, between-observation, approach, non-mortgage debt, and the highest quartiles of debt-to-wealth ratio in particular, had a robust unadjusted and adjusted association with the two mental wellbeing outcomes. The analysis then moved on to exploit the longitudinal dimension

of the data and focused on the within-individual variation in mental wellbeing over time. In this within-individual approach, non-mortgage debt was also linked to the two mental wellbeing variables but with much smaller sizes. Getting rid of and acquiring new non-mortgage debts were linked, respectively, to an increase and a decrease in mental wellbeing. The findings from these two settings are discussed in the following paragraphs, first separately and then in comparison.

The overall finding that debts have a robust link to lower mental wellbeing in a between-observation setting is also documented in previous cross-sectional research (Richardson, Elliott et al. 2013, Turunen and Hiilamo 2014). Non-mortgage debt predicted both mental wellbeing outcomes, before and after adjusting for observable covariates between observations. This study contributed to the literature in showing that the results were similar for both outcomes – number of depressive symptoms and quality of life – which is not necessarily self-evident (for example, widowhood can have opposite associations with these outcomes). This can be interpreted as showing that non-mortgage debt relates to both positive and negative aspects of one's mental wellbeing.

Interestingly, those with some debt but a low debt burden, and those with mortgage debt, had higher mental wellbeing than those without debt before adjusting for the differences in key characteristics. However, this seemingly beneficial role of small debts was diminished, or even reversed, after demographic and socioeconomic differences were taken into consideration. The cause of this reverse may be that those with small debts and with mortgage debt are a select group of individuals with some mentally beneficial characteristics, such as high income, lower age or advantageous labour market position.

The measures of debt burden affected the conclusion regarding the role of higher debt burden for mental wellbeing. Although a higher debt burden, measured either in *debt-to-income ("repayment ability")* or *debt-to-wealth* ("*overall burden*") ratios, showed increased adjusted risk of lower mental wellbeing in a higher exposure-higher response fashion, no such association was observed for the *debt amount* measure. *Debt amount* fourths did not differ from dichotomous debt status when predicting mental wellbeing. The *debt-to-wealth* fourths showed somewhat more consistent exposure–response association with mental wellbeing than the *debt-to-income* measure, which has

often been used in previous studies (e.g. (Keese and Schmitz 2014)), perhaps due to data availability. It can be speculated that individuals with high debt amounts may feel less stressed if they simultaneously hold large non-housing assets that can be used to pay off debts if needed, and more stressed if they have no such assets, whereas a high income per se might provide less mental security than assets. Overall, the findings that higher debt burden indeed increases risk of adverse mental wellbeing outcomes is in line with some previous investigations (Meltzer, Bebbington et al. 2011, Meltzer, Bebbington et al. 2013). These findings, and the complex relation between debts and other socioeconomic factors discussed earlier, suggest that subsequent research in this field that goes beyond dichotomous debt status and debt amount measures is vital, and that continuous amount-based measures may not capture the relation adequately.

The identified association between debts and mental wellbeing not only differed in terms of the way debt burden was operationalised but also by debt type, that is, whether the household debt was mortgage or non-mortgage in type. Mortgage debt was only linked to slightly lower quality of life (not depressive symptoms), but non-mortgage debts had strong links with both mental wellbeing outcomes. Earlier studies have also reported that long-term (mainly mortgage) and short-term/unsecured debts (mainly non-mortgage) have a different relationship to mental (ill-)health outcomes (Berger, Collins et al. 2016, Hojman, Miranda et al. 2016). This may be related to differences in the selection process for these two debt types or differences in their (speculative) causal effects. Getting mortgage loans typically requires some form of assets (normally deposits or guarantors), which are, in contrast, not always required for non-mortgage debts such as credit card debt. Those in less socioeconomically affluent positions may not have access to more secured debts. It is also possible that the differences in characteristics of these debt types – interest rates, repayment periods and deposit – may cause non-mortgage debts to be stronger predictors of mental wellbeing. Furthermore, mortgage debt provides access to homeownership, which has been shown to improve mental health in later life (Courtin, Dowd et al. 2017). Lastly, it may also be that an inverse-relationship from lower mental wellbeing to indebtedness is stronger for non-mortgage debt than for mortgage debt. In any case, in subsequent work, when investigating mental health consequences of indebtedness, a distinction between different types of debts is important.

In exploiting the longitudinal dimension of the data, the association between debts and mental wellbeing became attenuated when each person was treated as his or her own control. Adding the person fixed effects moved the focus to only within-individual variation over time in mental wellbeing and its predictors. Comparing these associations to those found among younger study populations is challenging due to differences in the debt measures, debt types owned (particularly student debts) and mental health outcomes used. Nevertheless, similar findings have been reported in previous studies exploiting longitudinal data on younger study populations and reporting that the association between debt and mental health exists but tends to somewhat weaken when the focus is on within-individual variation (Gathergood 2012, Berger, Collins et al. 2016), rather than on adjusted between-observation comparisons.

In the extended within-individual analysis, no evidence was found for the asymmetric effects of debts. Although this is not to say that such asymmetric effects do not exist, these models provided evidence that both paying off and acquiring new debt are linked to an increase and decrease, respectively, in mental wellbeing. This provides some reassurance that the previous fixed effect approach estimates are unlikely to be highly misleading. In terms of substantive findings, the absence of evidence for asymmetric effects can, however, be considered surprising. There is some previous evidence regarding asymmetric effects of changes in monetary variables, such as income, on mental wellbeing-related outcomes (e.g. (D'Ambrosio, Jäntti et al. 2019)). One could expect that similar asymmetric effects would occur for debts; acquiring new debts may not have immediate negative effects on mental wellbeing given that debt may provide temporary relief from economic difficulties or may help individuals to purchase desirable goods or services. In contrast, paying off debts would produce immediate mental wellbeing benefits as a result of fulfilling one's obligations. However, the absence of evidence for asymmetric effects of debt on mental wellbeing may be due to methodological issues, such as measurement issues of debt in asymmetric models (positive changes tend to be higher in amount than negative).

The fact that the effects of non-mortgage debt were significantly larger in the linear regression without the person fixed effects might imply that the individuals reporting debt are predisposed to also having lower levels of mental wellbeing in the periods when they are not in debt. This might be because some other time-invariant

factors were not observed here, such as personality or lack of wider social/family support, which might cause both indebtedness and lower levels of mental wellbeing. However, the different pictures obtained from the two approaches might also occur because the debt that did not exhibit any within-individual variation may be accumulated from earlier life phases, be more chronic, or differ in other qualitative terms from the "*fluid*" debt which did change over time and was used to calculate the within-individual estimates. Therefore, caution is needed to avoid over-interpreting the within-individual estimates as "unconfounded" associations because the sample and the debt from which these estimates were obtained somewhat differed from the sample used to calculate the estimates in the linear models without fixed effects.

The findings presented here do not allow causal inference without strong assumptions regarding time-order, selection bias and confounding. The estimates may reflect confounding (time-varying confounding in the case of the within-individual estimates), an inverse-causal link, or a causal relationship, each of which is a believable explanation from a theoretical perspective. First, there are many plausible (time-variant) confounding factors not controlled for here. These include, for example, problem gambling or lending to children in difficult life situations, which may cause both lower mental wellbeing and indebtedness, and thereby explain away the observed associations. Second, plausible pathways for reverse-causality exist, such as bipolar disorder symptoms, in which mania periods cause excess spending and lending (Richardson, Jansen et al. 2018, Richardson, Jansen et al. 2019). Lastly, the observed relationships may indeed reflect (partly) causal effects, for which some previous studies, from different contexts, have provided some evidence (Gathergood 2012). The potential mechanisms for this causal link are documented in previous qualitative and quantitative research (Drentea and Reynolds 2015, Sweet 2018, Purdam and Prattley 2020); stress, shame and social stigma arising from high debt burden, debt payments or debt collection actions can decrease mental wellbeing.

Altogether, this study, using different measures of debts, mental wellbeing outcomes and analytical approaches, shows that non-mortgage debts are consistently linked to lower mental wellbeing.

Although the strength of this association is dependent upon analytical approaches, and debts do not always result in "mental disaster", particularly for those

with high assets, older people with debts and with low repayment ability are at considerable risk of low mental wellbeing, which requires, as discussed below, further scrutiny and potential policy measures.

Research implications

There are several implications of these findings for the social epidemiological literature. Further research is merited to understand the mechanism through which debt links to lower mental wellbeing among older individuals and to find effective interventions to alleviate the mental wellbeing burden of indebted older individuals. Furthermore, mortgage and non-mortgage debt differed in their links with mental wellbeing in this study, but subsequent research is needed to investigate which specific characteristics of non-mortgage debts, such as interest rates, cause this difference.

Subsequent research may find the considerations of the most appropriate operationalisation of debt burden in later life useful. Although different debt burden measures did not provide contradictory findings in the regression models after adjustments, researchers should be careful when using measures of debt amount alone when looking at unadjusted levels of mental wellbeing. This is because debt amount and debt-to-income/wealth-based measures may provide conflicting conclusions in unadjusted comparisons; in this study higher debt amount was linked to a higher level of mental wellbeing before any adjustments, whereas higher debt-to-income/debt-to-wealth were linked to lower mental wellbeing.

The finding that non-mortgage debt was linked to substantially lower mental wellbeing may highlight the need for actions targeted at this population group. It is also important that potential measures targeting debt problems look not just at the debt amounts people hold, but also people's ability to cope with their debts. This is because those with seemingly low amounts of debt, but low wealth or income, may be particularly at risk of poor mental wellbeing. Mental health and debt advice workers may want to use debt-to-non-housing wealth ratios as a useful determinant of potential mental wellbeing issues among indebted older individuals. Furthermore, responsible lending practices are essential for older people, as there is a possibility that a high level of non-mortgage debt causes worsening mental wellbeing (or equally important, these debts attract persons with lower mental wellbeing).

Limitations

This study used longitudinal survey data over a maximum of eight measurement points, with an average and median of five observations in the longitudinal subsample, per person. However, the findings must be considered in the light of several limitations. Studies using surveys conducted face-to-face and using self-reported debt measures are prone to social desirability reporting bias, which might affect different debt types to a varying extent. People tend to underreport their debts (Zinman 2009), which may be related to the socially undesirable nature of heavy indebtedness. It can be only speculated that such underreporting might imply that the estimates are more conservative than they would be without such underreporting. Subsequent research using administrative data sources might overcome potential under-reporting of debt issues and might provide valuable insights into this topic.

It is worth noting that the non-mortgage debt category used here is a heterogeneous category containing many types of loans, from car loans to loans from a "tallyman". Specific debt categories were not studied separately because the data did not contain information regarding their amounts. The study did not also distinguish different mortgage types or their characteristics, such as interest rates, repayment periods and guarantors. For example, equity release (reverse mortgage) may have a different relation to mental wellbeing than normal mortgages, although their use is uncommon in the UK context.

When testing the asymmetric effects of debts, a significant limitation is that the reasons and processes that drove people to acquire and discharge debts were not observed. Further research is warranted to investigate the potential asymmetric effects of debts on mental health with a closer focus on the reasons for taking on debts and discharging debts them.

Furthermore, this study did not take business debt into consideration. This may be problematic for entrepreneurs and self-employed individuals whose debt may be related to their business. Business debt that may cause business bankruptcy can cause severe stress, as not only one's employment, but also one's employees' jobs are potentially at risk.

Lastly, this study is subject to the usual caveats of longitudinal survey data, namely non-response bias and non-random attrition (Steptoe, Breeze et al. 2012). Non-differential dropout by outcome (depression or wellbeing) is a concern that could potentially substantially affect the findings, but such selection cannot be fully tested. However, an indirect sensitivity check for this was conducted using a dichotomous variable, taking the value one when the subsequent outcome was missing and zero otherwise, as an additional predictor in the fixed effect models (Wooldridge 2010). This indicated that the dropout was preceded by slightly elevated levels of depressive symptoms and lower quality of life in the last observed wave, which suggests that those who drop out may be different in their (not observed) outcome, even conditional on the used predictors. Therefore, non-differential dropout may be a concern in this study. Nevertheless, allowing for such selection is impossible without unverifiable additional assumptions and is beyond the scope of this study.

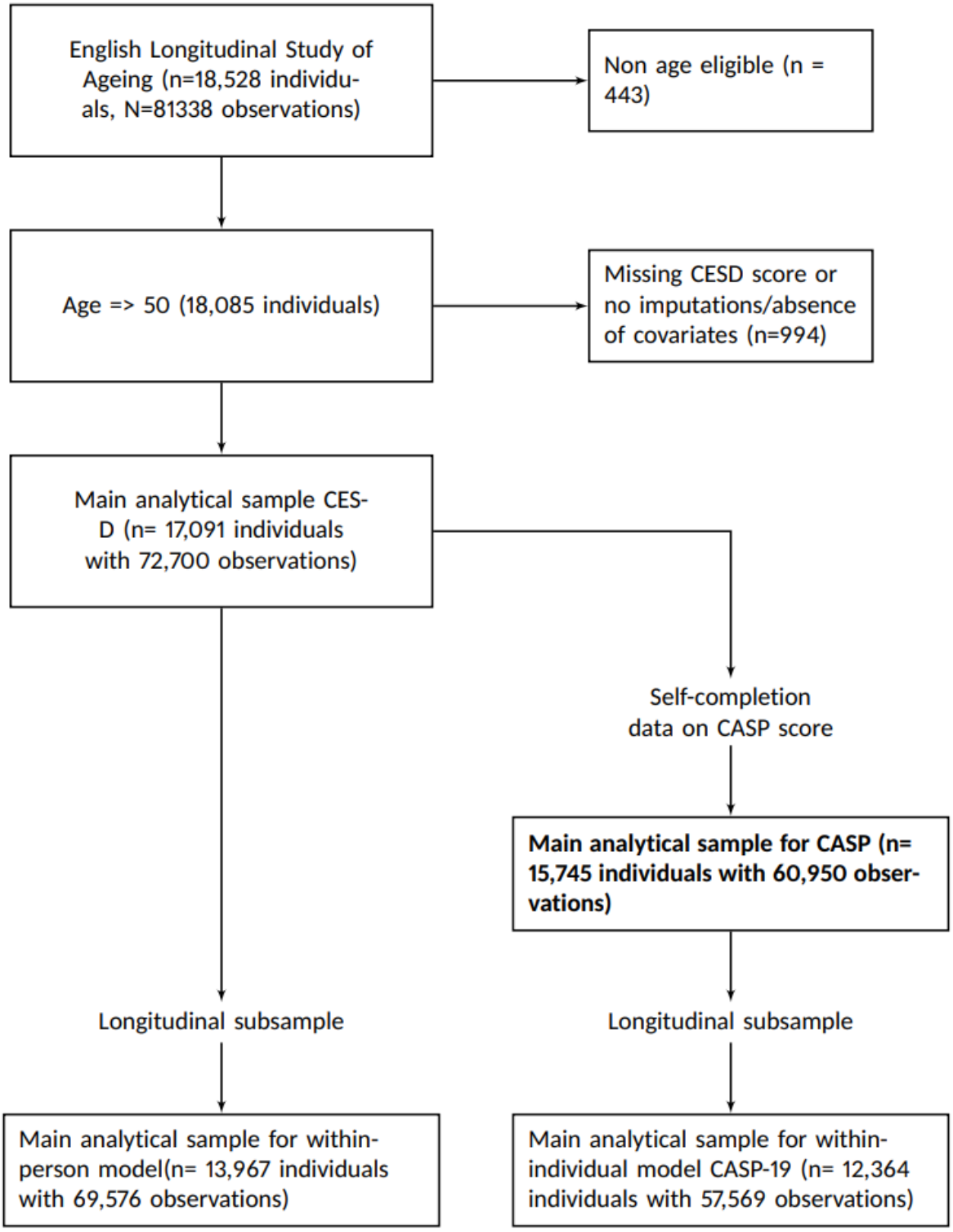
It is worth noting that in the debt-to-wealth measures, housing wealth was not included in the denominator, given that housing wealth cannot be easily used to pay off debts. Liquidising primary housing wealth is a long process and older individuals might be unlikely, or unwilling, to sell their primary housing to pay off debts. Therefore, it can be argued that the wealth tied to primary housing does not provide similar (mental) security for those in debt to that of non-housing wealth.

4.5 Conclusion

This study has investigated the links between several aspects of household indebtedness and mental wellbeing among older individuals in England, a previously under-explored population. The results indicated that debt type and debt measures matter for mental wellbeing. In particular, non-mortgage debt was linked to lower mental wellbeing between observations, and this link, although considerably smaller, was also observed within-individuals over time. These results, together with previous research, stress that heavy non-mortgage debt should also be considered as an important social determinant of poor mental wellbeing among older individuals. The results also highlight the need for targeted measures for older individuals with a high debt burden.

Supplementary materials for the first paper

Supplementary materials for “Debt matters? Mental wellbeing of older adults with household debt in England “



Supplementary figure S1. Construction of the study sample.

Supplementary table S1. CASP-19 score items.

Control
1C My age prevents me from doing the things I would like to do (reverse coded)
2C I feel that what happens to me is out of my control (reverse coded)
3C I feel free to plan for the future
4C I feel left out of things (reverse coded)
Autonomy
5A I can do the things I want to do
6A Family responsibilities prevent me from doing the things I want to do (reverse coded)
7A I feel that I can please myself what I do
8A My health stops me from doing the things I want to do (reverse coded)
9A Shortage of money stops me from doing things I want to do (reverse coded)
Pleasure
10P I look forward to each day
11P I feel that my life has meaning
12P I enjoy the things that I do
13P I enjoy being in the company of others
14P On balance, I look back on my life with a sense of happiness
Self-realisation
15S I feel full of energy these days
16S I choose to do things that I have never done before
17S I feel satisfied with the way my life has turned out
18S I feel that life is full of opportunities
19S I feel that the future looks good for me
Each item with 4-item response options: 'often', 'sometimes', 'not often' and 'never'

Supplementary table S2: Response patterns and debt stability.

		Non-mortgage debt			**Mortgage debt**		
	N (indviduals)	Ever in debt %	Ever not in debt %	Stability*	Ever in debt %	Ever not in debt %	Stability*
Sample type							
Two or more observations	13,967	53	90	53	30	91	61
Only one observation	3,124	33	67	100	23	77	100
Response pattern							
. 111	627	63	74	71	51	69	82
. . . 11111	1,285	52	93	50	30	92	62
. . 111111	589	74	86	54	57	87	59
. 1111111	188	68	96	43	37	98	38
1	1,930	27	73	100	15	85	100
11	1,239	36	83	74	17	90	79
111	890	38	89	62	21	90	71
1111	560	36	96	48	14	95	63
11111 . . .	455	42	94	52	17	96	59
111111 . .	501	46	95	47	24	96	54
1111111 .	521	52	98	39	22	98	46
11111111	2,896	62	97	41	31	98	41
Other (longitudinal)	4,216	54	86	59	34	87	67
Other (x-sectional)	1,194	42	58	100	36	64	100
*If ever in debt (total number of observations in debt/total number of observations)							

Table S3. Descriptive statistics of the highest non-mortgage debt quartile (note that all observations, same person can contribute twice).

	Highest amount quartile	Highest debt-to-income quartile	Highest debt-to-wealth quartile
Household debt			
In the highest amount quartile %	100	75	37
Median non-mortgage debt amount	13,223	12,167	4,590
In the highest debt-to-income quartile %	75	100	45
Median debt-to-income ratio	0.47	0.54	0.26
In the highest debt-to-wealth quartile %	37	45	100
Median debt-to-non-housing wealth ratio	1	1	19
Some mortgage debt %	48	42	35
Median mortgage debt £	0	0	0
Some non-mortgage debt %	100	100	100
subcategory: credit card debt %	62	62	62
subcategory: informal debt %	6	7	8
subcategory: other non-mortgage %	89	86	79
Age, income and wealth: median			
Age	58	59	59
Yearly income (not equivalised)	30,954	20,374	16,775
Gross non-housing wealth £	20,701	9,288	188
Education %			
Low	29	36	52
Intermediate	33	34	29
High	38	30	19
Household size %			
1	11	19	25
2	56	52	44
3	18	17	17
4 or more	15	13	14
Employment status %			
Employed	55	45	41
Self-employed	15	14	5
Seeking work	1	2	2
Sick and not seeking	4	8	16

Retired	21	25	28
Unoccupied	4	6	7
Marital status %			
Married or cohabiting	84	72	62
Single/never married	3	5	6
Widowed	3	6	9
Divorced or separated	10	17	23
Only longitudinal subsample.*			
How many observations in this category per persons (% of his/her observations)	39	37	47

Table S4. Descriptive statistics of the highest mortgage debt quartile (note that all observations, same person can contribute twice).

	Highest amount fourth	Highest debt-to-income fourth	Highest debt-to-wealth fourth
Household debt			
In the highest amount fourth %	100	68	36
Median mortgage debt amount	100,389	86,701	44,187
In the highest debt-to-income fourth %	68	100	44
Median debt-to-income ratio	3.03	3.89	1.94
In the highest debt-to-wealth fourth %	36	44	100
Median debt-to-non-housing wealth ratio	2	5	35
Some mortgage debt %	100	100	100
Some non-mortgage debt %	59	58	69
subcategory: credit card debt %	42	43	50
subcategory: informal debt %	4	5	5
subcategory: other non-mortgage %	43	39	49
Median non-mortgage debt £	1,543	889	1,871
Age, income and wealth: median			
Age	56	57	57
Yearly income (not equivalised)	36,021	19,803	22,176
Gross non-housing wealth £	46,389	17,787	975
Education %			
Low	20	29	40
Intermediate	34	34	33
High	47	37	27
Household size %			
1	8	17	16
2	48	44	44
3	24	21	23
4 or more	20	18	18
Employment status %			
Employed	60	49	58
Self-employed	20	19	9
Seeking work	1	2	1
Sick and not seeking	2	5	8
Retired	12	19	18
Unoccupied	5	7	6

Marital status %			
Married or cohabiting	87	73	73
Single/never married	2	4	5
Widowed	2	5	6
Divorced or separated	9	17	17
Only longitudinal subsample.*			
How many observations in this category per persons (% of his/her observations*)	48	45	47

Supplementary table S5. Results from linear regression models without person fixed effects for the associations between household debt and number of depressive symptoms (CES-D 8). Results from the regression models with different debt measures are presented: 1. debt amount quartiles 2. Debt-to-income quartiles and 3. Debt-to-wealth quartiles. SEs corrected for clustering within the first reported couple.

	(M1) Debt amount	(M2) Debt-to-income	(M3) Debt-to-wealth
No mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	0.013	-0.023	-0.052
	(0.043)	(0.039)	(0.038)
2nd fourth	-0.015	-0.041	-0.021
	(0.045)	(0.042)	(0.040)
3rd fourth	0.041	0.011	0.034
	(0.045)	(0.044)	(0.043)
4th fourth	0.036	0.103*	0.079
	(0.047)	(0.053)	(0.060)
No non-mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	0.259***	0.197***	0.029
	(0.036)	(0.033)	(0.028)
2nd fourth	0.235***	0.227***	0.149***
	(0.035)	(0.033)	(0.033)
3rd fourth	0.285***	0.254***	0.250***
	(0.036)	(0.036)	(0.036)
4th fourth	0.266***	0.373***	0.630***
	(0.038)	(0.042)	(0.052)
Observations	72,700	72,700	72,700
Clustered standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001			

Supplementary table S6. Results from linear regression models without person fixed effects for the associations between household debt and quality of life (CASP-19). Results from the regression models with different debt measures are presented: 1. debt amount quartiles 2. Debt-to-income quartiles and 3. Debt-to-wealth quartiles. SEs corrected for clustering within the first reported couple.

	(M1) Debt amount	(M2) Debt-to-income	(M3) Debt-to-wealth
No mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	-0.486*	-0.396+	0.251
	(0.231)	(0.217)	(0.217)
2nd fourth	-0.799***	-0.345	-0.160
	(0.237)	(0.220)	(0.220)
3rd fourth	-0.227	-0.552*	-0.578*
	(0.224)	(0.239)	(0.227)
4th fourth	-0.241	-0.394	-1.079***
	(0.295)	(0.288)	(0.318)
No non-mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	-1.803***	-1.526***	-0.464**
	(0.179)	(0.169)	(0.156)
2nd fourth	-1.574***	-1.548***	-0.945***
	(0.179)	(0.173)	(0.173)
3rd fourth	-1.931***	-1.830***	-1.744***
	(0.188)	(0.190)	(0.190)
4th fourth	-1.599***	-2.023***	-4.005***
	(0.207)	(0.214)	(0.262)
Observations	60,950	60,950	60,950
Clustered standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001			

Supplementary table S7. Results from linear regression models with person fixed effects for the associations between household debt and number of depressive symptoms (CES-D 8). Results from the regression models with different debt measures are presented: 1. debt amount quartiles 2. Debt-to-income quartiles and 3. Debt-to-wealth quartiles. SEs corrected for clustering within the first reported couple.

	(M1) Debt amount	(M2) Debt-to-income	(M3) Debt-to-wealth
No mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	-0.014	-0.052	-0.035
	(0.035)	(0.034)	(0.033)
2nd fourth	-0.038	0.006	0.003
	(0.038)	(0.037)	(0.036)
3rd fourth	0.035	0.011	0.004
	(0.041)	(0.042)	(0.041)
4th fourth	0.065	0.103*	0.066
	(0.045)	(0.047)	(0.052)
No non-mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	0.053+	0.018	0.001
	(0.028)	(0.027)	(0.025)
2nd fourth	0.034	0.073**	0.047+
	(0.027)	(0.027)	(0.027)
3rd fourth	0.084**	0.052+	0.073*
	(0.029)	(0.029)	(0.031)
4th fourth	0.061+	0.107**	0.165***
	(0.031)	(0.033)	(0.042)
Observations	69,576	69,576	69,576
Number of individuals	13,967	13,967	13,967
Clustered standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001			

Supplementary table S8. Results from linear regression models with person fixed effects for the associations between household debt and quality of life (CASP-19). Results from the regression models with different debt measures are presented: 1. debt amount quartiles 2. Debt-to-income quartiles and 3. Debt-to-wealth quartiles. SE corrected for clustering within the first reported couple.

	(M1) Debt amount	(M2) Debt-to-income	(M3) Debt-to-wealth
No mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	-0.257+	-0.277*	-0.208
	(0.146)	(0.137)	(0.130)
2nd fourth	-0.580***	-0.394**	-0.327*
	(0.146)	(0.148)	(0.143)
3rd fourth	-0.279+	-0.233	-0.395*
	(0.163)	(0.161)	(0.158)
4th fourth	-0.262	-0.594**	-0.619**
	(0.182)	(0.185)	(0.210)
No non-mortgage debt (ref.)	-	-	-
	(.)	(.)	(.)
1st fourth	-0.212*	-0.154	-0.072
	(0.105)	(0.099)	(0.093)
2nd fourth	-0.260*	-0.359***	-0.192+
	(0.107)	(0.101)	(0.105)
3rd fourth	-0.378***	-0.349**	-0.378**
	(0.108)	(0.114)	(0.115)
4th fourth	-0.372**	-0.392**	-0.920***
	(0.122)	(0.123)	(0.161)
Observations	57,569	57,569	57,569
Number of individuals	12,364	12,364	12,364
Clustered standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001			

Supplementary table S9. Socioeconomic control variables included in the regression models. Additionally, adjusted for age and the survey wave. SEs corrected for clustering within the first reported couple.

	Depressive symptoms (CES-D 8) - without individual fixed effects	Depressive symptoms (CES-D 8) - with individual fixed effects	Quality of life (CASP 19) - without individual fixed effects	Quality of life (CASP 19) - without individual fixed effects
Ln income	-0.12*** (0.013)	-0.02* (0.010)	0.99*** (0.074)	0.08+ (0.043)
Employee (ref.)	-	-	-	-
Self-employed	-0.06+ (0.033)	-0.02 (0.038)	1.05*** (0.208)	0.47** (0.160)
Seeking work	0.96*** (0.115)	0.26** (0.090)	-3.93*** (0.517)	-1.13*** (0.307)
Sick and not seeking	2.24*** (0.064)	0.51*** (0.061)	-10.93*** (0.291)	-2.20*** (0.230)
Retired	0.27*** (0.028)	-0.01 (0.025)	-0.63*** (0.155)	0.43*** (0.101)
Unoccupied	0.37*** (0.044)	-0.01 (0.038)	-1.84*** (0.238)	-0.05 (0.149)
Less than o-level or equiv (ref.)	-	-	-	-
O-level or equivalent	-0.28*** (0.030)	-	1.06*** (0.166)	-
Higher than a-level	-0.38*** (0.029)	-	2.14*** (0.164)	-
Male (ref.)	-	-	-	-
Female	0.31*** (0.022)	-	0.88*** (0.115)	-
People in household: 1 (ref.)	-	-	-	-
2	-0.19*** (0.055)	-0.20*** (0.055)	-0.79** (0.289)	-0.42+ (0.230)
3	-0.08 (0.061)	-0.18** (0.060)	-1.94*** (0.323)	-0.84*** (0.252)
4 or more	-0.10 (0.068)	-0.21** (0.068)	-2.19*** (0.369)	-1.17*** (0.287)
Married or cohabiting (ref.)	-	-	-	-
Single, never married	0.27*** (0.073)	0.28+ (0.145)	-2.51*** (0.382)	-0.09 (0.640)
Widowed	0.58*** (0.060)	0.60*** (0.071)	-1.79*** (0.321)	0.16 (0.292)
Divorced/seperated	0.50*** (0.061)	0.46*** (0.085)	-3.39*** (0.322)	-0.75* (0.340)

No non-mortgage debt (ref.)	-	-	-	-
Any non-mortgage debt	0.26*** (0.023)	0.06** (0.018)	-1.73*** (0.126)	-0.29*** (0.072)
No mortgage debt (ref.)	-	-	-	-
Any mortgage debt	0.02 (0.030)	0.00 (0.027)	-0.44** (0.165)	-0.35** (0.110)
Observations	72,700	69,576	60,950	57,569
Number of individuals		13,967		12,364
Clustered standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001				

Supplementary table S10. Additional analysis on the relationship between debts and mental wellbeing. Estimates (and their clustered standard errors) for models using a binary debt status, 'has some mortgage debt', and binary debt status, 'has some non-mortgage debt'. Results with alternative debt measures available upon request.

Subgroup:	Under SPA	Over SPA	Waves 2-8 & adjusted for LLI	Single	Partnered	Partnered & adjusted for partner's empl.
Linear model predicting number of depressive symptoms (higher is more)						
Mortgage	-0.01	0.09+	0.01	0.03	0.04	0.05
	(0.03)	(0.05)	(0.03)	(0.08)	(0.03)	(0.03)
Non-mortgage	0.29***	0.24***	0.23***	0.35***	0.23***	0.22***
	(0.03)	(0.03)	(0.02)	(0.05)	(0.03)	(0.03)
Number of observations	28,129	44,571	61,879	22,018	48,548	48,548
Linear model predicting quality of life (higher is better)						
Mortgage	-0.17	-0.84**	-0.48**	-0.06	-0.57**	-0.60**
	(0.18)	(0.30)	(0.17)	(0.39)	(0.19)	(0.18)
Non-mortgage	-1.80***	-1.65***	-1.52***	-1.81***	-1.68***	-1.58***
	(0.16)	(0.18)	(0.13)	(0.26)	(0.15)	(0.14)
Number of observations	24,422	36,528	51,852	16,611	42,657	42,657
Linear model predicting number of depressive symptoms with person FE						
Mortgage	0.04	-0.05	0.00	0.05	0.05	0.04
	(0.04)	(0.05)	(0.03)	(0.07)	(0.03)	(0.03)
Non-mortgage	0.07*	0.04	0.07**	0.10*	0.04+	0.04+
	(0.03)	(0.03)	(0.02)	(0.04)	(0.02)	(0.02)
Number of observations	26,493	43,083	60,686	21,112	46,510	46,510
Number of individuals	7,919	10,146	13,965	4,966	10,253	10,253
Linear model predicting quality of life with person FE						
Mortgage	-0.35*	-0.25	-0.29*	-0.62*	-0.42***	-0.41***
	(0.14)	(0.20)	(0.12)	(0.28)	(0.12)	(0.12)
Non-mortgage	-0.35***	-0.17+	-0.30***	-0.56***	-0.24**	-0.24**
	(0.10)	(0.10)	(0.08)	(0.16)	(0.08)	(0.08)

Number of observations	22,768	34,801	50,356	15,589	40,456	40,456
Number of individuals	7,180	8,952	12,363	4,058	9,295	9,295
Clustered standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. SPA = State pension age, LLI = Limiting long standing illness.						

Supplementary table S11. Additional analysis on the relationship between debts and mental wellbeing while adjusting for measures of gross wealth

	Depressive symptoms	Depressive symptoms with person FE	Quality of life	Quality of life with person FE
Mortgage debt-to-wealth quartile				
No mortgage debt (ref.)	-	-	-	-
	(.)	(.)	(.)	(.)
1st fourth	0.065+	-0.023	-0.454*	-0.321*
	(0.038)	(0.033)	(0.214)	(0.130)
2nd fourth	0.043	0.003	-0.484*	-0.381**
	(0.040)	(0.036)	(0.217)	(0.141)
3rd fourth	0.068	-0.008	-0.684**	-0.382*
	(0.043)	(0.041)	(0.228)	(0.158)
4th fourth	0.058	0.020	-0.816**	-0.430*
	(0.061)	(0.054)	(0.314)	(0.213)
Non-mortgage debt-to-wealth quartile				
No non-mortgage debt (ref.)	-	-	-	-
	(.)	(.)	(.)	(.)
1st fourth	0.099***	0.013	-0.876***	-0.146
	(0.028)	(0.025)	(0.154)	(0.094)
2nd fourth	0.133***	0.052*	-0.780***	-0.222*
	(0.033)	(0.027)	(0.170)	(0.105)
3rd fourth	0.134***	0.069*	-0.902***	-0.342**
	(0.036)	(0.031)	(0.188)	(0.115)
4th fourth	0.192***	0.113**	-0.988***	-0.567***
	(0.053)	(0.043)	(0.259)	(0.167)
Measures of gross wealth (ln tranformed)				
Housing wealth	-0.066***	0.003	0.396***	0.155**
	(0.008)	(0.012)	(0.045)	(0.050)
Non-housing wealth	-0.074***	-0.022***	0.520***	0.149***
	(0.005)	(0.005)	(0.027)	(0.020)
Observations	**72,700**	**69,576**	**60,950**	**57,569**
Number of individuals		**13,967**		**12,364**

Clustered standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Supplementary B: Asymmetric fixed effect models

As a sensitivity analysis, asymmetric fixed effect regression as proposed by Allison (2019) was conducted. This was motivated by a concern that the effect of transitions into indebtedness (or further into heavier debt burden) on mental wellbeing could differ in magnitude from the effect of transitions from indebtedness (or the lesser debt burden) to no indebtedness. In other words, the mental wellbeing effects of acquiring new debts may not be cancelled out by paying off these debts, or vice versa. The standard fixed effect model may hide this underlying pattern.

There are some theoretical reasons to believe that this may be the case. Getting rid of debts in later life might provide positive effects on mental health once obligations are fulfilled and there are no more debt payments. In contrast, acquiring new loans might not have immediate detrimental effects on mental health due to a temporal increase in consumption power and potential relief for other payment difficulties. Studying the directions of changes is also important for subsequent studies. It may provide suggestions about the suitability of the standard fixed effect models for the debt-mental health nexus investigations.

The asymmetry of the effect of paying off and acquiring new loans are tested using asymmetric fixed effect model as proposed by Allison (2019). What follows is an introduction to this test, which follows a notation by Allison's (2019), who also develops the formal data-generation model justifying the approach.

Testing the presence of asymmetric effects is done in four consecutive steps: In the first step, asymmetric difference scores of debt variables x_{it} for each person i and time (t=1…8.) are calculated as follows:

$$x_{it}^{+} = x_{it} - x_{i(t-1)}\ when\ x_{it} > x_{i(t-1)}$$

$$x_{it}^{+} = 0\ when\ x_{it} \leq x_{it-1}\ or\ x_{i(t-1)}\ not\ observed$$

$$x_{it}^{-} = -\left(x_{it} - x_{i(t-1)}\right)\ when\ x_{it} < x_{i(t-1)}$$

$$x_{it}^{-} = 0\ when\ x_{it} \geq x_{i(t-1)}\ or\ x_{it-1}\ not\ observed$$

Here x_{it}^{+} represent a positive change (acquiring new debts) and x_{it}^{-} negative change (getting rid of debts) in a given debt variable. These both variables are set to zero for occasions when there is no given change or when the change score is not observed (that is, s person's first observation).

In the second step, the accumulated sums of these asymmetric change scores for each person i since the time t are then calculated:

$$z_{it}^{+} = \sum_{s=1}^{t} x_{is}^{+}$$

$$z_{it}^{-} = \sum_{s=1}^{t} x_{is}^{-}$$

Where z_{it}^{+}represents the accumulation of observed positive changes in the debt variable (the number of times a person acquired new debts/ debt burden was increased) up to the time t for person i. The similar accumulation of observed negative changes are captured with z_{it}^{-} (the number of times a person paid off their debts/ debt burden was reduced). Note that when all variables used to calculate these scores are dichotomous (or set of dichotomous variables), the value of each of the two accumulation scores may range from 0 to t but the absolute value of their difference are maximum of one ($|z_{it}^{+} - z_{it}^{-}| \leq 1$).

The third step is a regression model with person fixed effect model and normal debt variables replaced by the accumulated sum scores from phase 2:

$$y_{it} = \beta_t wave + \beta^{+} z_{it}^{+} + \beta^{-} z_{it}^{-} + f_{\theta}(age_{it}) + \beta_{\mathrm{k}}\mathrm{covariates}_{\mathrm{it}} + \alpha_i + \varepsilon_{it}$$

In this linear regression model, the mental health outcome y_{it}, observed for observation i in the wave t [=1 …. 8]. $\beta_1 wave$ is wave specific intercept. β^{+} captures the effect of acquiring new debt (or increase in debt burden) and β^{-} captures the effect of getting rid of debt (or decrease in debt burden). In contrast to normal model, the effects of debts are allowed to differ by the direction of the change. Similar to standard models, the effect of ageing on mental wellbeing is added as quadratic function ($f_{\theta}(age_{it}) = \beta_3\, age_{it} + \beta_4 age_{it}^2$ and $\beta_{\mathrm{k}}\mathrm{covariates}_{\mathrm{it}}$ are observed time-varying sociodemographic and -economic covariates k. Person fixed effect α_i captures all time-constant factors.

Finally in the fourth step, the effect asymmetry is tested using Wald test of the two estimated parameters in the phase 3:

$$H_1: \quad -\beta^{-} \neq \beta^{+}$$

5 Heterogeneity in the debt and mental wellbeing link among older adults – combining population inference and target trial frameworks

Abstract

While debts are widely used financial tools, there is little discussion about their mental wellbeing implications for older adults. Older adults, particularly those not employed, are less likely to have increasing incomes to help them pay off their debts. This study investigates whether older adults with non-mortgage debts in different labour market states have lower mental wellbeing and, separately, whether it is likely that reducing their debts helps to improve mental wellbeing. Using the English Longitudinal Study of Ageing, the study focuses on the English context, which is particularly interesting due to the high levels of, and a unique policy approach to, private indebtedness.

The results indicate that people with debts have lower mental wellbeing (more depressive symptoms and lower quality of life) in all categories, but the mental pain linked to debts is stronger for people who are jobless (not working or retired). The analysis from an intervention perspective suggests that getting rid of debts may reduce depressive symptoms only among people who are jobless but may also improve quality of life among the retired and employed. Both these findings suggest that mental health services should work closely with debt advice when needed.

5.1 Introduction

This paper examines the debt-mental wellbeing connection and its moderation by labour market status, from the two separate but connected perspectives of population associations and causal effects. It does so while analysing representative data on older adults in England. Due to its ageing population, high prevalence of non-mortgage debts and unique policy approach to issues arising from indebtedness, England offers an interesting study context.

Across the Global North, consumer debts are frequently used and widely available and encouraged financial tools to redistribute resources from the future to the present. However, when debts became a problem, they may have devastating consequences at the personal level. People with a debt burden tend to report feelings of personal failure (Sweet 2018). Debt payments may cause stress and sleep problems (Hamilton, Wickens et al. 2019). Records of unpaid debts may limit access to affordable housing, internet subscriptions and even employment (Dwyer 2017). Debt collection actions may be traumatic events, and debt collectors may act in a threatening fashion (Deville 2015).

In an era of ageing populations, a focus on older adults is important. Older adults are familiar with debt and unlikely to be immune to the mental health consequences of debts (Zurlo, Yoon et al. 2014). In fact, they may be particularly vulnerable to mental distress arising from their debt payments because they, especially those not employed, are typically not in a position to be able to expect increasing incomes to cope with debts.

However, the available research on debt and mental wellbeing has often not clearly differentiated two fundamentally separate perspectives. These are population inference, that is, questions that aim to describe an actual population, and causal inference, that is, questions that aim to estimate the effects of interventions or changes of exposure in that population. While there is evidence that debts are associated with lower mental wellbeing, adjusting for other socioeconomic variables (Drentea and Reynolds 2012), it remains uncertain whether this association should be interpreted as a population association or as a causal effect.

Both population inference and causal inference (from observational data) are of importance and are aims of this paper, but without a deliberative distinction between the two, there is a risk of ineffective policy measures. From a policy viewpoint, an accurate description of the population at risk – how many people are affected, to what degree, and what kinds of characteristics and circumstances they have – is crucial, in the first place, in order to target support to the right people efficiently. In contrast, understanding the counterfactuals under different interventions is important in order to find the most effective forms of support. While analytically separate, questions of population and causal inference are very much connected – without knowing the right people to target the support at, the effects of the support cannot be defined.

Moreover, earlier research on older adults has ignored potential moderation of associations (referring to population inference) and causal effects (referring to causal inference). It is unclear whether debts are associated with, and cause, worse mental wellbeing similarly for all people or differently for people with different characteristics. This paper considers, in particular, such moderation by a person's labour market status. Not being in employment or retired (henceforth called joblessness in this paper), often ignored in the literature, may determine the extent to which debts are associated with worse mental wellbeing in older adults. Dealing with debts is less stressful with predictable income flows, which are provided by paid employment and retirement. In contrast, joblessness causes uncertainty regarding cash flow prospects in later life and thus weakens the ability to pay off debts. Low incomes and uncertainty may trigger hopelessness, debt payment difficulties and debt collection actions.

As an explanatory variable of interest, the paper focuses on non-mortgage debts (which are henceforth just called debts) because the association between mortgage debts and mental wellbeing is less clear (Hojman, Miranda et al. 2016). However, it is assumed that there are no spillover effects from non-mortgage debt to mortgage debt, and vice versa. The unit of analysis here is individual, but household debt is measured at benefit unit level.

The study uses two mental wellbeing outcome variables, depressive symptoms and quality of life summary score. The key moderating variable of labour market status is categorised as employed, retired or jobless. The jobless category consists of older adults who are unemployed, unable to work due to sickness, or not in the labour force

due to caring for family members, for example. This category is of interest because those neither participating in paid employment nor retired have a lower ability to cope with their debts and lower expected income in the future.

The first, population inference, perspective of this study investigates whether people who are jobless and with debt have lower mental wellbeing than one would expect knowing the separate associations of debt and joblessness with mental wellbeing alone. There is a clear policy implication of such a population descriptive question. For example, debt help organisations with limited resources need to decide which subgroups present the largest differences and most scope for potential positive effects of mental health interventions.

The second perspective focuses on a "what if" scenario. It conceptualises the parameters of interest using a target trial framework, adapted from epidemiological literature. It aims to estimate the effect of getting rid of debt on mental wellbeing and to investigate whether these effects vary by labour market status. The paper argues that this target trial framework is a useful tool worth introducing to social policy researchers to help them formulate clearly defined causal questions. The second perspective can, however, only provide tentative implications regarding whether and for whom there would be any mental wellbeing benefits of some interventions that help older adults to get debt free.

The paper begins with a description of the unique policy approach to private indebtedness in the UK, then discusses the link between debt and mental health, and finally provides an argument for treating labour market status as a key moderator in the debt-mental wellbeing association. This is followed by an introduction to the ELSA data, the measures used in the current study. Then the analytical plan for, and results of, the population inference and causal inference from observational data questions are presented. These show that while the mental pain linked to debts is observed in all labour market groups, the population association is largest in the jobless group. The causal inference from an observational data perspective, in which observational data are used to mimic a randomised controlled trial, shows that getting rid of debts predicts a smaller number of depressive symptoms among the jobless. The paper ends with a discussion section which argues that policymakers should consider further integration of mental and debt help services.

5.2 Background

Institutional context

The United Kingdom (UK) has witnessed substantial growth in the levels of household indebtedness in the last 50 years (Office for National Statistics 2020). It is estimated that around half of British adults have some non-mortgage debt, with the median amount owed at around £4,500 in 2016-18 (Office for National Statistics 2019). Cross-sectionally the level and amount of unsecured debt decreases curvilinearly with age, with a steeper decrease after mid-life (Hood, Joyce et al. 2018), but older adults often have debt. In Great Britain, the number of adults aged 55 and older with non-mortgage debts – often used interchangeably with financial or unsecured debts, albeit not as synonyms – has been increasing in recent years due to population ageing, standing at four million, around a fifth of the age-group, in 2016-2018 (Office for National Statistics 2019).

The widespread use of non-mortgage debts is no surprise. Debts are often convenient financial tools for the purchase of goods and services, alleviating financial shortfalls, and providing new economic opportunities. For most people with non-mortgage debts, these financial tools do not seem to cause significant problems. In the Wealth and Assets Survey (WAS) conducted between 2016-2018, 57% of British adults with financial debt reported that their debts were "not a problem at all", 30% reported debts to be "somewhat of a burden" and 14% "a heavy burden" (Office for National Statistics 2019).

Nevertheless, debts can cause social and economic hardship and exacerbate existing inequalities. Debts with worse terms are often targeted at people in disadvantageous socioeconomic circumstances without much choice of better options (Dwyer 2017). People with existing disadvantages are also more likely to experience daily disruptions arising from debts due to payment difficulties (Dwyer 2017). The troubles arising from debts may range from mental stress from debt payments to bailiff orders.

It is challenging to estimate the proportion of the population that experience such debt problems. This is because there is no widely shared view on the threshold

after which debts turn from useful financial tools into ”problem debts”. This is a limitation that precludes careful time-series analysis and prevalence estimates, and causes confusion in policy debates (Betti, Dourmashkin et al. 2007). According to a strict definition used in the WAS, some four percent of British households in 2016/2018 were identified as having a problem debt[4]. The WAS figures, however, differ substantially from the estimates presented by other organisations using different definitions (Palframan 2019).

The British policy approach to personal indebtedness has evolved within the wider background of the changing distributional landscape and role of public welfare provision. In a country with decreased public welfare provision – in the UK known as “austerity” – and a strong reliance on private savings to insure against social risks – “asset-based welfare” – easy access to credit has emerged as a substitute form of “safety net” (Soederberg 2014, Rowlingson, Appleyard et al. 2016, Dagdeviren, Balasuriya et al. 2019). It is argued that debts are used as a financial tool, without much choice, to substitute for a lack of savings and voids in social security, such as delays in payments of the main social assistance benefit, known as Universal Credit (Millar and Whiteford 2020).

Although the provision of formal debt help was less affected by the budget cuts from 2010 onwards, the crisis loans and Community Care Grants elements of the Social Fund [5] were terminated in 2013. Their role was, to a varying extent, transferred to local authorities (Gibbons 2015). For older individuals, the changes related to austerity have mainly affected people who are neither employed nor retired, especially long-term sick and disabled people, who have seen substantial restrictions in entitlement to both cash

[4] The definition “A household is defined as being in problem debt if it falls into one of the following two groups: *1. Liquidity problems*: a) household debt repayments represent at least 25% of net monthly income and at least one adult in the household reports falling behind with bills or credit commitments, or b) household is currently in two or more consecutive months arrears on bills or credit commitments and at least one adult in the household reports falling behind with bills or credit commitments
2. Solvency problems: a) household debt represents at least 20% of net annual income and at least one adult considers their debt a heavy burden” (ONS)

[5] The Social Fund was a form of social benefit intended for exceptional needs. It consisted of crisis loans, budgeting loans and Community Care grants Gibbons, D. (2015). "Where now for local welfare schemes." London: Centre for Responsible Credit.. Budgeting Loans are still provided by the Department for Work and Pensions.

and care (Burchardt, Obolenskaya et al. 2020). Employed older adults and the retired have been less affected by these cuts because their pensions have been secured.

Examples of the UK's policies on debt problems are shown in Figure 5.1. The approach has several distinct elements compared to the approaches taken by European welfare states. First, the preventative measures in the UK emphasise credit regulation, industry responsibility and financial literacy. Less weight is given in social security to income replacement to prevent people from falling into debt problems after income shocks, an approach taken in Northern European countries (Angel and Heitzmann 2015, Wiedemann 2018). Second, the non-profit sector is heavily involved in the provision of formal debt help and in alleviating debt problems, with a small role of some for-profit actors (Eurofound 2020). This is in contrast to other European countries in which formal debt help is often provided by local authorities or in the form of legal help or social work (Dubois and Anderson 2010, Alleweldt, Kara et al. 2014, Eurofound 2020). Third, the curative measures for debt problems are more debtor friendly in the UK than in continental European countries (Hoffmann 2012, Angel and Heitzmann 2015, König 2016, Eurofound 2020). For example, the UK offers Debt Relief Orders as a cheaper, nonjudicial and simplified alternative to traditional personal bankruptcy procedures. This type of "no income, no assets" policy measure is not available in many European countries (Heuer 2020). Thus, the lack of generous social insurance, and the sustained easy access to credit is, at least in principle, compensated for by the curative policies for debt problems.

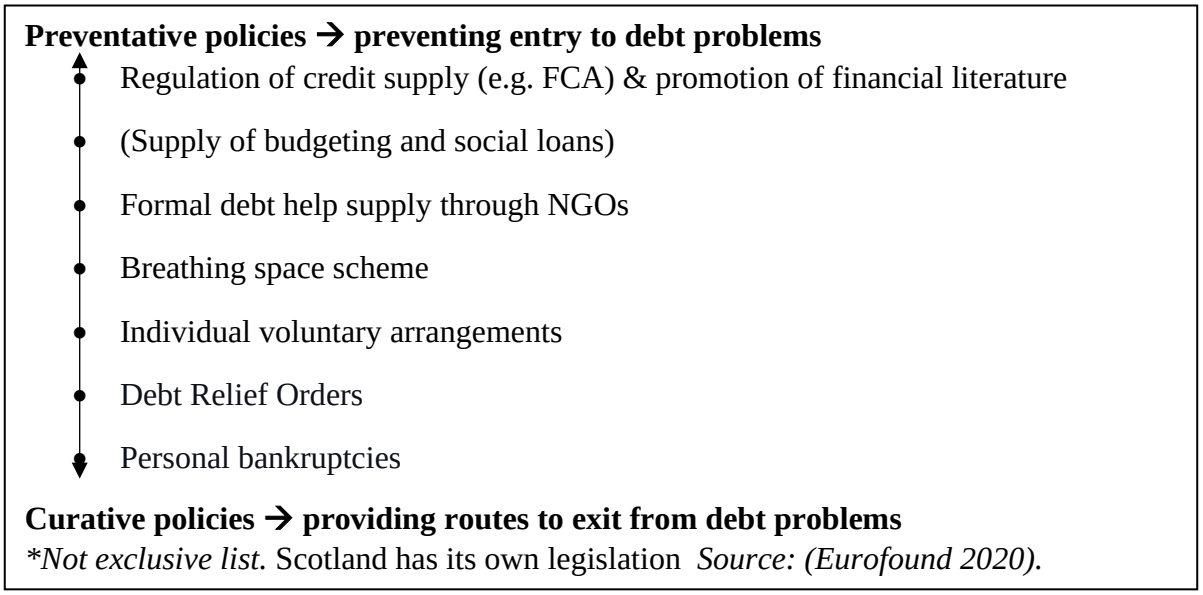


Figure 5.1 Examples of UK social policies to address debt problems*

The debate on personal indebtedness in the UK would thus benefit from a social epidemiological perspective. This overall design of debt policy – in so far as it has a conscious design at all – neglects the potential impact of problem debts on mental wellbeing. Very little is discussed about the implications of indebtedness for the population's (mental) health and wellbeing, especially among vulnerable population subgroups. Some important exceptions exist in the social policy literature (see (Balmer, Pleasence et al. 2006, French and McKillop 2017)), but these have not analysed older adults or vulnerable subgroups separately.

Social epidemiological understanding can shed light on multiple issues when analysing indebtedness in England. Although debt help organisations, which often see the most severe aspects of debt problems, emphasise the co-occurrence of debt and mental health problems in their reports (Bond and Holkar 2020), this issue is not translated into policies that, for example, integrate debt and mental health services. Furthermore, it is rarely considered whether there would be any mental health benefits

of policies that help people to get rid of their debts. This limits the discussion about the benefits of the debt help.

Debt and mental wellbeing

Research from the UK and elsewhere has consistently observed a relationship between household debt and depression. Systematic reviews have concluded that the association between non-housing debt and mental health is robust in different study settings and countries, whereas the association with mortgage or secured debt is less clear (Richardson, Elliott et al. 2013, Turunen and Hiilamo 2014).

The finding that people with non-mortgage debts tend to have a higher risk of depression and lower mental wellbeing (Richardson, Elliott et al. 2013) is, as such, very policy-relevant. However, as with numerous exposures in social epidemiology, there is debate on the extent to which this association can be interpreted as debts causing worse mental wellbeing. It is possible, and even likely, that the observed association reflects some third, unknown confounding factor, or that lower mental wellbeing causes indebtedness.

Previous observational studies on debt and mental wellbeing often fall far short of a meaningful causal interpretation. These issues in the context of social epidemiological research are debated at length elsewhere (Kaufman 2019), but, in short, the argument is that no causal interpretation can be provided chiefly because, in observational studies, clear causal questions have rarely been explicitly asked and separated from questions of population inference. As a result, the analytical approaches chosen are not designed to provide an answer to causal questions, and, it is further argued (Hernán 2018), the interpretations of the findings in these studies are left somewhere in the middle between descriptive population (what is) and causal (what if) inference. This is an important concern because social epidemiology as an academic discipline, like social policy, holds a mission-oriented approach towards improving population health and reducing unfair health inequalities, tasks for which a clear distinction between inference about actual population ("at whom to target help?") and inference about counterfactual scenarios under an intervention ("what works?") is needed. This paper argues that a target trial framework (García-Albéniz, Hsu et al. 2017) is a useful tool to help address such concerns.

Another key limitation in the previous research on debt and mental wellbeing is a lack of consideration of heterogeneity, in terms of the varied circumstances in which indebtedness is experienced and its causes across different characteristics or population groups. Neglecting this may lead to, in the worst cases, policy implications that are harmful for some subpopulations.

Debts are not depressing for all to the same extent. Qualitative investigations have suggested that debts are particularly stressful when combined with socioeconomic disadvantages such as long-term illness, unemployment or income poverty (Purdam and Prattley 2020). Some quantitative evidence also supports this line of argument (Hodson, Dwyer et al. 2014). However, the potential moderating role of labour market status in the association has not yet been investigated. Furthermore, the research on this topic has neglected older adults as a specific study population.

Joblessness may be a key moderating factor that determines the extent to which debts are linked to lower mental wellbeing among older adults. First, as discussed earlier, debts with worse terms are targeted to people in disadvantageous socioeconomic circumstances (Dwyer 2017), including those not employed. Such debts may be particularly stressful, thus causing a stronger link between debt status and mental wellbeing in older adults who are not employed. Second, being out of work implies lower incomes and a weaker current ability to cover debt payments, which may trigger lack of material resources, stress and potential debt collection actions. Third, unemployment may also have a serious effect on repayment ability in the longer run. A joblessness period in later life may weaken employment prospects and future pension income, and thereby affect people's subjective repayment ability to cope with debts in the long term. All these factors suggest that debts have a differential association with mental wellbeing in older adults in different labour market states.

Research questions

This study advances the research on debt and mental wellbeing in older adults by clearly separating questions of population inference from questions of intervention. It does so while studying the moderation of the connection between debt and depression by employment status. The research questions are:

- To what extent does the association between debt and mental wellbeing differ by labour market status in the older adult population in England?
- To what extent does the effect of getting rid of debt on mental wellbeing differ by labour market status in the older adult population in England?

5.3 Methods

Data and variables

The data set for this study is the English Longitudinal Study of Ageing (ELSA), which is an ongoing longitudinal household survey (Banks, Blake et al. 2019). This study uses data from ELSA waves 1-9, conducted approximately every two years between 2002/3-2018/9. ELSA aims to represent people aged 50 years and over living in England. The sample was drawn from earlier respondents to the Health Survey for England, which uses a two-stage stratified random sample selection process with postcode sectors and then households drawn from Royal Mail's Postcode Address File. The details of HSE sampling are provided in the cohort profile (Mindell, Biddulph et al. 2012)). To maintain the representativeness of the target population, the ELSA study was refreshed at waves 3, 4, 6, 7 and 9 with additional samples with the same inclusion criteria except for the birth year. Participants were followed up for re-interviews in the subsequent waves. The data was mainly collected via computer-assisted personal interviews (CAPI). Financial information, including household debt, was collected at the level of a benefit unit (couple with any dependent children) from a financial respondent when couples kept their finances together and from each individual otherwise. For this study, the harmonised, easy-to-use dataset provided by the Gateway to Global Aging Data (Beaumaster Sidney, Chien Sandy et al. 2019) was combined with individual ELSA data sets.

Measures

As an explanatory variable of interest, this study focuses on non-mortgage debt, measured at benefit unit level. Participants were asked whether they, or their partners, had any credit card debt, informal debt to relatives, friends or private individuals, or any other type of debt excluding mortgage or housing-related debt. These three categories were asked separately, but, for the purposes of this study, they were combined into a single dichotomous variable, which was coded 1 when the person, or other members of his/her benefit unit, reported any non-housing debt and 0 otherwise.

Two mental wellbeing outcome measures were used. The first is a continuous version of depressive symptom items reported in the eight-item Center for

Epidemiologic Studies Depression Scale (CES-D 8) (Turvey, Wallace et al. 1999). People were asked whether they felt the following depressive symptoms much of the time during the previous week (yes or no): depressed, everything was an effort, restless sleeping, felt happy (reverse coded), lonely, enjoyed life (reverse coded), sadness and unable to get going. The outcome ranged from 0 to 8, a higher value indicating a higher number of depressive symptoms. Second, quality of life was measured by the CASP-19 score. The details of this score are described in detail in previous articles (Hyde, Wiggins et al. 2003). The scale consisted of 19 items regarding control, autonomy, self-realisation and pleasure in life, each rated on a four-point scale. The theoretical range of this score was 0-57, a higher score reflecting a better quality of life. The score obtained from a self-completion survey.

The moderation variable was labour market status. This three-category variable was recoded from a self-reported employment status variable. Respondents were asked which category would best describe their situation from a list of seven options. For the purposes of this study this variable was recoded to employed (including self-employed), retired and jobless (including unemployed, permanently sick or disabled and looking after home or family member or other). This recoding was conducted to ensure that the groups were large enough to be analysed separately and reflected, with a reasonable proximity, the different socioeconomic circumstances that people faced. A self-reported employment status variable was preferred over other operationalisations, but other operationalisations were also tested, confirming the main findings.

5.4 Analytical approach and results

This study addresses the moderation of labour market status in the debt-mental wellbeing association from two perspectives. These two perspectives are presented here separately, but they are very much connected. The equations of the moderation scales and estimations are provided in the appendix.

First perspective – population inference of debt and mental wellbeing

The first perspective, investigating whether the mental burden associated with non-housing debt differs according to labour market status, describes the associations which exist between these variables in the actual population of people aged 50 and older in England. This is an instance of conventional finite-population survey estimation and inference. Association here is used to refer to differences in means between the groups of interest. The analysis uses cross-sectional survey weights and other information about the complex sampling design, which are provided by the ELSA team. The calculations were done using survey estimation procedures in Stata 15.

This perspective estimates the mean level of mental wellbeing measures in the population by debt and labour market status. To quantify the direction and extent of the moderating of labour market status, two moderation scales were used. The additive moderation scale quantifies the extent to which the combined association of debts and labour market status with mental wellbeing differs, in absolute terms, from the sum of their separate additive associations with the mental wellbeing outcome. The equation for this measure is shown in the appendix. There is additive moderation when this difference is different from zero. An alternative way of quantifying moderation is a multiplicative moderation scale in which the associations are compared in relative, rather than in absolute, terms. One of these relative associations measures is a ratio of means. The association moderation in the multiplicative scale quantifies the extent to which the combined, relative association of debt and moderation variable with the outcome differs from the product term of their separate, relative associations with the outcome. If the multiplicative modification differs from one, there is a multiplicative effect moderation. (VanderWeele and Knol 2014).

These measures were calculated for each of the nine waves of the ELSA. Depending on the wave, some 7 000 to 10 000 people of all ages contributed to this analysis. To account for non-response in the quality of life (CASP-19 score) score, the survey weights were further multiplied by manually calculated self-completion weights, in which age, sex, education and depression-related non-response bias was taken into consideration. The confidence intervals for the moderation measures were computed using predicted values from regression models and the delta method (Hosmer and

Lemeshow 1992) by taking advantage of Stata's "margins" and "nlcom" commands (VanderWeele and Knol 2014).

Table 5.1 presents the results. The mean number of depressive symptoms in 2018/9 ranged from 0.97 in the employed without debt group to 3.42 in people not employed or retired (the "jobless" category) and with debt. People with debt had more depressive symptoms than people without in all labour market categories throughout the period 2002/3-2018/9 (Figure 5.2). In 2018/9 the pooled difference in means was 0.22 depressive symptoms and the ratio of depressive symptoms was 1.16. In the jobless category, the association between debt and depression was, on the absolute scale, the greatest, with a difference in means of 0.89. On the additive moderation scale, this association in the jobless category was significantly higher than one would expect knowing the separate associations of debt and labour market status with depression.

Table 5.1 Association between debt and number of depressive symptoms (0-8 CES-D 8 score) by labour market status among older adults in 2018/2019 in England. ELSA wave 9.

	All (n=6771)	**Employed**	**Retired**	**Jobless***
A: E(Y | Debt = 0)	1.35	.97	1.39	2.53
B: E(Y | Debt = 1)	1.56	1.19	1.45	3.42
Difference (B-A)	.22	.22	.05	.89
95% CI	.08 - .35	.05 - .40	-.13 - .24	.30 - 1.48
Ratio of means (B/A)	1.16	1.23	1.04	1.35
95% CI	1.06 - 1.26	1.03 - 1.43	.91 - 1.17	1.10 - 1.61
Additive moderation**	-	-	-.17	.66
95% CI	-	-	-.43 - .09	.05 - 1.28
Multiplicative moderation***	-	-	.84	1.10
95% CI	-	-	.67 - 1.02	.82 - 1.37

* Jobless = Unemployed, sick or disabled, looking after home or family or other.
**Additive moderation scale= $B_{retired/jobless}$-$B_{employed}$-$A_{retired/jobless}$+$A_{employed}$)
*** Multiplicative moderation scale= ($B_{employed}$ $A_{retired/jobless}$)/($A_{employed}B_{retired/jobless}$))
95% confidence intervals were calculated using the Delta method.

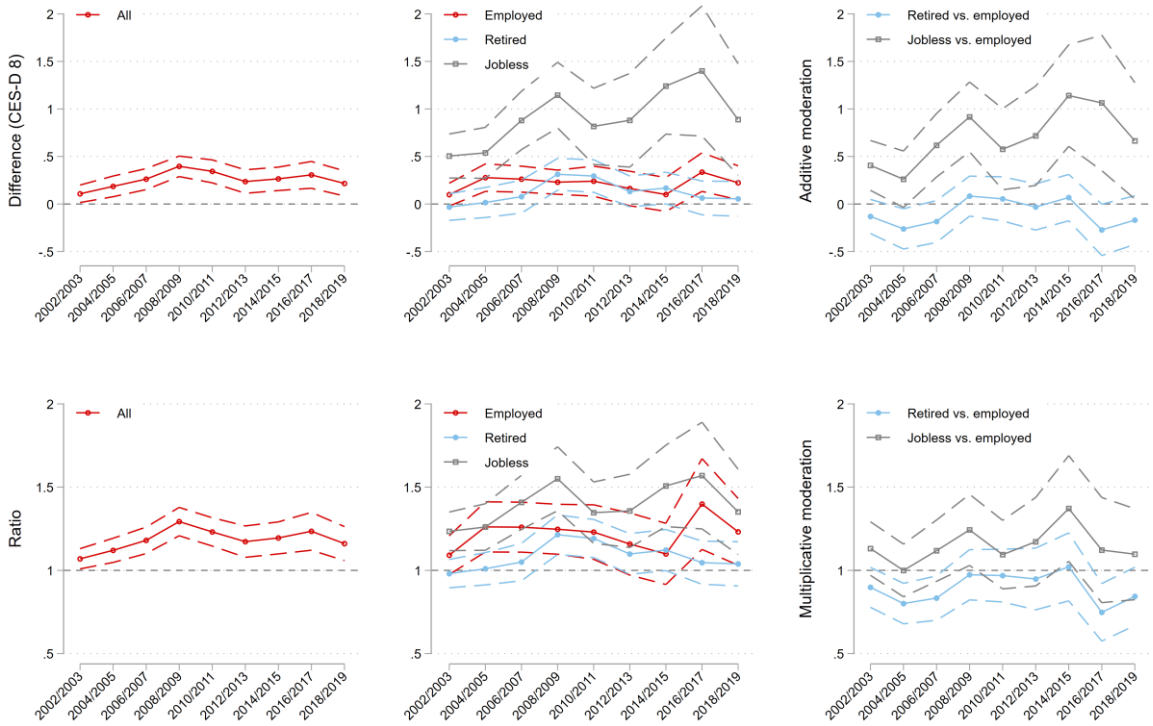


Figure 5.2 Association between debt and number of depressive symptoms by labour market status among older adults in England between 2002/3- 2018/19. 95% confidence intervals are calculated using the Delta method.

The findings for the quality of life score are shown in

Table 5.2 and Figure 5.3. In all labour market categories, those with debts had a lower quality of life score throughout the period 2002/3-2018/9. In 2018/2019, the association was strong in the jobless category, while the association was smaller in the employed and retired (but the null hypothesis of different from zero could not be rejected). There was some indication of association moderation on both additive and multiplicative moderation scales when the jobless category was compared to the employed category in each wave. Findings from each wave (Figure 5.3) indicated no consistent changes in this association in the study period.

Table 5.2 Association between debt and quality of life (0-57 CASP-19 score) by labour market status among older adults in 2018/2019 in England. 95% confidence intervals were calculated using the Delta method. ELSA wave 9.

	All (N=5672)	**Employed**	**Retired**	**Jobless***
A: E(Y | Debt = 0)	41.72	43.80	41.38	35.49
B: E(Y | Debt = 1)	40.64	42.17	41.09	32.64
Difference (B-A)	-1.08	-1.63	-.29	-2.84
95% CI	-1.79 - -.37	-2.69 - -.57	-1.28 - .69	-5.64 - -.05
Ratio of means (B/A)	.97	.96	.99	.92
95% CI	.96 - .99	.94 - .99	.97 - 1.02	.84 - 1.00
Additive moderation**	-	-	1.34	-1.21
95% CI	-	-	-.10 - 2.78	-4.19 - 1.76
Multiplicative moderation***	-	-	1.03	.96
95% CI	-	-	1.00 - 1.07	.87 - 1.04

* Jobless = Unemployed, sick or disabled, looking after home or family or other.
**Additive moderation scale= $B_{retired/jobless}$-$B_{employed}$-$A_{retired/jobless}$+$A_{employed}$)
*** Multiplicative moderation scale= ($B_{employed}$ $A_{retired/jobless}$)/($A_{employed}B_{retired/jobless}$))

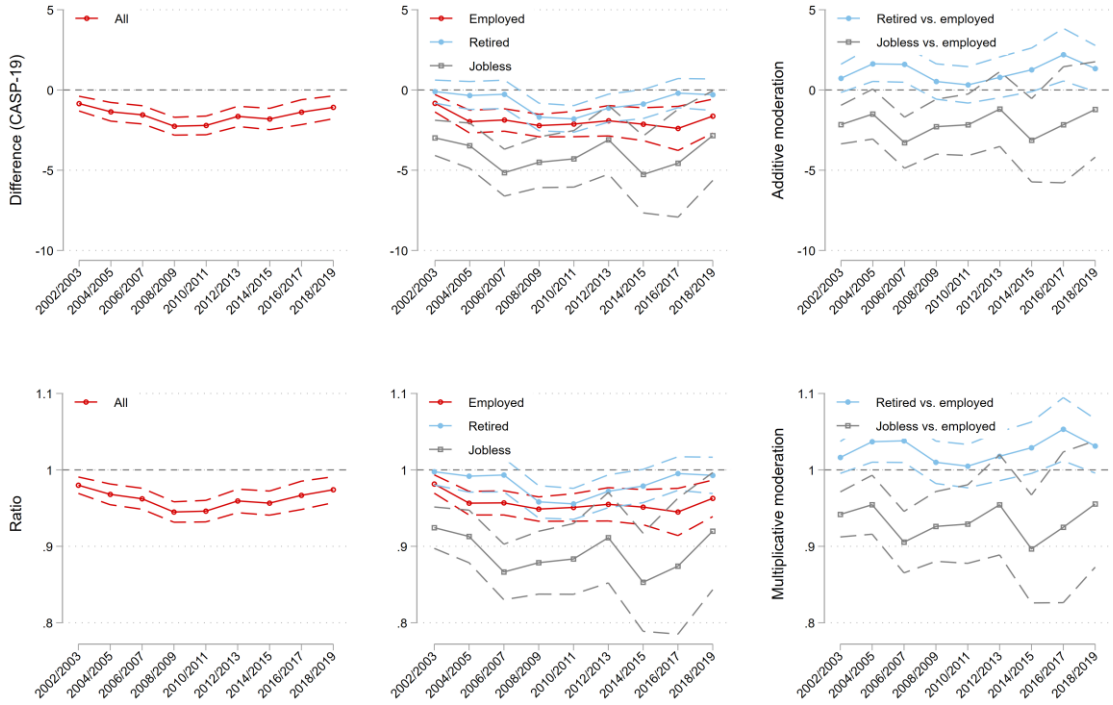


Figure 5.3 Association between debt and quality of life (CASP-19 score) by labour market status among older adults in England between 2002/3- 2018/19. 95% confidence intervals are calculated using the Delta method.

In sum, these findings from a population inference perspective show that the link between debt and mental wellbeing is particularly strong among older adults who are jobless. These findings are, it is worth noting, limited by the fact that people tend to misreport their debts (Zinman 2009)[6]. Another limitation here is that there was no specific information about debt types.

These descriptive findings showed that debt is more closely linked to lower mental wellbeing when combined with joblessness. This calls for researchers and people working with debt not to decontextualise debts from the individual socioeconomic circumstances in which debt is experienced.

It is not surprising to find such an association (Richardson, Elliott et al. 2013), and also among older adults (Zurlo, Yoon et al. 2014), but the key contribution here, however, is showing that the strength of this association varies by labour market status. For those who were jobless (long-term sick/disabled, unemployed, or otherwise out of the labour market but not yet retired), the association between debt and depressive symptoms was surprisingly strong given the separate associations of joblessness and debt with mental wellbeing.

Second perspective - "What if" older adults got rid of their debts?

The second research question - to what extent does the effect of getting rid of debt on mental wellbeing differ by labour market status? - is a question about causal effects. It needs to be addressed using the language and methods of causal inference, allowing for the fact that the data are observational rather than experimental, and exploiting their longitudinal nature and measured confounding variables. Combining them with the survey weights in the probability sample of ELSA then also allows the estimated causal effects to be generalised to the wider target population beyond the sample.

It is useful to think of the analysis presented as a set of non-randomised pseudo-trials (García-Albéniz, Hsu et al. 2017). Conceptualising observational analysis as pseudo-trials helps to avoid the usual pitfalls in causal inference from observational

[6] **This may be a serious concern in this study if those with elevated depression (and greater shame due to their debts) are more prone to misreporting and therefore cause underestimation of the associations.**

data, including ill-defined causal questions, ill-defined study population, unclear comparison group and conditioning on post-treatment variables.[7] The target trial of interest is summarised in the PICO framework (Schardt, Adams et al. 2007) in Table 5.3. The target populations of interest are (a) employed (b) retired (c) jobless (not employed nor retired) older adults aged 50 to 80 in England holding some non-housing debt at wave t. The intervention is getting rid of debts, regardless of the amount, within the approximately two-year window, between the baseline (wave t) and follow-up (the subsequent wave t+1). The comparison group consists of people who did not get rid of their debts, that is who were in debt in the baseline and the follow-up, regardless of the amount to be paid. The two outcomes analysed, both measured at the follow-up, were number of depressive symptoms and quality of life (CASP-19 score).

[7] Prominent statistician W. G. Cochran already argued in 1965 that "The planner of an observational study should always ask himself: How would the study be conducted if it were possible to do it by controlled experimentation" Cochran, W. (1965). "The Planning of Observational Studies of Human Populations." Journal of the Royal Statistical Society: Series A (General) **128**(2): 234-255.

Table 5.3 Definition of the target non-randomised "pseudo" trial in the PICO framework.

Population	=	(a) Employed, (b) retired (c) jobless older adults aged 50 to 80 in England and holding some non-mortgage debt at time t (eight periods through 2002/3-2018/9).
Intervention	=	Getting rid of their debts altogether, regardless of the amount, within an approximate, two-year time window before time t+1 (the subsequent wave).
Comparison	=	The comparison group was the peers not getting rid of their debts, i.e. those observed also being in debt at t+1.
Outcome	=	Number of depressive symptoms and CASP-19 score at time t+1.

The sample for this perspective differed from the sample used in the first perspective. The inclusion criteria for the trial were being aged between 50 and 80 and having some debt in the baseline. People with no missing variables on pre-treatment characteristics at baseline and follow-up data on outcome were included in the analysis. Adults older than 80 were excluded because there were very few people aged 81 or older with debts. Furthermore, when calculating the population average treatment effect (see detail below), the observations without cross-sectional weights were excluded.

Eight such pseudo-trials were considered, each commencing every two years throughout the period 2002-2017. Furthermore, a pooled trial was conducted while pooling data from all waves together and analysing them in a single model, providing a summary effect estimate.

Using the inverse probability treatment weighting (IPTW) technique, this study aims to minimise the confounding bias, the inherent problem in observational studies arising from the fact that the observed treatment (getting rid of debts) and the outcome (mental wellbeing) may both be affected by pre-treatment characteristics (Hernan and Robins 2020). Weighting the observed data with IPTW in effect creates a pseudo-population in which the distribution of those pre-treatment characteristics which are used to define the weights is similar between the treated and comparison groups. IPTW thus breaks the link between the measured pre-treatment characteristics and treatment. The key untestable assumption behind this estimation is no unmeasured confounding, that is that the variables used for the weighting are sufficient (Stuart 2010). The credibility of this assumption is discussed in detail after presenting the results.

The inverse probability treatment weights are calculated as inverses of propensity scores, fitted probabilities of the treatment (getting rid of debts) given measured pre-treatment variables. These probabilities were calculated from an estimated logistic regression model for the treatment, where the explanatory variables included sociodemographic variables (age [continuous], age square, sex, marital status, number of household residents, number of children, place of birth [the UK or elsewhere]), socioeconomic variables (specific employment status [not the recoded version], education, income, wealth and non-housing wealth, mortgage, amount of debt, amount of credit card debt, home-owner), health (physical activity, memory score, number of depressive symptoms, ever had severe ill-health conditions [high blood pressure, cancer, heart problems, lung disease, stroke, arthritis], functional limitations in daily activities), survey year and several characteristics of the spouse if any (employment status and age). Furthermore, in the CASP-19 analysis, CASP-19 score at time t was also included. Some interactions with the moderating labour market status were also included.

The IPTW can be used to calculate an estimate of the "sample average treatment effect", that is the effect of getting rid of debts on mental wellbeing for the respondents who are included in the observed sample (definitions of these causal effects and their estimators are given in the appendix). However, the IPTW technique can also be exploited to estimate the effect among the population of people from which the sample was drawn ("population average treatment effect"), using estimators of the same form but with the weights modified to also include the ELSA survey weights. Here this was done by multiplying the IPTW by the cross-sectional survey weights at time t and, because some people are not observed in time t+1, by attrition weights between t and t+1 (attrition weights were calculated similarly to IPTW, but age, education, limitations in daily activities survey wave and labour market status were used as predictors of the attrition). The estimates for the sample average treatment effects are provided in the appendix, while population average treatment effects are presented as main results. These are of foremost interest given their policy relevance.

Estimates of labour market status specific average treatment effects were obtained by calculating the effects separately for respondents with different statuses. Measures of moderation of the causal effects by labour market status were calculated analogously with the measures of moderation of associations discussed above (see the

appendix for their formulas). Standard errors of all of the estimates were calculated using bootstrap resampling with 1,000 replications per model.

Next the results are presented. The balance characteristics of the pooled trial show that the inverse probability treatment weighting (IPTW) created a pseudo population in which the distribution of the pre-treatment characteristics was similar between the treated and comparison groups (provided in Supplementary Tables 3-5).

Table 5.4 presents the results from the IPTW population pooled trial using the number of depressive symptoms as an outcome. Figure 5.4 presents the estimates from the eight individual trials and the pooled estimates for the population. Shown in the fifth row of Table 4, among the employed and retired, none of the models was able to reject the null effects. In the jobless category, by contrast, the population average treatment effect estimates indicated that being in a treated group was linked to an average reduction of 0.27 depressive symptoms, compared to the comparison groups who did not get rid of their debts. This is equal to a 9% reduction. While the wave-specific analysis did not show significant effects, the point estimates pointed mainly in the same direction. It is worth noting here that similar findings were obtained with the sample average treatment effect model, which are shown in Supplementary Figure 1.

Table 5.4 Results from PATE (using weights IPTW*cross-sectional weights*attrition weights) model with continuous number of depressive symptoms as an outcome. Estimated average numbers of depressive symptoms if individuals in the population remained in debt at time t+1 and if they got rid of their debts and their differences. 95% normal confidence intervals are calculated using bootstrapping (1000 replications).

	All (n=14565 (5629 treated))	**Employed (n**=7064 (2390))	**Retired (n**=5248 (2415))	**Jobless* (n**=2253 (824))
A: Comparison: in debt also t+1	1.64	1.20	1.62	3.05
B: Treated: got rid of debt before t+1	1.57	1.19	1.61	2.78
Difference in means (B-A)	-.06	-.02	-.01	-.27
95% CI	-.14 - .01	-.12 - .08	-.13 - .11	-.49 – (-.06)
Ratio of means (B/A)	.96	.98	.99	.91
95% CI	.92 - 1.01	.91 - 1.07	.92 - 1.07	.84 - .98
Additive moderation**	-	-	.01	-.26
95% CI	-	-	-.15 - .16	-.49 – (-.02)
Multiplicative moderation***	-	-	1.01	.92
95% CI	-	-	.90 - 1.12	.82 - 1.04

* Jobless = Unemployed, sick or disabled, looking after home or family or other.
**Additive moderation scale= $B_{retired/jobless}$-$B_{employed}$-$A_{retired/jobless}$+$A_{employed}$
*** Multiplicative moderation scale= ($B_{employed}$ $A_{retired/jobless}$)/($A_{employed}B_{retired/jobless}$))

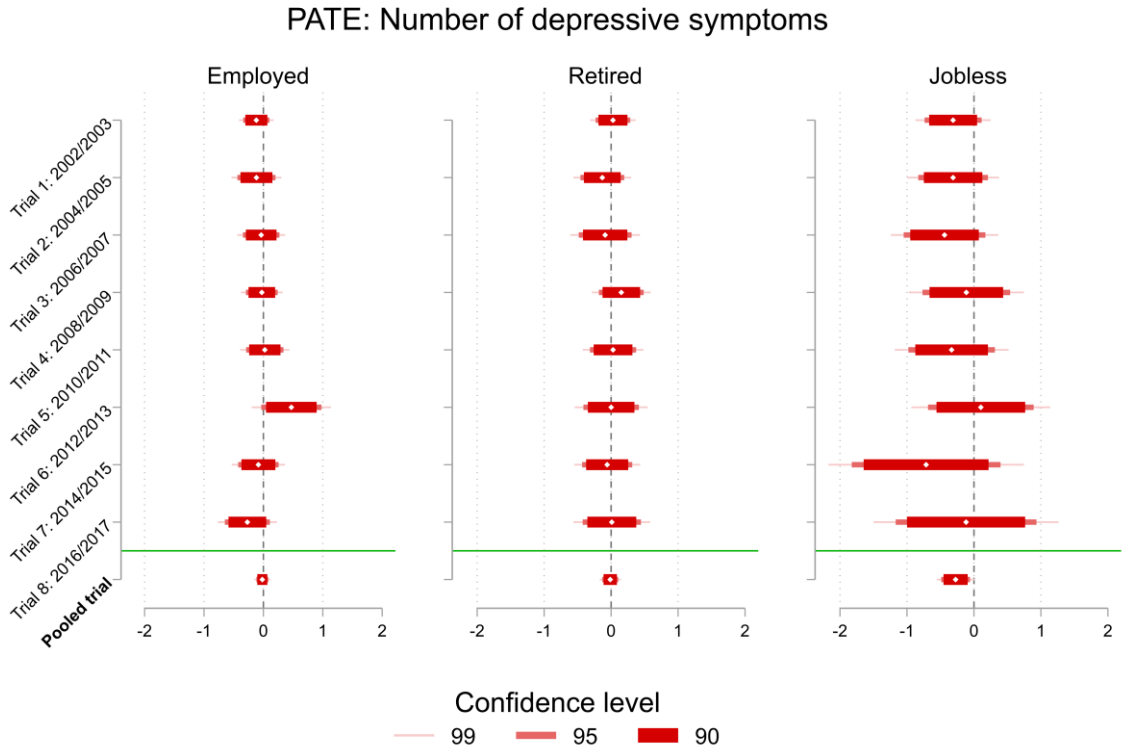


Figure 5.4 Results from IPTW for the population (PATE, IPTW multiplied by cross-sectional weights at time t and attrition weights). Number of depressive symptoms (CES-D 8) is the continuous outcome. Horizontal axis is mean differences in the outcome in original scale. Normal confidence intervals are calculated using bootstrapping (1000 replications). Number of observations per trial are shown in Supplementary Table 1

The results using the quality of life score as outcome variable are shown in Table 5.5. The wave-specific estimates are shown in Figure 5.5. These show that getting rid of debts was linked to a higher quality of life in all labour market categories with no evidence of effect moderation on either additive or multiplicative scales. The difference between the treated and comparison groups was 0.86 points on the original scale. The individual trials showed similar effects and estimates in the same direction. Almost identical estimates were obtained with the sample average treatment effect model, shown in Supplementary Figure 2.

Table 5.5 Results from PATE (using weights IPTW*cross-sectional weights*attrition weights) model with continuous quality of life score (CASP-19) as an outcome. Estimated average of the quality of life score if individuals in the population remained in debt at time t+1 and if they got rid of their debts and their differences. 95% normal confidence intervals are calculated using bootstrapping (1000 replications).

	All (n=11398 (of which 4398 treated)	**Employed (n**=5663 (1939))	**Retired (n**=4110 (1891))	**Jobless* (n**=1625 (568))
A: Y of Comparison: in debt also t+1	39.87	41.88	39.82	33.46
B: Y of Treated: got rid of debt before t+1	40.73	42.66	40.29	35.13
Difference in means (B-A)	.86	.79	.47	1.67
95% CI	.55 - 1.17	.31 - 1.26	-.12 - 1.06	.58 - 2.75
Ratio of means (B/A)	1.02	1.02	1.01	1.05
95% CI	1.01 - 1.03	1.01 - 1.03	1.00 - 1.03	1.02 - 1.08
Additive moderation**	-	-	-.31	.88
95% CI	-	-	-1.16 - .53	-.32 - 2.09
Multiplicative moderation***	-	-	.99	1.03
95% CI	-	-	.97 - 1.01	1.00 - 1.07

* Jobless = Unemployed, sick or disabled, looking after home or family or other.
**Additive moderation scale= $B_{retired/jobless}$-$B_{employed}$-$A_{retired/jobless}$+$A_{employed}$)
*** Multiplicative moderation scale= ($B_{employed}$ $A_{retired/jobless}$)/($A_{employed}B_{retired/jobless}$))

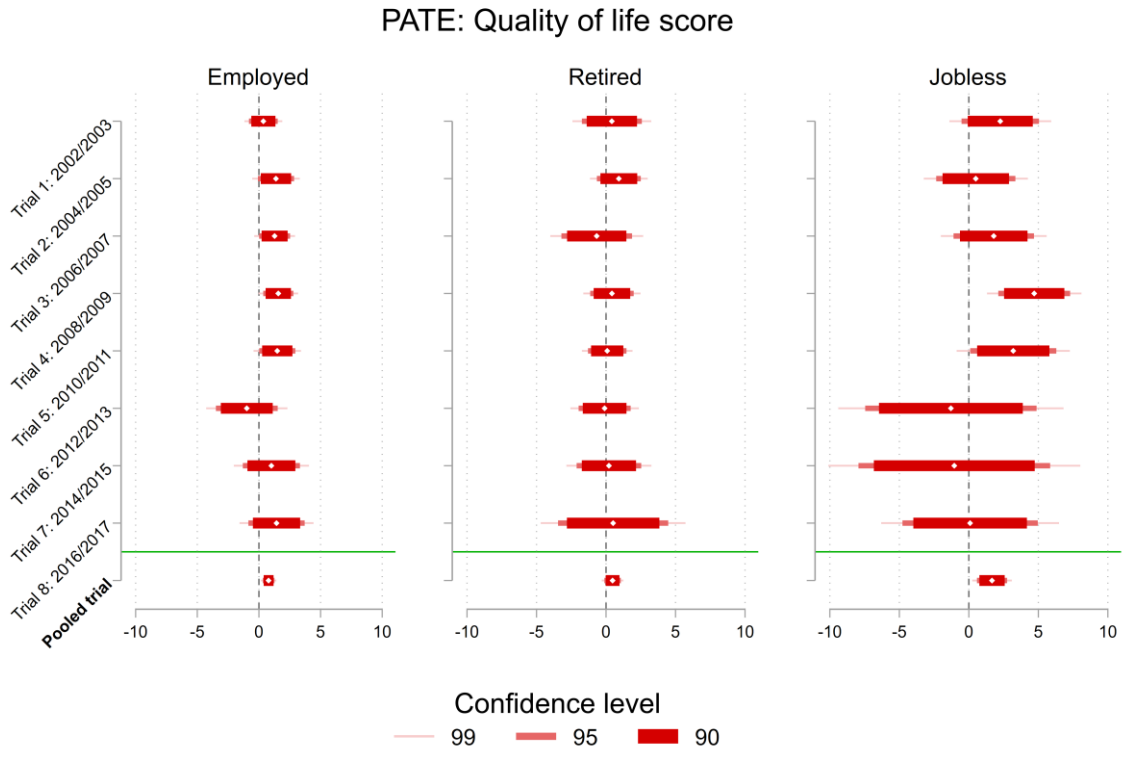


Figure 5.5 Results from IPTW for the population (PATE, IPTW multiplied by cross-sectional weights at time t and attrition weights). Quality of life score (CASP-19) is the continuous outcome. Horizontal axis is mean differences in the outcome in original scale between the treated and comparison groups in each trial and the pooled summary estimate. 95% normal confidence intervals are calculated using bootstrapping (1000 replications). Number of observations per trial are shown in Supplementary Table 2.

It is worth reiterating that the critical assumption behind these estimates is that all pre-treatment characteristics that affect the treatment and outcome are measured either directly or indirectly via the measured variables which were used to calculate the estimated propensity scores. The extent to which unmeasured confounding factors are present cannot be directly tested. It is, however, important to speculate whether the estimates presented are under- or over-estimates if this assumption does not hold.

It is also assumed that no multiple versions of treatment exist, which is unlikely to fully hold. There are many ways getting rid of debts, for example, paying them off all at once, with steady repayments, via debt collection actions or via personal bankruptcy. Therefore, the estimates obtained should be conceptualised as some unknown weighted average of the varying ways in which people got rid of their debts vs. varying ways in which people did not. Furthermore, a key untestable assumption is that getting rid of debts should precede the mental wellbeing outcome.

This claim that getting rid of debts may improve mental wellbeing in people in disadvantageous labour market positions should be assessed alongside the wider evidence available. The claim is supported not only by the previous evidence, but also wider scientific understanding of the causes of mental wellbeing. Clear mechanisms for the causal link from debts to mental health problems exist, which include shame, stress and experienced stigma, documented in several qualitative investigations (Sweet, DuBois et al. 2018, Purdam and Prattley 2020).

Some early quantitative investigations, relying on the instrumental variable (IV) and policy change designs, support these findings that debts cause mental health problems, and getting rid of them improves mental wellbeing. In the UK, using an IV approach, Gathergood (Gathergood 2012) reports a causal relationship between self-reported debt problems and mental distress. In the US, a working paper by Lee (Lee 2019) showed that access to payday lending increased the suicide rate. In Singapore, Ong et al (Ong, Theseira et al. 2019) report that a debt-relief programme reduced the risk of anxiety. In the US, Dobbie and Song (Dobbie and Song 2015) showed that debt relief via consumer bankruptcy reduced mortality (their study did not include any mental health-related outcomes).

However, unlike these studies, this study used a confounder-control type of approach by breaking the link between pre-treatment characteristics and the treatment. The analysis here relied on a different set of assumptions to the previous studies. In particular, previous causal estimates are obtained from units (people) that may not be representative, without assumptions, of actual populations. This study thus provided additional support for the causal claims that reducing debt may improve mental wellbeing among disadvantaged subpopulations. These findings support the idea that helping reduce debt may improve mental wellbeing. It is worth noting that people who were in the jobless category would be more eligible for the Debt Relief Order (DRO), a policy measure which would write off debts. Calculations based on wealth and debt amount (criteria on spare income and previous DRO were not taken into account) suggested that no more than a third of people in the jobless category may be eligible for DRO compared to less than 15% in the retired and less than 10% in the employed groups. This would suggest that the DRO eligibility criteria target the policy measure effectively, but subsequent studies are needed to assess the mental health effects of DROs.

5.5 Discussion

In quantitative social sciences, there have been increasing concerns regarding the ambiguity of the parameters of interest (Lundberg, Johnson et al. 2021). Social policy literature is no exception in these concerns. This paper attempted to take these concerns seriously while embracing not only the importance of the description of a well-defined population, that is population inference, but also considering separately potential counterfactual in that population. While doing so, the study investigated the extent to which the relationship between debt and mental wellbeing is moderated by labour market status. The first perspective focused on the association between debt and mental wellbeing in older adults in England. This was a question of population inferences, that is, description of an actual population, which is far more difficult, and important, than description of the sample to be used in subsequent analysis, an approach often taken. This perspective showed that older adults with debt in all labour market status

categories had a higher number of depressive symptoms and lower quality of life than the people who were debt free. However, the link between debt and mental wellbeing was particularly strong among the jobless.

This finding has clear policy implications. Targeted mental health services and further integration of mental and debt help services are essential. The fact that, in the UK, debt help is provided by the third sector, rather than the public sector, may allow for more agility in adopting innovative ways to improve the mental wellbeing of people in problem debt. Some attempt to integrate mental health advice with debt help already exists, but approaches with rigorous scientific evaluation of their effectiveness are needed. There is currently a lack of evidence on the best practices for integrating mental health and debt help.

The second part of this paper aimed to investigate, within the limitations of observational data, the causal effect of getting rid of debts on mental wellbeing in older adults in different labour market states. This analysis using inverse probability treatment weighting suggested that getting rid of debts may slightly reduce the number of depressive symptoms in people who were jobless before the treatment. Getting rid of debt was also linked to a small improvement in quality of life for all, without evidence of effect moderation by labour market status.

These findings assume no unmeasured confounding and, while not useless, are of course greatly uncertain. In this context, there is a tendency to avoid causal language altogether in studies using observational data without quasi-experiment or instrumental variable type design. Studies often refer to their estimates of interest as “associations”, which leaves several different – including both population description and causal – interpretations open. Nevertheless, this study made the deliberate, and one could argue still unconventional, decision to use causal language despite being a study design without any “exogenous factors”. This decision was informed by arguments in epidemiological research that using causal language helps to define clear causal parameters of interest.

This clarity of parameters of interest, in turn, helps to alleviate concerns about the ambiguity of the research questions, helps to avoid problems in the analytical approaches, helps understanding and transparency about the assumptions made, and makes the interpretation of the results clearer (Hernán 2018). The methodological

approach taken in this paper may thus, hopefully, provoke debate about the parameters of interest and language used when describing them in the social policy literature. The paper put forward an argument that, in this context, a target-trial framework, used in epidemiology, is also a useful mental tool for social policy scholars.

From a policy point of view, it is worth noting that there have been few intervention studies on the effect of reducing debt or debt help services on mental health outcomes. For example, *Debt Counselling for Depression in Primary Care: an adaptive randomised controlled pilot trial (DeCoDer)* focused on the clinical effectiveness of additional debt counselling advice on top of the usual care for people with depression and debt (Gabbay, Ring et al. 2017). This pilot study was terminated due to recruitment delays, and thus the sample was determined to be too small for statistical analysis (Gabbay, Ring et al. 2017). This experience perhaps reflects the challenges in conducting trials among participants with economic and social vulnerabilities. It may be that alternative study designs, such as qualitative and comprehensive impact assessments, are needed to evaluate the mental health aspects of debt help.

In many countries, easy access to credit is combined with institutional structures in which debt problems have serious consequences for people's lives, including, but not limited to, access to affordable housing and internet subscription. There is a demand for various forms of credit products, for example, to overcome transient economic difficulties, but policies are needed to balance the increasing availability of credit with potential routes out of heavy indebtedness among older adults. This study did not investigate the effectiveness of these types of policy measures. However, evidence exists, for example, from the US context, indicating that consumer bankruptcy legislation may improve various debtor outcomes, such as longevity, incomes and employment (Dobbie and Song 2015). Studying such effects on mental health and in other country contexts is vital.

Supplementary materials for the second paper

Supplementary Table 1. Number of observations per trial. PATE CESD-D sample. Brackets is the number of treated observations.

	All	Employed	Retired	Not employed/ retired
Trial 1	2689 (992)	1394 (435)	799 (396)	496 (161)
Trial 2	1966 (773)	928 (330)	664 (296)	374 (147)
Trial 3	1879 (721)	994 (332)	567 (276)	318 (113)
Trial 4	2135 (815)	1119 (386)	698 (319)	318 (110)
Trial 5	1708 (686)	779 (268)	685 (319)	244 (99)
Trial 6	1591 (608)	762 (263)	621 (269)	208 (76)
Trial 7	1353 (494)	615 (197)	585 (245)	153 (52)
Trial 8	1185 (514)	454 (172)	604 (284)	127 (58)
Total	14506 (5603)	7045 (2383)	5223 (2404)	2238 (816)

Supplementary Table 2. Number of observations per trial. PATE CASP-19 sample. Brackets is the number of treated observations.

	All	**Employed**	**Retired**	**Not employed/ retired**
Trial 1	2111 (776)	1166 (369)	588 (295)	357 (112)
Trial 2	1478 (584)	735 (269)	480 (214)	263 (101)
Trial 3	1423 (548)	758 (256)	445 (216)	220 (76)
Trial 4	1710 (655)	895 (309)	583 (267)	232 (79)
Trial 5	1372 (533)	628 (211)	559 (249)	185 (73)
Trial 6	1268 (481)	612 (217)	501 (214)	155 (50)
Trial 7	1057 (388)	483 (156)	464 (200)	110 (32)
Trial 8	948 (423)	371 (147)	481 (234)	96 (42)
Total	11367 (4388)	5648 (1934)	4101 (1889)	1618 (565)

Supplementary Table 3. Balance characteristics before and after weighting. SATE sample shown (the population average treatment effect was not shown given the use of sampling weights). Employed subgroup.

Variable	Raw mean not treated	Raw mean treated	Standardised difference	Weighted mean not treated	Weighted mean treated	Standardised difference
Any credit card debt						
No	0.31	0.51	0.42	0.38	0.37	-0.01
Yes	0.69	0.49	-0.42	0.62	0.63	0.01
Whether own home						
No	0.14	0.10	-0.12	0.14	0.13	-0.03
Yes	0.86	0.90	0.12	0.86	0.87	0.03
Number of people in household						
1	0.11	0.11	0.00	0.11	0.11	-0.02
2	0.50	0.53	0.07	0.51	0.52	0.01
3	0.22	0.21	-0.04	0.21	0.21	0.01
4 or more	0.17	0.15	-0.06	0.16	0.16	-0.00
Any mortgage debt						
No	0.45	0.57	0.24	0.49	0.49	0.00
Yes	0.55	0.43	-0.24	0.51	0.51	-0.00
Education qualification						
Less than O-level or equivalent	0.30	0.30	-0.00	0.31	0.30	-0.02
O-level or equivalent	0.36	0.33	-0.06	0.35	0.35	0.01
Higher than A-level	0.34	0.37	0.06	0.35	0.35	0.01
Place of birth elsewhere outside of UK						
No	0.91	0.92	0.01	0.91	0.92	0.02
Yes	0.09	0.08	-0.01	0.09	0.08	-0.02
Some difficulties in activities of Daily Living						
No	0.94	0.93	-0.01	0.94	0.93	-0.04
Yes	0.06	0.07	0.01	0.06	0.07	0.04
Sex						
Men	0.49	0.49	0.00	0.49	0.49	-0.01
Women	0.51	0.51	-0.00	0.51	0.51	0.01
Ever had arthritis						
No	0.78	0.78	0.00	0.78	0.77	-0.03
Yes	0.22	0.22	-0.00	0.22	0.23	0.03
Ever had cancer						
No	0.95	0.95	0.01	0.95	0.95	-0.01
Yes	0.05	0.05	-0.01	0.05	0.05	0.01
Number of living children						
None	0.12	0.12	0.01	0.12	0.12	-0.01
1	0.21	0.21	-0.00	0.21	0.22	0.03
2	0.35	0.39	0.08	0.37	0.37	0.01
3 or more	0.31	0.27	-0.10	0.30	0.29	-0.03
Paying rent						
No	0.87	0.91	0.13	0.88	0.89	0.04
Yes	0.13	0.09	-0.13	0.12	0.11	-0.04

Whether financial respondent						
No	0.28	0.28	0.02	0.28	0.28	0.01
Yes	0.72	0.72	-0.02	0.72	0.72	-0.01
Ever had heart problems						
No	0.91	0.89	-0.05	0.91	0.89	-0.05
Yes	0.09	0.11	0.05	0.09	0.11	0.05
Ever had high blood pressure						
No	0.69	0.70	0.03	0.69	0.69	-0.00
Yes	0.31	0.30	-0.03	0.31	0.31	0.00
Some difficulties with instrumental activities of daily living						
No	0.99	0.99	-0.03	0.99	0.99	-0.05
Yes	0.01	0.01	0.03	0.01	0.01	0.05
Interview year						
2002	0.17	0.14	-0.06	0.16	0.15	-0.05
2003	0.02	0.02	0.02	0.02	0.02	0.01
2004	0.07	0.07	0.02	0.07	0.08	0.03
2005	0.06	0.06	0.01	0.06	0.06	0.01
2006	0.12	0.12	-0.00	0.12	0.11	-0.03
2007	0.02	0.02	-0.02	0.02	0.03	0.02
2008	0.10	0.10	-0.01	0.10	0.11	0.02
2009	0.06	0.07	0.04	0.06	0.06	-0.01
2010	0.08	0.08	0.02	0.08	0.07	-0.03
2011	0.04	0.04	-0.01	0.04	0.04	-0.00
2012	0.09	0.10	0.01	0.09	0.10	0.01
2013	0.02	0.02	0.01	0.02	0.02	0.01
2014	0.07	0.07	0.00	0.07	0.08	0.04
2015	0.03	0.02	-0.04	0.02	0.02	-0.01
2016	0.05	0.05	0.01	0.05	0.05	0.02
2017	0.02	0.03	0.05	0.02	0.02	-0.01
Freq light physical activity						
> 1 per week	0.83	0.84	0.02	0.83	0.84	0.03
1 per week	0.09	0.09	-0.02	0.09	0.09	-0.01
1-3 per month	0.03	0.03	-0.01	0.03	0.03	-0.01
Hardly ever or never	0.05	0.04	-0.00	0.05	0.04	-0.04
Ever had lung disease						
No	0.97	0.98	0.01	0.97	0.98	0.02
Yes	0.03	0.02	-0.01	0.03	0.02	-0.02
Marital status						
Married	0.75	0.77	0.03	0.76	0.76	0.01
Partnered	0.07	0.06	-0.02	0.07	0.07	0.00
Separated	0.02	0.01	-0.04	0.01	0.01	-0.02
Divorced	0.10	0.09	-0.03	0.10	0.10	0.00
Widowed	0.02	0.03	0.05	0.02	0.02	-0.01
Never married	0.04	0.04	-0.01	0.04	0.04	-0.01
Ever had stroke						
No	0.99	0.99	0.03	0.99	0.99	0.04
Yes	0.01	0.01	-0.03	0.01	0.01	-0.04

Spouse's labour market status						
Employed	0.51	0.49	-0.05	0.50	0.50	-0.00
Self-employed	0.09	0.09	0.00	0.09	0.09	0.01
Retired	0.09	0.12	0.10	0.10	0.10	-0.01
Disabled	0.04	0.03	-0.03	0.03	0.03	0.00
Unemployed/ looking after home or family	0.06	0.07	0.02	0.06	0.07	0.02
No spouse	0.21	0.21	-0.01	0.21	0.21	-0.01
Self-reported employment status						
Employee	0.83	0.82	-0.04	0.83	0.83	-0.01
self_emp	0.17	0.18	0.04	0.17	0.17	0.01
Continuous variables						
Number of depressive symptoms at time t	1.19	1.20	0.00	1.20	1.21	0.01
OUTCOME (not included in weighting: number of depressive symptoms at t+1	1.21	1.13	-0.05	1.19	1.19	-0.01
OUTCOME (not in weighting: Quality of life score (CASP-19) at t+1	4.19	4.33	0.17	4.21	4.31	0.13
Quality of life score (CASP-19) at t	4.22	4.31	0.11	4.23	4.27	0.04
Non-mortgage debt to gross wealth (log)	-3.40	-4.50	-0.42	-3.73	-3.71	0.01
Household income (log)	10.16	10.21	0.05	10.16	10.19	0.03
Gross wealth (log)	11.66	12.03	0.17	11.74	11.76	0.01
Gross non-housing wealth (log)	8.38	9.20	0.29	8.63	8.50	-0.04
Mortgage debt amount (log)	5.67	4.35	-0.26	5.22	5.19	-0.01
Spouse's age if no data	54.88	55.90	0.16	55.23	55.38	0.02
Age	56.95	57.81	0.18	57.24	57.32	0.02
Total Recall Summary Score	11.61	11.59	-0.01	11.56	11.61	0.02
Credit card debt amount (log)	5.16	3.34	-0.50	4.54	4.62	0.02

Supplementary Table 4. Balance characteristics before and after weighting. SATE sample shown (the population average treatment effect was not shown given the use of sampling weights). Retired subgroup.

Variable	Raw mean not treated	Raw mean treated	Standardised difference	Weighted mean not treated	Weighted mean treated	Standardised difference
Any credit card debt						
No	0.38	0.53	0.30	0.45	0.45	-0.01
Yes	0.62	0.47	-0.30	0.55	0.55	0.01
Whether own home						
No	0.24	0.18	-0.14	0.20	0.23	0.06
Yes	0.76	0.82	0.14	0.80	0.77	-0.06
Number of people in household						
1	0.26	0.25	-0.01	0.25	0.25	-0.01
2	0.61	0.64	0.06	0.63	0.63	-0.00
3	0.09	0.07	-0.07	0.08	0.08	-0.00
4 or more	0.04	0.03	-0.02	0.03	0.04	0.03
Any mortgage debt						
No	0.82	0.89	0.19	0.85	0.85	0.01
Yes	0.18	0.11	-0.19	0.15	0.15	-0.01
Education qualification						
Less than O-level or equivalent	0.45	0.45	0.01	0.44	0.46	0.03
O-level or equivalent	0.28	0.25	-0.07	0.27	0.26	-0.03
Higher than A-level	0.27	0.30	0.05	0.28	0.29	0.00
Place of birth elsewhere outside of UK						
No	0.93	0.93	0.02	0.93	0.93	-0.02
Yes	0.07	0.07	-0.02	0.07	0.07	0.02
Some difficulties in activities of Daily Living						
No	0.76	0.80	0.11	0.77	0.79	0.03
Yes	0.24	0.20	-0.11	0.23	0.21	-0.03
Sex						
Men	0.45	0.46	0.02	0.45	0.45	0.01
Women	0.55	0.54	-0.02	0.55	0.55	-0.01
Ever had arthritis						
No	0.52	0.57	0.11	0.54	0.55	0.02
Yes	0.48	0.43	-0.11	0.46	0.45	-0.02
Ever had cancer						
No	0.87	0.89	0.07	0.88	0.88	0.02
Yes	0.13	0.11	-0.07	0.12	0.12	-0.02
Number of living children						
None	0.11	0.12	0.01	0.11	0.11	-0.01
1	0.16	0.14	-0.05	0.15	0.14	-0.03
2	0.33	0.37	0.09	0.35	0.35	-0.00
3 or more	0.40	0.37	-0.06	0.38	0.40	0.03
Paying rent						
No	0.83	0.87	0.13	0.86	0.84	-0.06
Yes	0.17	0.13	-0.13	0.14	0.16	0.06
Whether financial respondent						

No	0.25	0.26	0.04	0.25	0.26	0.02
Yes	0.75	0.74	-0.04	0.75	0.74	-0.02
Ever had heart problems						
No	0.79	0.80	0.01	0.80	0.79	-0.00
Yes	0.21	0.20	-0.01	0.20	0.21	0.00
Ever had high blood pressure						
No	0.50	0.53	0.06	0.51	0.50	-0.01
Yes	0.50	0.47	-0.06	0.49	0.50	0.01
Some difficulties with instrumental activities of daily living						
No	0.96	0.97	0.03	0.96	0.96	-0.00
Yes	0.04	0.03	-0.03	0.04	0.04	0.00
Interview year						
2002	0.12	0.14	0.05	0.12	0.14	0.07
2003	0.01	0.02	0.03	0.02	0.02	0.01
2004	0.08	0.07	-0.03	0.08	0.07	-0.05
2005	0.04	0.05	0.01	0.05	0.05	0.01
2006	0.09	0.10	0.03	0.10	0.10	0.01
2007	0.01	0.01	0.02	0.01	0.01	0.04
2008	0.10	0.09	-0.02	0.09	0.09	-0.00
2009	0.04	0.04	0.03	0.04	0.04	0.03
2010	0.09	0.10	0.02	0.09	0.10	0.01
2011	0.04	0.03	-0.02	0.04	0.04	0.02
2012	0.11	0.10	-0.03	0.11	0.10	-0.02
2013	0.02	0.01	-0.04	0.02	0.01	-0.06
2014	0.10	0.09	-0.05	0.10	0.09	-0.02
2015	0.02	0.02	-0.05	0.02	0.02	-0.01
2016	0.10	0.10	0.01	0.10	0.09	-0.03
2017	0.03	0.03	0.02	0.03	0.03	-0.01
Freq light physical activity						
> 1 per week	0.80	0.80	-0.00	0.80	0.79	-0.02
1 per week	0.09	0.09	-0.02	0.09	0.09	0.01
1-3 per month	0.04	0.03	-0.00	0.04	0.04	0.00
Hardly ever or never	0.07	0.08	0.02	0.08	0.08	0.02
Ever had lung disease						
No	0.90	0.92	0.05	0.91	0.91	0.01
Yes	0.10	0.08	-0.05	0.09	0.09	-0.01
Marital status						
Married	0.66	0.68	0.05	0.67	0.67	0.01
Partnered	0.03	0.03	-0.00	0.03	0.03	-0.01
Separated	0.02	0.01	-0.09	0.02	0.01	-0.04
Divorced	0.13	0.10	-0.10	0.12	0.11	-0.01
Widowed	0.12	0.15	0.08	0.13	0.13	0.02
Never married	0.04	0.04	-0.02	0.04	0.04	0.00
Ever had stroke						
No	0.96	0.96	0.01	0.96	0.96	-0.01
Yes	0.04	0.04	-0.01	0.04	0.04	0.01
Spouse's labour market status						
Employed	0.13	0.11	-0.07	0.12	0.12	-0.01

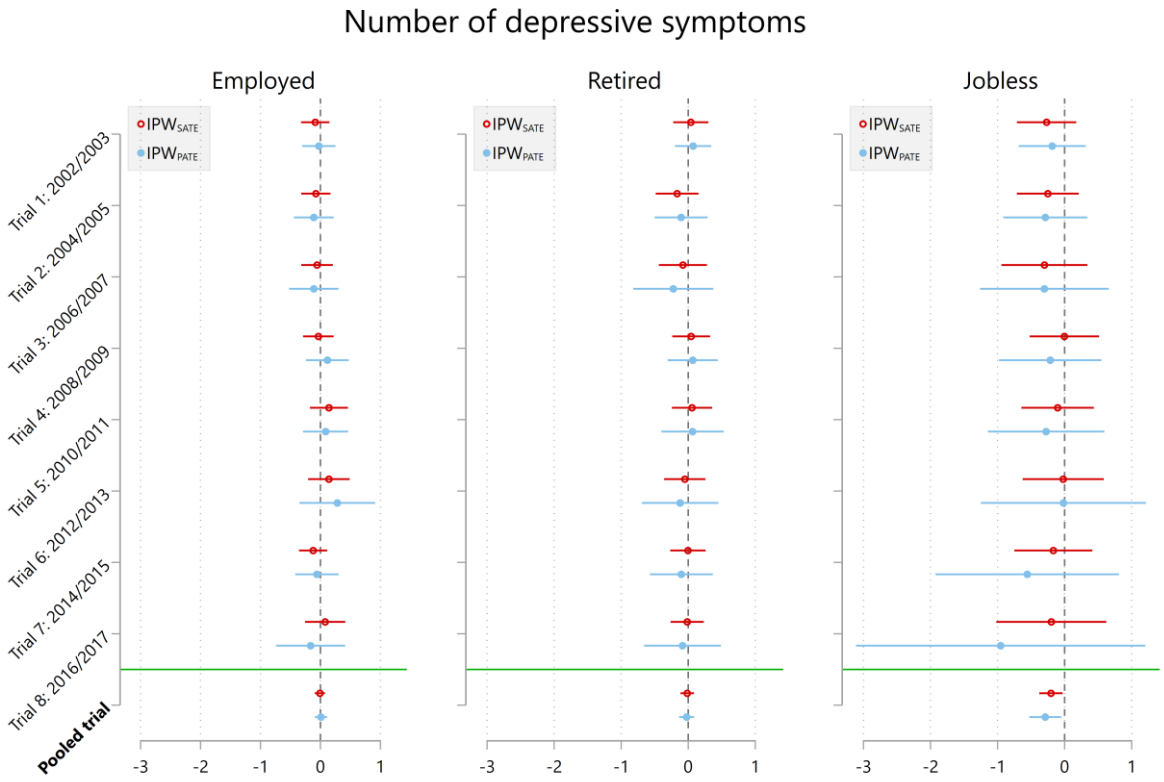
Self-employed	0.03	0.02	-0.04	0.03	0.03	-0.01
Retired	0.42	0.48	0.12	0.44	0.45	0.02
Disabled	0.03	0.02	-0.05	0.02	0.03	0.01
Unemployed/ looking after home or family	0.06	0.06	-0.00	0.06	0.05	-0.03
No spouse	0.34	0.31	-0.05	0.32	0.32	-0.00
Self-reported employment status						
Retired	1.00	1.00	.	1.00	1.00	.
Continuous variables						
Number of depressive symptoms at time t	1.60	1.42	-0.09	1.53	1.52	-0.00
OUTCOME (not included in weighting: number of depressive symptoms at t+1	1.60	1.45	-0.07	1.55	1.54	-0.01
OUTCOME (not in weighting: Quality of life score (CASP-19) at t+1	4.00	4.16	0.17	4.03	4.11	0.09
Quality of life score (CASP-19) at t	4.06	4.18	0.14	4.09	4.12	0.03
Non-mortgage debt to gross wealth (log)	-3.17	-4.64	-0.42	-3.89	-3.71	0.05
Household income (log)	9.78	9.80	0.03	9.80	9.77	-0.03
Gross wealth (log)	10.68	11.38	0.21	11.05	10.88	-0.05
Gross non-housing wealth (log)	8.07	9.20	0.35	8.54	8.51	-0.01
Mortgage debt amount (log)	1.76	1.09	-0.19	1.48	1.46	-0.01
Spouse's age if no data	60.34	61.33	0.10	60.88	60.72	-0.02
Age	67.53	68.24	0.12	67.86	67.73	-0.02
Total Recall Summary Score	10.46	10.40	-0.02	10.45	10.43	-0.01
Credit card debt amount (log)	4.33	2.90	-0.41	3.66	3.68	0.01

Supplementary Table 5. Balance characteristics before and after weighting. SATE sample shown (the population average treatment effect was not shown given the use of sampling weights). Jobless subgroup.

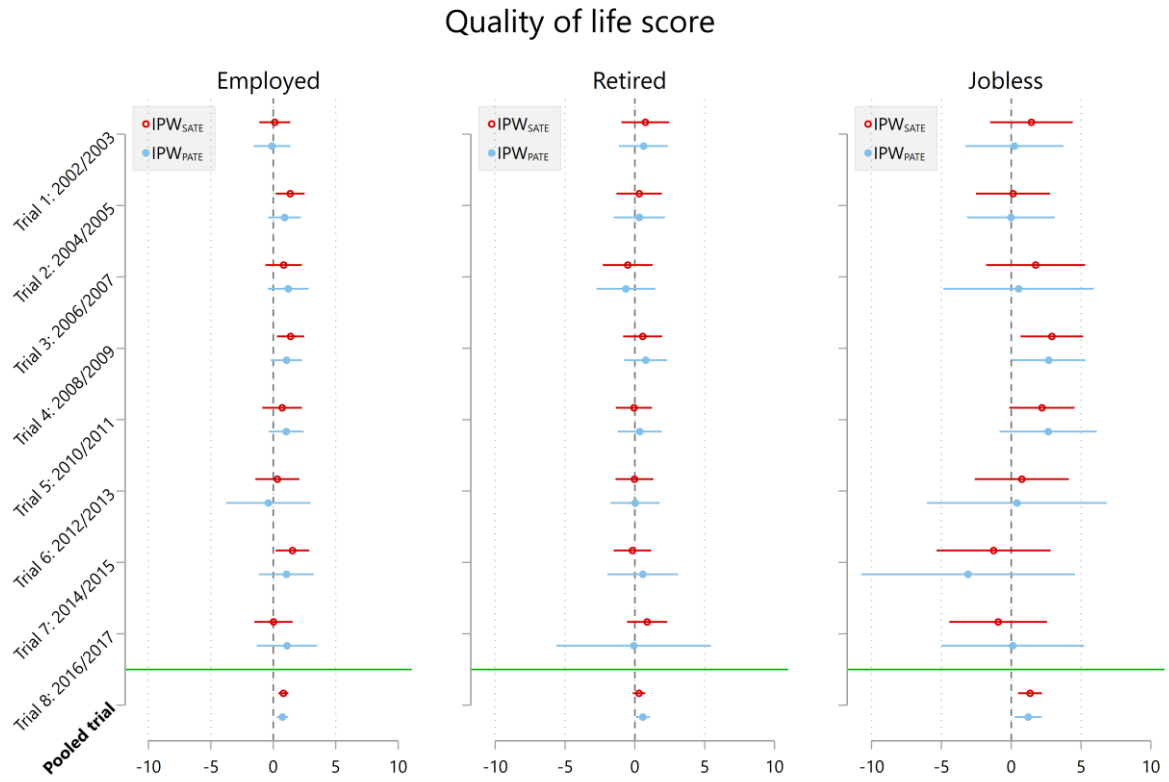
Variable	Raw mean not treated	Raw mean treated	Standardised difference	Weighted mean not treated	Weighted mean treated	Standardised difference
Any credit card debt						
No	0.43	0.55	0.24	0.48	0.48	0.01
Yes	0.57	0.45	-0.24	0.52	0.52	-0.01
Whether own home						
No	0.42	0.33	-0.18	0.39	0.39	-0.01
Yes	0.58	0.67	0.18	0.61	0.61	0.01
Number of people in household						
1	0.18	0.19	0.00	0.18	0.20	0.04
2	0.49	0.52	0.05	0.51	0.50	-0.02
3	0.19	0.18	-0.01	0.18	0.18	0.00
4 or more	0.14	0.12	-0.06	0.13	0.12	-0.01
Any mortgage debt						
No	0.70	0.78	0.17	0.73	0.73	-0.01
Yes	0.30	0.22	-0.17	0.27	0.27	0.01
Education qualification						
Less than O-level or equivalent	0.51	0.52	0.01	0.51	0.50	-0.02
O-level or equivalent	0.32	0.32	-0.00	0.31	0.34	0.06
Higher than A-level	0.17	0.17	-0.01	0.18	0.16	-0.05
Place of birth elsewhere outside of UK						
No	0.93	0.90	-0.10	0.92	0.90	-0.08
Yes	0.07	0.10	0.10	0.08	0.10	0.08
Some difficulties in activities of Daily Living						
No	0.59	0.66	0.13	0.61	0.62	0.01
Yes	0.41	0.34	-0.13	0.39	0.38	-0.01
Sex						
Men	0.34	0.34	0.01	0.33	0.35	0.04
Women	0.66	0.66	-0.01	0.67	0.65	-0.04
Ever had arthritis						
No	0.51	0.54	0.06	0.51	0.51	-0.01
Yes	0.49	0.46	-0.06	0.49	0.49	0.01
Ever had cancer						
No	0.93	0.92	-0.03	0.93	0.92	-0.04
Yes	0.07	0.08	0.03	0.07	0.08	0.04
Number of living children						
None	0.13	0.14	0.01	0.13	0.13	0.00
1	0.17	0.15	-0.05	0.17	0.16	-0.01
2	0.29	0.31	0.05	0.31	0.30	-0.02
3 or more	0.40	0.40	-0.02	0.40	0.41	0.03
Paying rent						
No	0.74	0.79	0.12	0.76	0.76	-0.01
Yes	0.26	0.21	-0.12	0.24	0.24	0.01
Whether financial respondent						

No	0.31	0.32	0.02	0.32	0.30	-0.03
Yes	0.69	0.68	-0.02	0.68	0.70	0.03
Ever had heart problems						
No	0.80	0.84	0.09	0.80	0.83	0.08
Yes	0.20	0.16	-0.09	0.20	0.17	-0.08
Ever had high blood pressure						
No	0.54	0.56	0.04	0.54	0.54	-0.00
Yes	0.46	0.44	-0.04	0.46	0.46	0.00
Some difficulties with instrumental activities of daily living						
No	0.86	0.90	0.10	0.87	0.88	0.03
Yes	0.14	0.10	-0.10	0.13	0.12	-0.03
Interview year						
2002	0.19	0.16	-0.09	0.19	0.16	-0.07
2003	0.02	0.02	-0.00	0.02	0.02	-0.05
2004	0.08	0.09	0.05	0.08	0.09	0.05
2005	0.07	0.08	0.01	0.07	0.07	-0.03
2006	0.12	0.13	0.03	0.12	0.13	0.02
2007	0.02	0.01	-0.13	0.02	0.01	-0.09
2008	0.10	0.09	-0.03	0.09	0.10	0.03
2009	0.05	0.05	-0.02	0.06	0.04	-0.05
2010	0.07	0.10	0.12	0.07	0.09	0.07
2011	0.04	0.03	-0.09	0.04	0.03	-0.06
2012	0.09	0.09	-0.01	0.09	0.09	0.01
2013	0.01	0.02	0.03	0.01	0.02	0.02
2014	0.06	0.05	-0.05	0.06	0.06	0.00
2015	0.01	0.02	0.04	0.01	0.02	0.04
2016	0.04	0.05	0.08	0.04	0.05	0.07
2017	0.02	0.03	0.08	0.02	0.03	0.05
Freq light physical activity						
> 1 per week	0.75	0.73	-0.04	0.75	0.70	-0.11
1 per week	0.11	0.08	-0.08	0.10	0.10	0.01
1-3 per month	0.04	0.04	-0.00	0.04	0.05	0.06
Hardly ever or never	0.11	0.15	0.12	0.11	0.14	0.09
Ever had lung disease						
No	0.91	0.90	-0.03	0.91	0.90	-0.05
Yes	0.09	0.10	0.03	0.09	0.10	0.05
Marital status						
Married	0.65	0.68	0.05	0.66	0.65	-0.03
Partnered	0.05	0.05	-0.01	0.05	0.06	0.03
Separated	0.02	0.02	0.01	0.02	0.03	0.10
Divorced	0.16	0.13	-0.10	0.15	0.16	0.00
Widowed	0.05	0.07	0.07	0.06	0.05	-0.03
Never married	0.06	0.06	-0.03	0.06	0.05	-0.02
Ever had stroke						
No	0.96	0.96	-0.00	0.96	0.95	-0.03
Yes	0.04	0.04	0.00	0.04	0.05	0.03
Spouse's labour market status						
Employed	0.26	0.24	-0.03	0.25	0.26	0.02

Self-employed	0.06	0.06	-0.01	0.06	0.05	-0.02
Retired	0.17	0.21	0.11	0.19	0.17	-0.05
Disabled	0.11	0.09	-0.05	0.10	0.10	-0.01
Unemployed/ looking after home or family	0.08	0.09	0.04	0.08	0.09	0.04
No spouse	0.33	0.30	-0.05	0.32	0.33	0.01
Self-reported employment status						
Unemployed	0.09	0.09	0.02	0.09	0.09	0.01
lt_sick	0.47	0.37	-0.19	0.44	0.43	-0.01
Other	0.44	0.53	0.18	0.47	0.48	0.00
Continuous variables						
Number of depressive symptoms at time t	2.96	2.60	-0.14	2.84	2.81	-0.01
OUTCOME (not included in weighting: number of depressive symptoms at t+1	2.90	2.42	-0.20	2.79	2.59	-0.08
OUTCOME (not in weighting: Quality of life score (CASP-19) at t+1	3.45	3.76	0.30	3.50	3.68	0.17
Quality of life score (CASP-19) at t	3.45	3.67	0.22	3.50	3.55	0.04
Non-mortgage debt to gross wealth (log)	-1.18	-2.89	-0.38	-1.78	-1.83	-0.01
Household income (log)	9.36	9.36	-0.00	9.39	9.28	-0.06
Gross wealth (log)	8.74	9.74	0.22	9.07	9.11	0.01
Gross non-housing wealth (log)	6.17	7.35	0.30	6.57	6.57	0.00
Mortgage debt amount (log)	2.98	2.21	-0.17	2.68	2.72	0.01
Spouse's age if no data	56.25	58.06	0.22	56.80	56.95	0.02
Age	58.59	60.37	0.28	59.18	59.37	0.03
Total Recall Summary Score	10.64	10.31	-0.10	10.59	10.40	-0.06
Credit card debt amount (log)	4.14	2.98	-0.32	3.69	3.65	-0.01



Supplementary Figure 1. **Results from IPTW for the population (PATE, IPTW multiplied by cross-sectional weights at time t and attrition weights) and the sample (SATE). Number of depressive symptoms (CES-D 8) is the continuous outcome. Mean differences in the outcome between the treated and comparison groups in each trial and the pooled summary estimate. Normal confidence intervals are calculated using bootstrapping (1000 replications).**



Supplementary Figure 2. **Results from IPTW for the population (PATE, IPTW multiplied by cross-sectional weights at time t and attrition weights) and the sample (SATE). Quality of life score (CASP-19) is the continuous outcome. Mean differences in the outcome between the treated and comparison groups in each trial and the pooled summary estimate. Normal confidence intervals are calculated using bootstrapping (1000 replications).**

Technical appendix

This technical appendix describes the populations and variables of interest, parameters of interest, measures of moderation, and their estimation.

Variables and populations

For the analysis of population associations between holding debt and mental wellbeing, let Y_i denote the current value of a measure of mental wellbeing (depression or quality of life) for each individual i in the population of interest, that is, the persons

aged 50 and over living in England. The value of Y_i is observed for a sample of n members of the population in the ELSA survey. Each individual is also characterised by whether they hold debt ($D_i = 0; 1$ for no and yes respectively) and their labour market status ($M_i = 0; 1; 2$ for employed, retired and jobless respectively).

For the causal analysis, now consider the subset of the population above who are aged between 50 and 80 and who hold debt at a given time t, which corresponds to one of the ELSA waves 1-8 or the pooled sample. The data for this analysis is the corresponding subset of the ELSA sample. Here each individual's labour market status M_i at time t is again considered a fixed characteristic, but for debt, now D $= 1$ denotes if an individual got rid of their debt by time t + 1 and D = 0 if they did not. For the people in the sample, we observe either $D_i = 0$ or $D_i = 1$, the value realised for them. However, the definitions of causal effects need to consider both possibilities for every individual in the sample and, when population causal effects are of interest, in the population, and the values of Y, potential outcomes, under both of the treatment values. Thus, potential outcome framework is needed (Rubin 1974).

Two potential outcomes $Y_i(D)$, for $D = 0; 1$ are defined to each individual, so that $Y_i(1)$ denotes the (real or counterfactual) value of Y for individual i had they got rid of their debts and $Y_i(0)$ the value of Y had they not got rid of their debts. The value of $Y_i(D_i) = Y_i$ is observed for members of the sample. However, the other potential outcome for them, and both potential outcomes for the rest of the population of interest not sampled, are unobserved.

Parameters of interest

The study is interested in two types of parameters – population associations and causal effects – and similar moderation measures derived from them.

For the population associations, let E_{dm} denote the average of Y_i among the members of the population who have debt status $D = d$ and labour market status M =m, for the six subsets of individuals which are defined by the combinations of d=0,1 and m=0,1,2. Associations between D and Y in the population, separately in each category of M, can be quantified by comparisons of the averages E_1m and E:0m, in particular by their differences E_1m-E_0m and their ratio E1m/E0m.

For the causal effects, let E_{dm} now denote the average of the potential outcome $Y_i(d)$ among the members of the population who have labour market status $M = m = 0,1,2$, for $d = 0,1$. Here one can consider E_{dm} defined both for all members of the population and for the individuals i who are observed in the sample. In both cases, the averaging for both, E_{1m} and E_{0m}, is over all members of the population or the sample. A causal effect on mental wellbeing of an individual with labour market status m of getting rid of their debts vs. not doing so can be quantified by the difference of the averages of the two potential outcomes $E_{1m} - E_{0m}$ or their ratio $\frac{E_{1m}}{E_{0m}}$. This is referred to (especially with reference to the difference) as the "population average treatment effect" (PATE) when defined with the averages across all members of the population, and as the "sample average treatment effect" (SATE) when limited to the average of potential outcomes of the members of the sample.

Measures of moderation

Let E_{dm} denote either of the quantities defined above, for population associations or for causal effects. Consider how an association or causal effect is moderated for individuals with labour market status 1 (retired) or 2 (jobless), compared to those with status 0 (employed).

A measure of moderation on an additive scale is

$$(E_{1m} - E_{00}) - [(E_{10} - E_{00}) + (E_{0m} - E_{00})] = (E_{1m} - E_{0m}) - (E_{10} - E_{00}) \quad (1)$$

separately for m= 1,2. The first expression in (1) shows that this is the difference between the association or effect when both D and M are changed, and the sum of the two associations or effects when just one of them is changed. The second expression in (1) shows that this is also simply the difference of the associations or effects between D and Y, on an additive scale, among those with $M = m$ vs. those with $M = 0$.

With a similar logic, measures of moderation on a multiplicative scale are defined as

$$\frac{E_{1m}/E_{00}}{(E_{10}/E_{00})(E_{0m}/E_{00})} = \frac{E_{1m}/E_{0m}}{E_{10}/E_{00}} \quad (2)$$

separately for $m = 1,2$. As in the additive association, the second expression in (2) shows that this is the difference, in ratio scale, of the association or effects between D and Y, measured now on a ratio scale, among those with $M = m$ vs. those with $M = 0$.

Estimation

The parameters introduced above are estimated using three types of weights:

1. Survey weights w_{si}, which are used to account for imbalances between the characteristics of the individuals who are included in the ELSA sample and of individuals in the whole target population. These combine weighting elements for the sampling design, nonresponse and further calibration to known population distributions. The survey weights of the ELSA data are described in detail in the ELSA documentation (Banks, Batty et al. 2014). The survey weights are multiplied by attrition weights between t and t+1 to account for non-random attrition. The same variables and techniques were used in calculating the attrition weights as in the IPTW weights below.
2. Inverse probability treatment weights (IPTWs)) w_{pi}, which are used to account for imbalances in measured pre-treatment characteristics between individuals in the sample who were observed to have got rid of their debts ($D_i = 1$) and those who had not ($D_i = 0$). Let X_i denote a set of variables which are observed for respondents i in the sample (the selection of these variables in the analysis of this paper is discussed in the main text). Let $\pi(X_i) = P(D_i = 1|X_i)$ denote the probability that an individual with characteristics X_i gets rid of their debts between time t and t+ 1. This probability can be modelled using the logit model

$$log\left[\frac{\pi(X_i)}{1-\pi(X_i)}\right] = \beta X_i \text{ , (3)}$$

   defined and estimated separately for each time t and the pooled trial, using the data in the sample. The propensity score for individual i is then their fitted probability $\hat{\pi}_i = \hat{\pi}(X)$ from this estimated model. The IPTW is the inverse of the estimated probability of the treatment value individual i was observed in the data $w_{pi} = 1/\left[\hat{\pi}_i{}^{D_i}(1-\hat{\pi})_i{}^{1-D_i}\right]$
3. Combined weights $w_{ci} = w_{si}w_{pi}$ which account for both the sampling of individuals from the population and the selection of which sampled individuals are observed to have treatment levels $D_i = 1$ and $D_i = 0$.

The expectation quantities introduced above are then estimated by a weighted sample average of the form

$$\hat{E}_{dm} = \frac{\sum_{i\in S_{dm}} w_i Y_i}{\sum_{i\in S_{dm}} w_i} \text{ (4)}$$

Where S_{dm} is that set of respondents in the sample for whom $D_i = d$ and $M_i = m$. For population means and associations, the weight w_i is chosen to be $w_i = w_{si}$, (4) defining an estimate of the population mean of Y_i. $w_i = w_{pi}$ it defines an estimate of the average of potential outcome $Y_i(d)$ among the sample, and with $w_i = w_{ci}$ it defines an estimate of the average of potential outcome $Y_i(d)$ among the population, each of these for the subset of people with $M_i = m$. Estimates of the associations, treatment effects and moderation measures defined above are then obtained by substituting the appropriate version of E_{dm} in their definitions.

Standard errors

The standard errors, and the corresponding 95% confidence intervals, for the population associations are calculated using the delta method (Oehlert 1992). The normal-based 95% confidence intervals for the causal analysis are calculated using bootstrapping (Efron and Tibshirani 1994).

6 Household non-mortgage debt and depression in older adults in 22 countries – what is the role of social norms, institutions and macroeconomic conditions?

Abstract

There are an increasing number of adults aged 50 years and older with debts in Western countries. But debt and mental health policies and services for this population are fragmentary. We need to understand more about the relationship between debt and mental health in different contexts to inform and invigorate the policy response. Is the association between debt and depression so fundamental that it occurs across time and place? Are some countries better at mitigating the depression related to debt than others? This study addresses these questions by taking advantage of three harmonised longitudinal surveys, consisting of older adults in 21 European countries and the US. People with household non-mortgage debt have higher odds of depression, net of differences in other socioeconomic variables, in all countries. In most countries the associations are as strong as the association between education level and depression. They are particularly strong in countries with poor personal debt discharge legislation and low levels of indebtedness, both of which are indicators of stigma related to debts. The link between debt and depression seems to be elevated within countries in poor economic times. Policy measures such as integrated debt and mental health services are needed to alleviate the mental health burden of the increasing number of older adults with non-mortgage debts, and particularly important in times of economic hardship such as we are encountering, as temporary relief provided during the pandemic is removed.

6.1 Introduction

This study investigates the extent to which household non-mortgage debt is associated with depression among adults aged 50 and older in 21 European countries and the US. Older adults are a particularly interesting study group, and the focus of this study. They may experience stronger social stigma from their debts given that the use of debts is less common in their life stage, and they may expect to have declining incomes, for example after transitioning to retirement, causing difficulties in paying off debts. European countries and the US were selected as the focus of this study given the high, and in many cases increasing, levels of household indebtedness in these countries.

Depression is a leading cause of disability worldwide (Institute for Health Metrics and Evaluation (IHME) 2018), affecting a large share of older adults, their families and the caregiving sector of the economy. The symptoms of depression include long lasting loss of interest, lack of pleasure, sadness and hopelessness not explained by normal mood fluctuations and responses. The Global Burden of Disease study suggests that some six percent of adults aged 50 and older experience depression (Global Burden of Disease Collaborative Network 2018), but reliable prevalence estimates are difficult to obtain due to data limitations and cultural differences in the reporting of mental symptoms.

To reduce the enormous public health and economic burden of depression, it is critical to note that depression, like almost any other disease, is closely connected to socioeconomic circumstances and the power structures of a society (World Health Organization 2014). Debts reflect power structures and are distinct socioeconomic variables. Debts may, for many, be useful and necessary financial tools to bridge income shortfalls, but people with non-secured, non-mortgage, financial or "problem" debts have a higher risk of depression and other mental health-related outcomes (Richardson, Elliott et al. 2013). Much of this evidence on debt and mental health outcomes comes from the US and UK contexts, where debts are widely used, making it an important social exposure to study.

This study expands the literature to a much broader set of countries while addressing two fundamental aims of cross-country research on social exposures and health outcomes. The study assesses whether the association of interest is observed in

different country contexts and whether it is moderated by contextual factors. This study focuses exclusively on household non-mortgage debt as the key predictor because previous evidence indicates that a link between mortgage debt and depression is less clear (Hojman, Miranda et al. 2016). The study focuses on dichotomised depressive symptoms outcomes (probable depression) derived from well-established depression scales.

For many countries, this is, in fact, the first study to provide evidence on household non-mortgage debt and depression among older adults. Little is currently known about debt and depression among older adults in a number of, particularly Southern, European countries. While the use of debts is less common among older adults, a non-negligible proportion of them have non-mortgage debts in these countries (Household Finance and Consumption Network 2020). As many as a fifth of older adults in Western European countries have household non-mortgage debt (Lewin-Epstein and Semyonov 2016, Household Finance and Consumption Network 2020)[i]. This, together with the ageing population and the substantial burden of depression in these countries, makes the potential link between debts and depression among older adults worthy of investigation. As an analytical strategy, a series of logistic regression models are fitted for each country to assess the consistency of the associations across countries and time points. To further test the role of unmeasured confounding, fixed effect logistic regression models are used to investigate the extent to which paying off (or acquiring new) debt during the study periods decreases (or increases) the odds of depression.

The second contribution of this study is to explore the extent to which the association is moderated by country-level variables. Described in the seminal work by Sweet (2018), the experience of indebtedness is embedded within wider institutional contexts. Contextual factors such as social norms and legal institutions construct debt problems as "personal failure" and determine their potential sociolegal consequences. But previous social epidemiological research on this topic has often considered debt in isolation from its social and economic contexts. Currently, findings from one country context are often generalised to another without any discussion of the peculiarities of the investigated context, and the potential country moderation.

This study tests three hypotheses regarding the role of context, the first relating to economic environment (operationalised by unemployment rate), the second relating to social norms (average level of indebtedness among older adults) and the third relating to the role of sociolegal environment (debt discharge regimes) in the debt-depression link. In methodological terms, this second aim of the study is about country-level moderation of an association. The study avoids the problems of multilevel models with a small number of countries (Bryan and Jenkins 2015) by using a two-step analytical approach. In this approach, country-time point specific debt-depression associations are first estimated, and then regressed on the contextual factor of interest. In this contribution, the approach of this study is clearly descriptive, not causal, while the aim is to pave the way for causally orientated questions on policies that may alleviate the mental burden linked to debts.

The key results are the following. The association between non-mortgage debt and depression is nearly universal. It is moderate to large in magnitude in most of the investigated countries but stronger in countries with poor personal debt discharge legislation and low levels of indebtedness. Over time, the association is intensified within countries in poor economic times. In almost all countries, this association is also observed within individuals over time. Taken together, these findings emphasise the need to take seriously the mental health consequences among older adults of the increasing household debt levels.

Next, the background section provides an individual-level theory of debt and depression and discusses why country context may matter in this association. This is followed by a brief introduction to the three datasets, their measures of debt, depression and covariates, and the methods used. The results section reports key findings. The paper ends with a discussion about these key results and potential directions for subsequent research.

6.2 Background

Three hypotheses on why the debt-depression link may differ between countries

Previous observational studies link measures of debt, debt burden or over-indebtedness to depression and depression-related outcomes, including suicide (Lee

2019, Rojas 2021), suicidal related behaviour (Meltzer, Bebbington et al. 2011), disability retirement due to mental illness (Blomgren, Maunula et al. 2017), sleep problems (Warth, Puth et al. 2019), and other adverse mental health outcomes (Fitch, Hamilton et al. 2011, Richardson, Elliott et al. 2013, Turunen and Hiilamo 2014, Tay, Batz et al. 2017). However, common issues in the previous studies on this topic are a heavy reliance on cross-sectional study design, inconsistent debt measures, which makes comparison across studies difficult, and a limited focus on moderation of this association, which makes generalisation of the findings challenging. Nevertheless, some early evidence using instrumental variable approaches suggests that a part of the association between debt and depression is likely to reflect a causal process from debt to depression (Gathergood 2012). Several studies exist on debt and depression among older adults (Drentea and Reynolds 2012, Zurlo, Yoon et al. 2014) which replicate the finding that debts are linked to depression independent of other socioeconomic markers.

The three often speculated causal mechanisms through which debt links to depression include prolonged stress (Drentea and Reynolds 2015), psychosocial factors, and foregone resources due to debt payments. Debt may cause prolonged stress through fear of debt payments, payment reminders and debt collection actions (Drentea and Reynolds 2012). Psychosocial factors, such as the social stigma of debt problems, may affect debtors' self-worth, shame and social isolation. These processes are documented in qualitative investigations (Sweet, DuBois et al. 2018, Purdam and Prattley 2020). Economic and time resources spent in dealing with debts may also be important pathways between debts and depression (Sweet 2020).

These mechanisms are relevant for theorising the role of contextual moderation in the link between debt and depression. Contextual factors construct the stigma of debt problems, determine the potential sociolegal consequences of debt problems and affect repayment ability. If the key mechanisms through which debts cause depression are resource constraints caused by debts, we would expect that debts are more depressing when debtors face difficulties in their repayment horizon due to, for example, an economic recession. If, by contrast, psychosocial factors, including stigma, are key mechanisms, then social norms and legal institutions should influence the extent to which debts link to depression. Numerous country-level variables may be relevant here,

but, drawing on earlier studies, three broad hypotheses are explored in this study. These three hypotheses are summarised in Table 6.1 and discussed below.

Table 6.1 Summary of hypothesised country differences and evidence.

Hypothesis	Moderating factor	Indicator used in this study	Previously investigated, for example, by	Findings when comparing countries and time points	Findings when comparing over time within countries
H1	Economic difficulties: debts are more depressing in poor economic times.	Unemployment rate	Hodson et al. (2014)	Weak support	Weak support
H2	Social norms: debts are less depressing when more people hold them.	Prevalence of non-mortgage debt among people aged 50 years and older	Gathergood (2012)	Support	No evidence to support
H3	Institutional differences determine how stressful debts are.	Debt discharge regime	Angel (2016)	Support	Not applicable

The first hypothesis is that *the association between debt and depression is weaker when the unemployment rate is low* (Hodson, Dwyer et al. 2014). A poor economic environment moderates the link between debt and mental depression by increasing the financial strain of debt payments or the fear of not being able to fulfil one's debt commitments. This hypothesis is taken from work by Hodson et al, in which the authors theorised that *"an economic recession poses significant vulnerabilities to everyone, but these vulnerabilities may be especially keenly felt by those already overextended with unsecured consumer debt" (Hodson, Dwyer et al. 2014).* This vulnerability hypothesis was supported by their analysis, showing that the association between unsecured debt and anxiety strengthened after the onset of the Great Recession in 2008 in the US. However, this hypothesis is yet to be tested in a cross-country setting. In a cross-country study, the asymmetric unemployment shock which occurred after the great recession in 2008 offers a unique opportunity to test the hypothesis. This study uses country-level unemployment rate as a proxy variable of the macroeconomic conditions of a given country.

The second hypothesis concerns social norms. It states that *the association between debt and depression is weaker in countries where, and time-points when, the prevalence of debt is higher*. This social norm hypothesis posits that social exposures are less harmful for those affected when these exposures are shared widely. This is because people are, the theory posits, not only concerned about and affected by their absolute socioeconomic standing, but also their relative standing to reference groups (Clark 2003). These mechanisms include "status stress", internalised shame, stigma, and discrimination (Wilkinson and Pickett 2010, Pickett and Wilkinson 2015, Wilkinson and Pickett 2018).

A study by Gathergood focuses on the social norm hypothesis in the debt-depression association. In the study (Gathergood 2012), consistent with the hypothesis, the association between debt problems and depression was stronger in geographical areas where debt problems were less common. This, according to the author, suggests that "*the social norm of problem debt, through peer group effects in localities in which problem debt is more prevalent, lessens the anxiety and worry caused by an individual's problem debt position."* In a similar logic, at the country level, a lower prevalence of debts could imply that there is a stronger stigma linked to debts, thus a stronger association between debt and depression. This study uses the prevalence of non-housing debt among older adults, calculated from the data in each country, as a proxy variable for these social norms.

The final hypothesis concerns institutions. It expects that *the association between debt and depression is weaker in countries with more debtor friendly institutional structures.* This institutional hypothesis is adapted from work by Angel (Angel 2016), who anticipated that "*Being over-indebted in a country where there are more and faster ways of debt relief or where dispute resolution with creditors is easier should result in lower levels of distress.*". Angel focused on the association between over-indebtedness and self-rated health and used the debt discharge regime clustering discussed in a legal context by Hoffman (2012). However, the author finds that "*the evidence for the hypothesis on stress through stricter debt discharge mechanisms is weak*". Nevertheless, no subsequent studies, using mental health outcomes, have assessed this hypothesis.

European countries and the US have followed distinct trajectories to regulate and promote their financial markets, in general, and the availability of consumer debts, in particular. These historical processes, often shaped by major economic crises and political ideology towards debts, are described in detail in various studies (Heuer 2013, Wiedemann 2018, Heuer 2020). In short, today, countries diverge in the extent to which they promote or prevent household (non-mortgage) borrowing, via, for example, collectively-funded income replacement after income shocks. They also differ in policies that regulate the availability of lending, via, for example, interest rate ceilings, in policies that alleviate debt problems via, for example, debt advice, and in policies that "cure" debt problems via debt discharge mechanisms (Eurofound 2020).

There are many aspects of these institutional structures that may matter for the link between debt and depression. These institutional differences are challenging to summarise and do not follow typical welfare state clusters proposed in comparative social policy literature. There have been several attempts to fit indebtedness to comparative social policy frameworks, but limited harmonised data on debt legislation are available (Heuer 2013, Angel and Heitzmann 2015, Wiedemann 2018). For example, in the context of personal debt discharge, Heuer proposes personal discharge regimes – Anglo-Saxon countries (the US and UK) have followed a market model in which personal discharge is used to increase market efficiency, Germany and Austria follow a liability model which emphasises debtor obligation for debt repayment, and Scandinavian countries use a mercy model in which debt relief is granted based on the "deservingness" of the debtor. Wiedemann, by contrast, rates countries according to their credit permissiveness, which, in interaction with welfare state generosity, explains major country differences in the distribution of indebtedness across socioeconomic groups (Wiedemann 2021).

This study is not concerned with household debt regimes. Instead, it uses the personal debt discharge regime classification introduced by Hoffman (Hoffmann 2012) and used in previous research by Angel (Angel 2016). Evidence indicates that debt-insolvency procedures matter for people with debts (West 2003, Dobbie and Song 2015). This may not only be due to the process per se, but also because the notion of having a last resort may alleviate distress for people with debt problems. Moreover, this variable may provide a proxy for the wider institutional approach to private

indebtedness, and how sociolegal institutions treat people with debts. Hoffman's system classifies countries into four types of personal debt insolvency regimes: countries without any or with weak personal discharge legislation, countries with a partial discharge mechanism, countries with a Scandinavian approach to discharge or with a German influence on debt discharge, and countries providing the most debtor friendly legal systems. This classification greatly overlaps with regimes discussed in Heuer (Heuer 2020) and correlates with credit permissiveness scores put forward by Wiedemann (Wiedemann 2021). It also has many similarities to the differences in debt help provision mapped by Eurofound (Eurofound 2020). The classification can thus be taken as a summary of the key institutional differences related to household debt and interpreted as signalling country differences in social norms related to debts that are reflected in legislation.

This study

Is the association between debt and depression so fundamental that it occurs across time and place? Are some countries better at mitigating the depression related to debt than others? These are the questions that this study addresses. It investigates descriptively the three hypotheses proposed above. Inherent to cross-country comparisons, this part of the analysis provides preliminary and descriptive evidence, not evidence for causal moderation. Nevertheless, the findings may guide subsequent studies evaluating specific interventions.

6.3 Methods

Three harmonised ageing datasets

Three harmonised datasets consisting of older individuals in 22 countries were analysed. The countries included are Austria, Belgium, Croatia, the Czech Republic, Denmark, England, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United States.

The first dataset is The Health and Retirement Survey (HRS), which focuses on the older US population (Sonnega, Faul et al. 2014). This nationally representative

survey started in 1992 and has been conducted every two years since then. The original sample in 1992 consisted of individuals aged 51-61 and their spouses, regardless of age, but this cohort was enriched in a subsequent wave by a sample of older individuals. In subsequent waves, a refreshment sample has been added regularly to maintain representativeness for the US population aged over 50. The sample is a multi-stage area probability design with geographical stratification and oversampling of minority demographic groups. In single-person households, the same respondent answered all questions (but a proxy was used if needed). In couple households, one person could provide the financial information. The questions from which the depression outcome was derived were not comparable between wave 1 and those later. The first wave was therefore not included in this study. Thus, this study uses the HRS dataset from waves 2-13, conducted between 1994 and 2016. The HRS is described more in detail in (Sonnega, Faul et al. 2014).

The second dataset is the English Longitudinal Study of Ageing (ELSA) (Banks, Blake et al. 2019). ELSA focuses on the non-institutionalised older population with a known address in England. ELSA aims to represent the English population aged 50 years and over. It is an ongoing longitudinal, approximately biannual, household survey. The sample of the first wave, conducted in 2002/3, was drawn from respondents to the Health Survey for England (HSE). In all waves, the data were collected mainly through computer-assisted interviews (CAPI), while some items, not used in this study, were collected via self-completion questionnaires. Refreshment samples were added regularly in later waves to maintain the age distribution in the data. In many instances, two participants (partners) from the same household were interviewed. The current study uses the ELSA data set from waves 1-9, which were conducted between 2002/3 and 2018/9. ELSA data are described in greater detail in the cohort profile (Steptoe, Breeze et al. 2012).

The third dataset is The Survey of Health, Ageing, and Retirement in Europe (SHARE). SHARE focuses on the older population in Europe and Israel aged 50 and older. SHARE aims to provide a nationally representative sample of its target population, that is people 50 years of age or over with permanent residency in each country. The institutionalised population and those unable to communicate in the country's language(s) were excluded. Partners living in the same household were

interviewed regardless of their age. Respondents were followed up and contacted for subsequent waves. However, for many individuals only a single observation is available due to attrition. Most of the data were collected via CAPI, while drop-off questionnaires were also used in some waves. The first wave was conducted in 2004 for most of the participating countries. The survey has been conducted approximately every two years since then, but the field work times differ between countries. Some countries were not able to participate in all waves, and many countries joined the survey in later waves. Wave 3 (SHARELIFE) did not contain the normal questionnaire and does not, therefore, provide the necessary data for the current study. Furthermore, in wave 7, the necessary variables for this study were drawn from a smaller subsample of participants who had responded to a life history survey earlier. As a result, the current study uses data from waves 1-2 and 4-6 for the cross-sectional logistic regression models and 1-2 and 4-7 for the longitudinal models (see details below). This study uses the SHARE data from Austria, Belgium, Croatia, Czechia, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden and Switzerland. For Croatia, Ireland and Hungary, only cross-sectional data are available, and these countries were not included in the longitudinal models. Israel, which participated in the SHARE waves of interest, was not included in this study. The dataset is described in detail in the cohort profile (Börsch-Supan, Brandt et al. 2013).

Harmonised versions of these three datasets (Harmonised SHARE E.2, November 2020, Harmonised ELSA G.2, and RAND HRS) and codebooks were provided by the Gateway to Global Ageing Data portal (https://g2aging.org/).[8] The sample used for this study consisted of persons aged 50 years or more. Imputed values provided by the survey providers for missing variables, except the outcome (depression), were used. In the weighted, cross-sectional regression models, people without weights or zero weight were excluded.

Main predictor: household non-mortgage debt

[8] The development of the harmonised datasets was funded by the National Institute on Aging (R01 AG030153, RC2 AG036619, 1R03AG043052

The household debt measures were derived at the household level (respondent and his/her partner, if any). All surveys provided information on non-mortgage debt with minor differences in the questions asked. In HRS, non-mortgage debts were derived from the following question: *"And do you [or your (husband/wife/partner)] have any debts that we haven't asked about, such as credit card balances, medical debts, life insurance policy loans, loans from relatives, and so forth?"* and then "*Altogether, about how much would that amount to?"* In ELSA, respondents were separately asked whether they had any, and the amount left to pay, of the following debt categories: credit card debt, debt to friends and relatives, and other types of debt (excluding mortgage debt). The non-mortgage debt was constructed as the sum of these debt categories. In SHARE, the respondents were asked to identify whether they had several types of non-mortgage debt from a list. This list included credit and store cards, loans from financial institutions, car loans, debts to relatives and friends, student loans, and overdue bills. Those reporting any of the listed debts were asked the total amount not yet paid to these debts ("*How much do you [and] [your] [husband/wife/partner] owe in total?*"). There were slight changes in the wording of this question and the order of the list across waves of the SHARE. The only substantial difference between the surveys was that in the HRS question, car loans were not included in the measure.

For this study, non-mortgage debt was used as a dichotomous variable, taking value one when a person was in a household with the debt type and zero otherwise. Furthermore, to study the exposure-response relationship between a higher debt burden and a higher risk of depression, an ordinal variable was computed. Debt to non-housing gross wealth ratios were calculated and then divided into non-zero fourths. For those with zero non-housing gross wealth, the wealth was imputed by the smallest amount found in the data to allow the division. This implied that all people without any liquid wealth were classified to the highest fourth. The association between the debt burden fourths variable and depression was analysed in separate models.

Outcome: Depression

Depression was a dichotomised outcome variable, measured using well-established multi-item scales. A version of the Center for Epidemiologic Studies Depression Scale (CES-D 8) was used for HRS and ELSA. Participants were asked whether they had

experienced symptoms of depression much of the time during the previous week. These eight symptoms were: felt depressed, felt that everything was an effort, restless sleeping, felt happy (reverse coded), felt lonely, enjoyed life (reverse coded), felt sad, and not able to get going much. A dichotomised version was used with the standard cut-off point of three or more reported symptoms (Radloff 1977, Turvey, Wallace et al. 1999).

In SHARE, depression was measured with the EURO-D, which is a depression measure developed for purposes of cross-country comparative analysis (Prince, Reischies et al. 1999). Respondents were asked about depression-related symptoms in the previous month (depression, pessimism, wishing death, guilt, sleep, lack of interest, irritability, appetite, fatigue, lack of concentration [on reading or entertainment], lack of enjoyment, and tearfulness). Responses to each of these items were dichotomised. Following the standard cut-off point, those reporting four or more of the 12 depressive symptom items were considered a case of depression (Mehrbrodt, Gruber et al. 2017).[9]

While this variable is called depression in this paper, it does not measure clinically assessed depression. The variable gives much higher prevalence estimates than other sources which have data on clinically assessed depression, such as the Global Burden of Disease study.

The comparisons between SHARE and ELSA/HRS are limited by different depression measures (CES-D 8 and EURO-D). While these two measures are often used in combination (Richardson, Keyes et al. 2020), it has been argued that these two depression measures should not be used to compare the prevalence of depression across countries (Courtin, Knapp et al. 2015). An exploratory analysis using SHARE wave 2 in which both scales, EURO-D and CES-D, were used with a subsample, showed that the association between debt and depression was slightly stronger when using the EURO-D measure (with conventional cut-off points).

[9] Previous studies have compared these measures Courtin, E., M. Knapp, E. Grundy and M. Avendano-Pabon (2015). "Are different measures of depressive symptoms in old age comparable? An analysis of the CES-D and Euro-D scales in 13 countries." International Journal of Methods in Psychiatric Research **24**(4): 287-304. and while they point out some limitations in comparing their predictors, for example, they predict similar education-related inequalities in depression. Although the two scales consist of some shared items, these are asked in different time-frames (SHARE past month while CESD past week), which prevents comparisons of their components.

Control variables

A set of variables capturing potential factors that may affect both debt and depression were included. The link between age and depression was modelled in a quadratic function by including continuous age and age squared (in ELSA, age was top coded to 90; thus, a similar top coding was also manually done for HRS and SHARE surveys). Sex was coded as male or female. Marital status was categorised as married/partnered, separated/divorced/never married or widowed. The number of people in the household was treated as a categorical variable with categories of 1, 2, 3 and 4 or more. Labour market status consisted of the following five categories: employed or self-employed, unemployed, retired, permanently sick or disabled, and homemaker or not in the labour force.

Socioeconomic status was measured as time-invariant education, log of gross non-mortgage wealth and mortgage debt. Education was treated as a categorical variable, consisting of three categories: 1. less than upper secondary education, 2. upper secondary and vocational training, and 3. tertiary education. The natural logarithm of gross-non-housing, "liquid", wealth was initially adjusted for price index. The total all non-housing wealth was computed as the sum of the non-housing wealth components mentioned in each survey. Non-mortgage debt was not subtracted. Mortgage debt was included as a dichotomised variable, taking value one when a person was in a household with some mortgage debt and zero otherwise.

There were slight differences in how these variables were obtained in the three surveys, and which categories were included in the original questionnaire. However, all of the variables can be seen to capture similar constructs. The regression models (see below) were fitted separately for each country.

Statistical analysis

The preliminary analysis consisted of weighted means and unadjusted odds ratios of depression in around 2015/6. Then a series of logistic regression models, estimated via maximum likelihood, was fitted for each country-time point separately and for pooled SHARE and, separately, HRS and ELSA, samples. Depression was regressed to household non-mortgage debt and all covariates listed above. In the pooled models, the coefficients of all covariates, except the debt variable, could differ by country by

including country interaction terms. The models were weighted by wave specific analysis weights provided by the survey providers (the weights were summed to the size of the population of the country of interest, thus providing a meaningful pooled estimate[10]). The models were also replicated using debt-to-wealth quartile variables as an alternative debt measure.

Odds ratios, that is, ratios of odds of depression for people with and without non-mortgage debt, are presented in figures. Predicted probability differences were also calculated from the models and reported to provide more tangible association measures.

To explore the extent to which the findings were driven by unobserved differences between people with and without debts, a series of individual fixed effects logistic regression models, estimated via conditional likelihood, were fitted for each country separately and for pooled samples (Allison 2009). The fixed effect models were not weighted. By exploiting within-individual variation in the variables of interest, these models compared a person's odds of depression when he/she was in debt with his/her odds of depression when not in debt, net of the controlled time-varying covariates. This allowed the model to consider all time-invariant differences between people. In doing so, all people without change in their depression status are effectively dropped from the models, yielding a subsample of the longitudinal sample. Furthermore, to explore the association between acquiring debts and getting rid of them, that is, asymmetric effects of debts, extended asymmetric models of fixed effects logistic regression were fitted. In these models, the effects of paying off and of acquiring new debt on depression had separate estimates. The assumptions behind asymmetric models are described in detail in Allison (2019). All time-varying control variables were included in the models (i.e. not education and sex).

To investigate the moderating role of country-level variables, a two-step approach was chosen. In this modelling approach, the country and time-specific log odds ratios of the debt variable were first estimated and then regressed on the contextual variables of interest. These three variables were debt discharge regime variable (obtained from Hoffman 2012, used in Angel; fixed effect estimates were plotted), the

[10] In ELSA the original weights provided by survey team, had a mean of 1. These weights were thus multiplied by sample/estimated population size (20,700,000, ONS estimate for 2018).

prevalence of non-mortgage debts in the country among people aged 50 and older (calculated from the surveys used), and the country-level unemployment rate (obtained from the World Bank). While the majority of the older adults in the sample were not at risk of unemployment, it was assumed that the general uncertainty linked to a higher unemployment rate would increase distress related to indebtedness. The economic indicators based on the gross domestic product were deemed inappropriate given that their changes may not be reflected in people's everyday lives.

The subsequent, second-level, linear regression models were run without and with country fixed effects to explore whether the contextual indicators predicted the strength of the debt-depression association between and within countries over time. Robust standard errors were calculated. The results are presented in plots with predicted regression lines and their 95% confidence intervals.

6.4 Results

Descriptive findings

Table 6.2 shows weighted descriptive statistics and contextual indicators. The weighted mean of age was around 64-67 in all countries with a similar interquartile range. In 2015/6, the prevalence of the dichotomised depression was lowest in Denmark (17%), Switzerland (18%) and the Netherlands (18%), and highest in Hungary (41%), Poland (40%) and Portugal (40%). In the same period, the prevalence of non-mortgage debt varied substantially between countries. It was the highest in the US (36%), Greece (30%) and Sweden (28%). The prevalence of debt was lowest in Switzerland (7%), the Netherlands (8%) and Italy (9%). These country differences are in line with previous studies (Lewin-Epstein and Semyonov 2016, Richardson, Keyes et al. 2020).

Table 6.2 Description of sample used in cross-sectional comparison in 2015/2016.

Country (survey year for cross-sectional comparison)	Number of observations	Mean age (interquartile range)	% with depression	% with non-mortgage debt	Unemployment rate (OECD)	Debt discharge regime**
Austria AUT (2015)	3019	66 (57-74)	21	12	6	2
Belgium BEL (2015)	5315	65 (56-73)	28	19	8	3
Switzerland CHE (2015)	2659	66 (57-73)	18	7	5	.
Czech Republic CZE (2015)	4483	65 (56-71)	22	12	5	2
Germany DEU (2015)	4160	66 (57-74)	24	15	5	3
Denmark DNK (2015)	3492	65 (57-72)	17	25	6	3
England ENG (2016)	6630	67 (59-74)	21	26	5	4
Spain ESP (2015)	4719	65 (56-73)	25	11	22	.
Estonia EST (2015)	5021	66 (57-75)	35	14	6	.
France FRA (2015)	3634	65 (56-73)	35	24	10	4
Greece GRC (2015)	4497	66 (57-75)	32	30	25	1
Croatia HRV (2015)	2270	65 (57-73)	32	23	16	.
Hungary HUN (2011)	2869	65 (58-72)	41	14	11	1
Ireland IRL (2007)	966	65 (56-72)	20	22	5	1
Italy ITA (2015)	4661	66 (56-74)	33	9	12	1
Luxembourg LUX (2015)	1462	64 (55-71)	32	28	7	1
Netherlands NLD (2013)	3911	64 (53-72)	18	8	7	3
Poland POL (2015)	1582	64 (56-71)	40	17	8	1
Portugal PRT (2015)	1362	66 (59-73)	40	13	12	2
Slovenia SVN (2015)	3891	65 (57-72)	23	18	9	.
Sweden SWE (2015)	3694	66 (58-73)	19	28	7	3
United States USA (2016)	18639	65 (57-71)	20	36	5	.

Weighted.

Table 6.3 shows the prevalence of depression among people with debt and people without debt, and unadjusted odds of depression in around 2015/6. Before any adjustments, people with non-mortgage debt had, in almost all countries, higher odds of depression than people without non-mortgage debt. The unadjusted odds ratios (ORs) were highest in the Czech Republic (2.29 [95% confidence intervals 1.30–4.06]), Italy (2.22 [1.65-3]) and Switzerland (1.90 [1.24-2.89]), and lowest in Slovenia (0.94 [0.72–1.23]), Estonia (1.05 [0.87-1.27]) and Croatia (1.13 [0.90-1.42]). These unadjusted odds ratios were, however, smaller than reported, for example, in a previous meta-analysis (Richardson, Elliott et al. 2013).

Table 6.3 Unadjusted association between household debts and depression in 2015/2016.

Country	Non-mortgage debt		
	% depression in people with debt	% depression in people without debt	Unadjusted OR (95% confidence interval)
AUT	20	31	1.85 (1.31–2.61)
BEL	27	35	1.48 (1.19–1.84)
CHE	17	28	1.90 (1.24–2.89)
CZE	20	36	2.29 (1.30–4.06)
DEU	23	33	1.61 (1.28–2.03)
DNK	15	23	1.71 (1.39–2.12)
ENG	19	24	1.29 (1.07–1.56)
ESP	24	32	1.45 (0.94–2.24)
EST	35	36	1.05 (0.87–1.27)
FRA	33	38	1.25 (1.03–1.51)
GRC	28	40	1.70 (1.45–1.99)
HRV	31	34	1.13 (0.90–1.42)
HUN (2011)	39	50	1.55 (0.97–2.49)
IRL (2007)	19	21	1.15 (0.76–1.73)
ITA	31	50	2.22 (1.65–3.00)
LUX	29	37	1.43 (1.03–2.00)
NLD (2013)	18	27	1.72 (1.05–2.81)
POL	39	45	1.27 (0.91–1.77)
PRT	39	47	1.39 (0.68–2.82)
SVN	23	22	0.94 (0.72–1.23)
SWE	18	20	1.15 (0.90–1.48)
USA	18	23	1.34 (1.21–1.48)
ELSA+HRS	18	23	1.32 (1.21–1.45)
SHARE	28	37	1.52 (1.38–1.66)
*In the US and England depression measured with CESD-D (>2). In other countries with EURO-D (>3) Weighted.			

Figure 6.1 shows the results from the logistic regression models, adjusting for observable socioeconomic and demographic variables. In these models, household non-mortgage debt was associated with higher odds of depression in all 22 countries. The pooled odds ratios in the SHARE pooled sample were 1.82 [95% confidence interval 1.64–2.02], and 1.48 [1.34–1.64] in the ELSA and HRS pooled sample. The average predicted probability of depression was 11 percentage points higher with debt than without debt for the SHARE sample and 5 percentage points higher in ELSA+HRS (Supplementary Figure 1).

The country-specific associations, shown in separate lines, were stronger in Eastern and Southern European countries such as Greece (2.24 [1.87–2.69]) compared to Northern European countries such as Sweden (1.30 [0.98–1.73]). The magnitude of

these associations was large in most of the countries. The odds ratios (ORs) were similar, for example, to the ORs of the lowest education level vs. the highest education level (this comparison is shown in Supplementary Figure 2). The right panel of Figure 1 shows the estimates from the models with debt-to-wealth quartiles as alternative debt measures. There was generally a clear pattern of higher debt burden with higher odds of depression. Shown in supplementary materials, comparing these associations within countries over time did not show any clear time trend patterns. Non-mortgage debt was linked to higher odds of depression in almost all time points (Supplementary Figure 3).

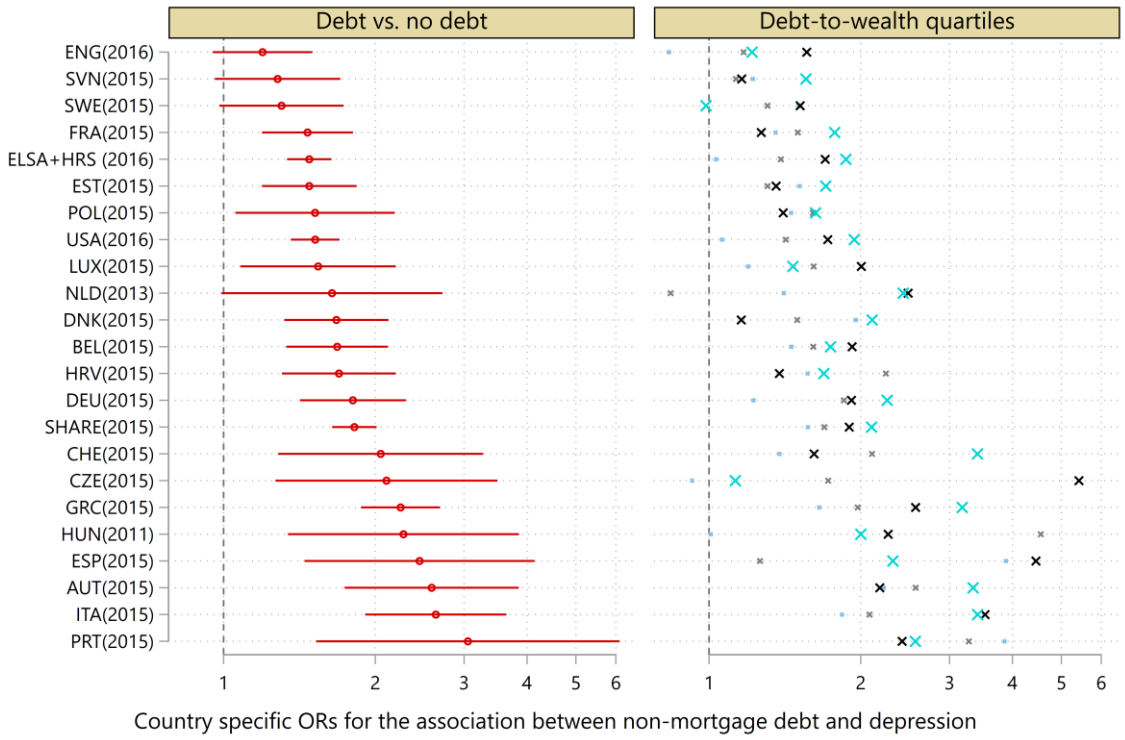


Figure 6.1 Country-specific associations between non-mortgage debt and depression. Results from country-specific logistic regression models predicting odds of depression. Odds ratios (and their 95% confidence intervals) are presented. All models are adjusted for socioeconomic and demographic variables. Only cross-sectional sample in 2015/6 in most of the countries. Models are weighted. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). The right panel shows the graded association between debt-to-wealth fourths and odds of depression. Larger X presents a larger debt-to-wealth quartile.

For the fixed effect analysis, only longitudinal observations were considered. The longitudinal subsample who experienced a change in their depression status over

the study period, and thus contributed to the fixed effect analysis, is described in Table 6.4. They include about a third of the full sample.

Table 6.4 Description of the longitudinal subsample (people with change in their depression status during the follow-up) used in the fixed effects logistic regression models.

Country	Number of persons (observations)	Mean number of observations per person (max)	Potential time-period range	% with a within-individual change in non-mortgage debt variable
AUT	1359 (4329)	4 (6)	2004–2017	19
BEL	2124 (7930)	4 (6)	2005–2017	28
CHE	1018 (3600)	4 (6)	2004–2017	21
CZE	1827 (5519)	3 (5)	2007–2017	17
DEU	1413 (4514)	4 (6)	2004–2017	25
DNK	1053 (3900)	4 (6)	2004–2017	37
ENG	5886 (35058)	7 (9)	2002–2018	48
ESP	2079 (7001)	4 (6)	2004–2017	22
EST	2266 (6224)	3 (3)	2011–2015	19
FRA	2131 (7483)	4 (6)	2004–2017	36
GRC	954 (3072)	3 (4)	2004–2017	30
ITA	2012 (7672)	4 (6)	2004–2017	25
LUX	221 (442)	2 (2)	2013–2015	22
NLD	753 (2281)	3 (4)	2004–2013	17
POL	814 (2710)	4 (4)	2007–2017	27
PRT	386 (772)	2 (2)	2011–2015	17
SVN	879 (2294)	3 (3)	2011–2015	19
SWE	1294 (4709)	4 (6)	2004–2017	41
USA	15285 (109053)	9 (13)	1994–2018	59

Shown in Figure 6.2, unmeasured time-invariant differences between people with debts and people without explained some of the cross-sectional associations found above, but not all. In SHARE, people had 35% higher odds of depression when they had non-mortgage debt, within-person, than times when they did not, net of time-varying control variables (pooled OR 1.35 [1.27–1.43]). In the HRS and ELSA combined sample, this figure was 12% (pooled OR 1.12 [1.08–1.16]). Asymmetric estimates indicated that associations were symmetric and in both directions. For example, getting rid of debts multiplied the odds of depression within person by 0.78 (0.73–0.83) in SHARE and by 0.88 (0.85–0.92) in ELSA/HRS. To provide more concrete effect measures, a linear probability model with fixed effects was fitted because predicted probabilities cannot be calculated from logistic fixed-effects models estimated using conditional likelihood estimation. Analysis using this linear probability model showed

that these corresponded on average to a four percentage points higher predicted probability of depression in SHARE and a one percentage point higher probability in ELSA+HRS (Supplementary Figure 4).

The country differences in the fixed effect logistic regression models were similar to the between-person models. The strongest association was observed in Greece (2.02 [1.48–2.76]), Poland (1.77 [1.28-2.43]) and Estonia (1.61 [1.28-2.01]), and the smallest in Sweden (1.01 [0.84–1.22]), England (1.08 [1.01-1.18]) and the US (1.12 [1.08-1.17]). The strength of these associations was small to moderate in most of the countries. In the pooled SHARE sample, the magnitude of the within-person ORs was around half of the widowed vs. married OR. In the pooled ELSA+HRS sample, the OR was around a fifth of the widowed vs. married OR (these comparisons are shown in Supplementary Figure 5).

Given concerns about depression being an umbrella term for different mental conditions rather than its own condition, in additional analysis, specific depressive symptoms were used as alternative outcomes. These additional models showed that the associations were fairly similar and significant for all depressive symptoms measured in EURO-D and CES-D scores (data not shown).

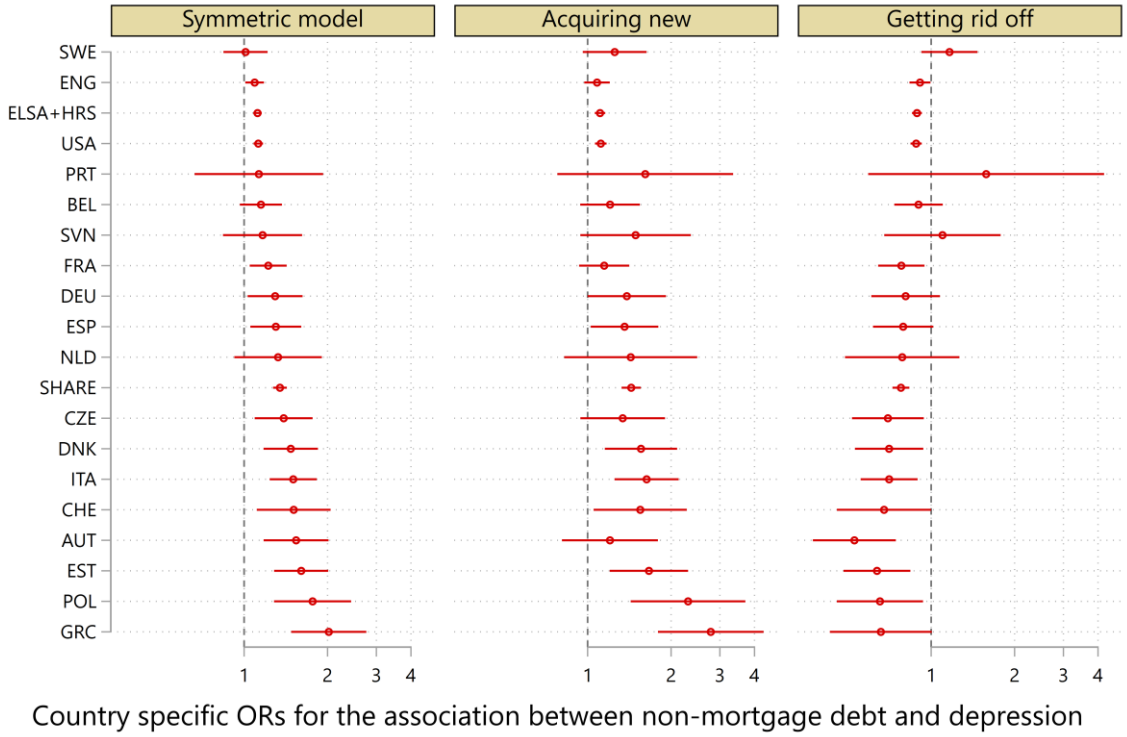


Figure 6.2 Country-specific associations between non-mortgage debt and depression from normal and asymmetric fixed effects logistic regression models. Odds ratios (and their 95% confidence intervals) from pooled and country-stratified models. All models are adjusted for socioeconomic and demographic variables. Note that Luxembourg was included in the pooled model but not in the country-specific because the longitudinal sample size was too small. No weights. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3).

Comparing the associations in different contexts

The country and time-point specific associations between non-mortgage debt and depression are plotted (in log odds ratio scale) against the relevant contextual variables in Figure 6.3**,** Figure 6.4 and Figure 6.5

To test the vulnerability hypothesis, the debt-depression associations measure, shown on the vertical axis of Figure 6.3, was compared to the unemployment rate in a given country-time point, on the horizontal axis. In a between country-wave setting, shown in the left panel of the figure, the country-level unemployment rate showed a weak moderating role. In a country fixed effect approach, shown in the right panel of the figure, there was also a weak indication that non-mortgage debt-depression associations became stronger as the unemployment rate increased. This is to say that

increases in unemployment were associated with increases in the magnitude of the association between debt and depression within countries.

To test the social norm hypothesis, associations were compared to the prevalence of non-mortgage debt in a given country. Shown in Figure 6.4, non-mortgage debt was a stronger predictor of depression in country-time points where the prevalence of non-mortgage debt was lower. However, after adding the country fixed effects, which effectively moved to comparison to within countries over time, there was no evidence for such moderation. This is to say that increases (decreases) within countries in the prevalence of non-mortgage debt were not associated with stronger (weaker) associations between debt and depression.

Finally, to test the institutions hypothesis, the within-person associations, obtained from fixed effect models above, were compared to debt discharge regimes (Figure 6.5). There was a clear pattern that the association was strong in countries with no or weak personal discharge legislation (in 2012). The associations were weakest in the Scandinavian approach countries and Anglo-Saxon countries. Similar findings were obtained when these moderations were tested in additive terms using predicted probability difference in the first stage, instead of multiplicative terms (supplementary figures 6-8).

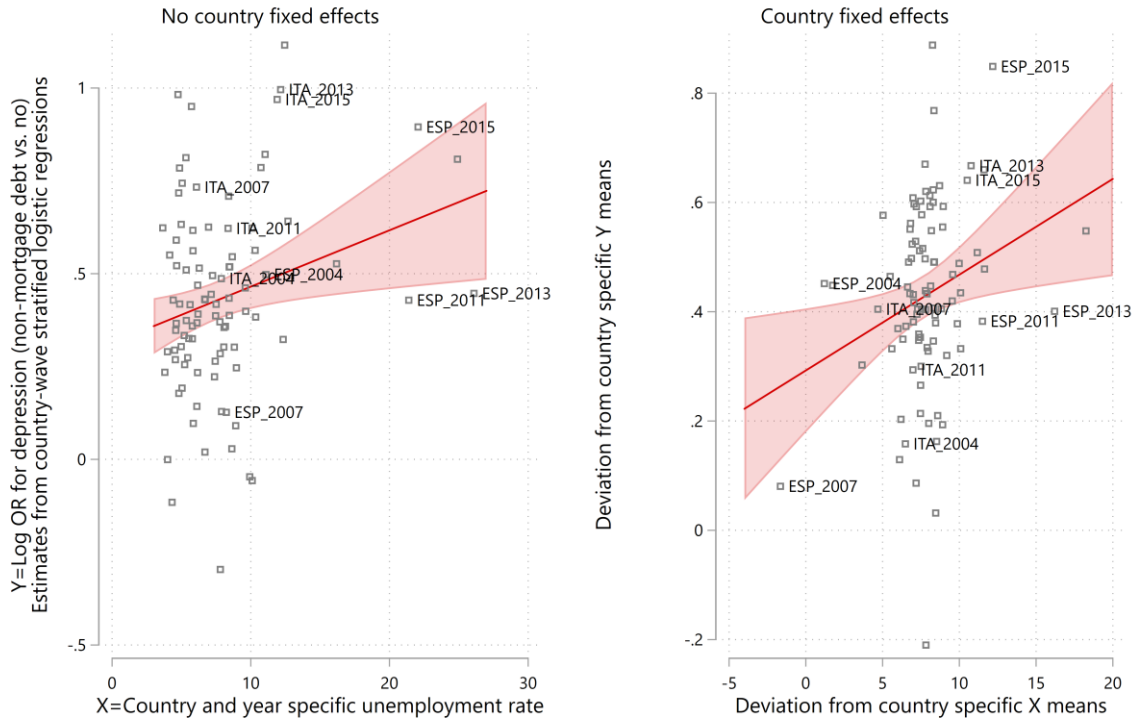


Figure 6.3 Moderation of the unemployment rate in the association between non-mortgage debt and depression. Vertical axis presents country and wave specific log odds ratios for the association between non-mortgage debt and depression obtained from separate logistic regression model (also presented in Figure 2). Horizontal axis presents the unemployment rate (provided by the OECD) in each country and wave. Vertical axis presents country wave specific associations between non-mortgage debt and depression (in log odds ratios). Fitted line and its predicted 95% confidence intervals are obtained from linear regression model with robust standard errors. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). Spain and Italy are highlighted.

Figure 6.4 Moderation of social norms in the association between non-mortgage debt and depression. Vertical axis presents country and wave specific log odds ratios for the association between non-mortgage debt and depression obtained from separate logistic regression model (also presented in Figure 2). Horizontal axis presents the prevalence of non-mortgage debt in each country and wave point calculated from the weighted data. Vertical axis presents country wave specific associations between non-mortgage debt and depression (in log odds ratios). Fitted line and its predicted 95% confidence intervals are obtained from linear regression model. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). Spain and Italy are highlighted.

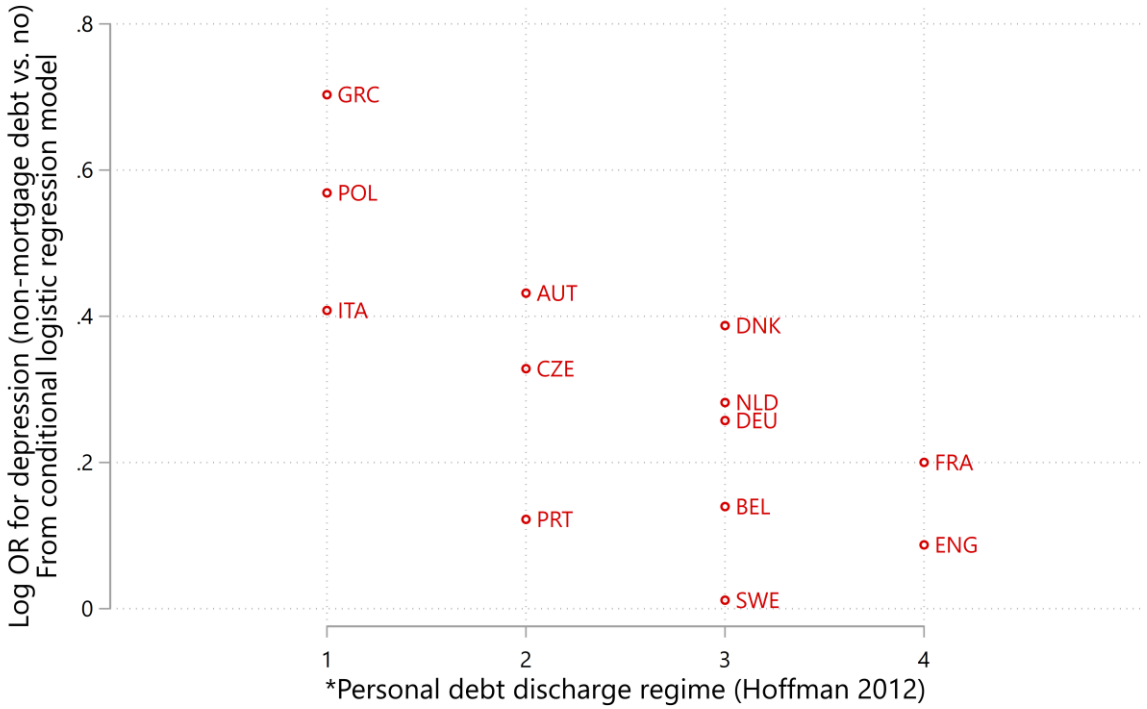


Figure 6.5 Moderation of personal debt discharge regimes in the association between non-mortgage debt and depression. Vertical axis presents country-specific log odds ratios for the association between non-mortgage debt and depression obtained from separate fixed effects logistic regression model (also presented in Figure 3). Horizontal axis presents debt discharge regime rank obtained from Hoffman 2012. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3).

6.5 Discussion

This study interrogated the link between household non-mortgage debt and depression among older adults in 22 countries. The paper took a cross-country perspective by looking at both consistency and potential moderation of this association across countries and time points.

The key findings can be summarised as follows. In all countries, before and after adjusting for observable characteristics, older adults with non-mortgage debts had higher odds of depression compared to their peers without debts. The strength of this association was moderated by contextual factors. The association was particularly strong in countries that had no or weak personal debt discharge mechanisms and low levels of indebtedness among older adults. There was also a weak indication that the association was stronger in times of high unemployment. In almost all countries, people had higher odds of depression in times when they had non-mortgage debt, compared to themselves in other times when they were debt free. These associations were fairly similar for all specific depressive symptoms.

This study confirms the findings from earlier investigations into the association between non-mortgage debt and depression (Richardson, Elliott et al. 2013, Zurlo, Yoon et al. 2014). But an aspect that sets this study apart is the focus on numerous country contexts simultaneously. In almost all the countries studied and time-periods, in a between-person comparison setting, debt links to higher odds of depression with moderate-to-large effect size. Moreover, the fixed effect models indicate that people also had lower odds of depression after paying off their debt than before, and higher odds of depression after acquiring debts than before. But these within-individual associations were significantly smaller than the between-people estimates. This may imply that people holding debts also have a propensity to a somewhat higher risk of depression in times when they are debt free, but this is not the whole story. The observation that people had a lower risk of depression after they got rid of their debts supports previously stated causal claims about debt and mental health (Gathergood 2012).

The association between non-mortgage debt and depression was stronger in some countries and time points than in others. The country differences identified provided some descriptive support for all three hypotheses, summarised in Table 6.1.

As predicted in the third hypothesis, there was a weak indication that the debt-depression link was stronger in uncertain economic times. Perhaps people become afraid that their repayment ability will weaken in the future, which strengthens the stress and mental burden of debt (Hodson, Dwyer et al. 2014). The unemployment rate was used as a proxy for an uncertain economic environment.

There was also some support for the hypothesis that the associations are stronger in countries in which fewer older adults hold debts, a measure of the possible social stigma of debts. The associations were weaker in debt-led economies (Sweden, England and the US) compared to countries where indebtedness is less of a norm. However, when comparing the associations within countries over time, this study was unable to confirm that increasing or decreasing levels of average indebtedness modified the association between debt and depression. Nevertheless, the lack of within-country moderation over time is consistent with slow-changing social norms, and thus does not lead us to reject the social norm hypothesis.

The prevalence of non-mortgage debt among the study population is not, of course, an unproblematic proxy variable of social norms. It is susceptible to compositional effect bias, in which a higher prevalence of debt may imply that people without predisposed mental health problems are in debt. Reverse causation may also explain the finding; more people without mental health problems may get debts because holding debts is not perceived as an exception from the norm. However, other indicators of social norms – such as attitudes towards poverty or the welfare state – should be analysed in further research.

Finally, the association between non-mortgage debt and depression was disturbingly strong in countries with no, or a very weak, consumer insolvency mechanism (e.g. Greece, Italy and Poland) or only a partial discharge mechanism (e.g. Austria and Portugal). In contrast, the associations were much weaker in countries with a Scandinavian approach to consumer debt discharge (Sweden and Denmark) or in the countries with the most debtor-friendly discharge mechanisms (France, England and the US) (see for discharge regimes (Hoffmann 2012)).

The debt discharge regime classification was selected to follow previous work (Angel 2016). However, this classification was originally derived from an analysis of potential consumer insolvency tourism within the EU in 2012 (Hoffmann 2012), not mental strain arising from debt discharge possibilities. Many countries were not included in this classification, and it may not be applicable to the most recent data points. However, the classification greatly overlapped with, for example, other debt institution classifications, social norms related to debts, the availability of debt help mapped by Eurofound in 2020, and the welfare state model in general. For example, Eurofound has reported that in most of the weakest debt discharge regime countries, only scattered debt help is currently provided. Thus, the finding does not imply that debt discharge legislation necessarily affects the mental health of people with debts as such. Rather the finding suggests that institutional structure in general, for which the regime classification was used as a proxy, may matter.

For now, the evidence for these three hypotheses remains essentially descriptive and open to speculation. Nevertheless, these findings show that the association between debt and depression is particularly strong in Southern European countries. It is worth noting that these countries currently provide inadequate debt help (Eurofound 2020).

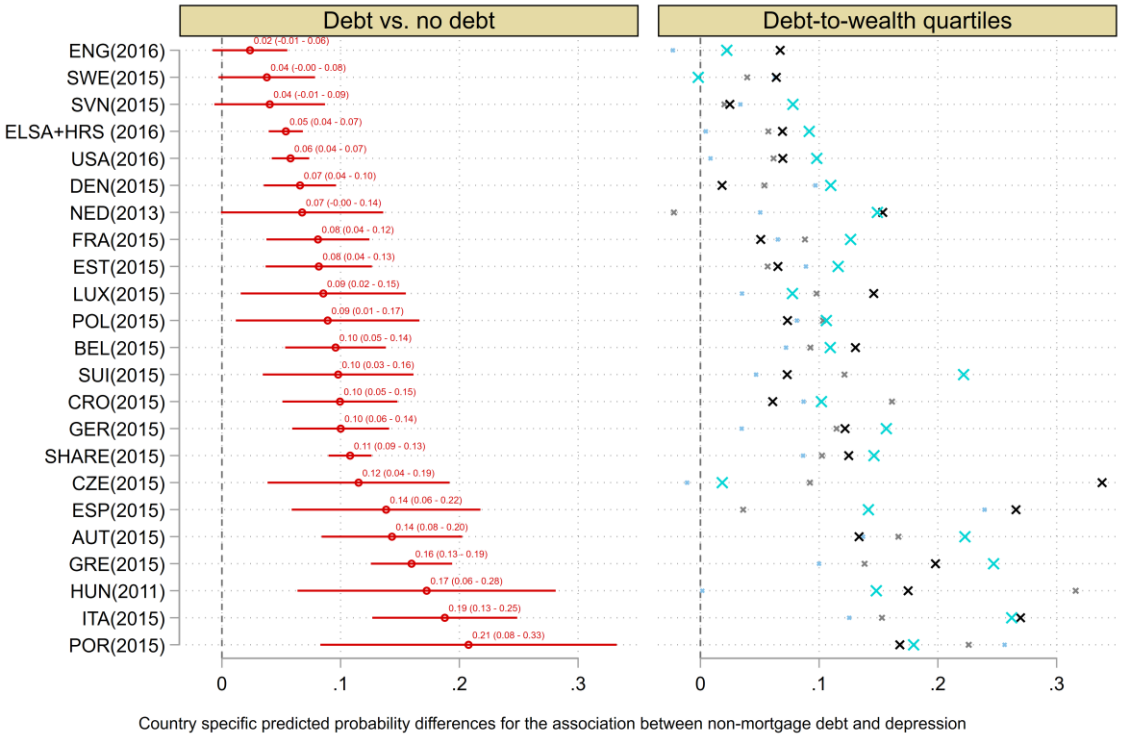
The findings from the contextual perspective of this paper suggest questions for further, causally oriented, research. For example, do specific policy changes regarding consumer debts, such as introducing personal debt discharge mechanisms, affect the risk of depression among people in debt? Do campaigns on debt-related stigma help to decrease the mental burden of people with debts? Overall, research is needed to examine effective measures, such as non-stigmatised debt advice, to alleviate depression in older adults with debts, particularly in Southern European countries.

A general limitation of this study is that there were no specific measures of non-mortgage debt. Although debt-to-liquid wealth fourths were included in the models' testing dose-response effect, the study was unable to distinguish "manageable" and "unmanageable" types of debts. It is important to emphasise that non-mortgage debt is a heterogeneous category, which potentially contains a wide range of debt types, such as informal loans and credit card loans. Some of the country differences observed in this study may be explained by the differences in the debt portfolios older adults hold in different countries. Moreover, non-mortgage debt was assessed in the household

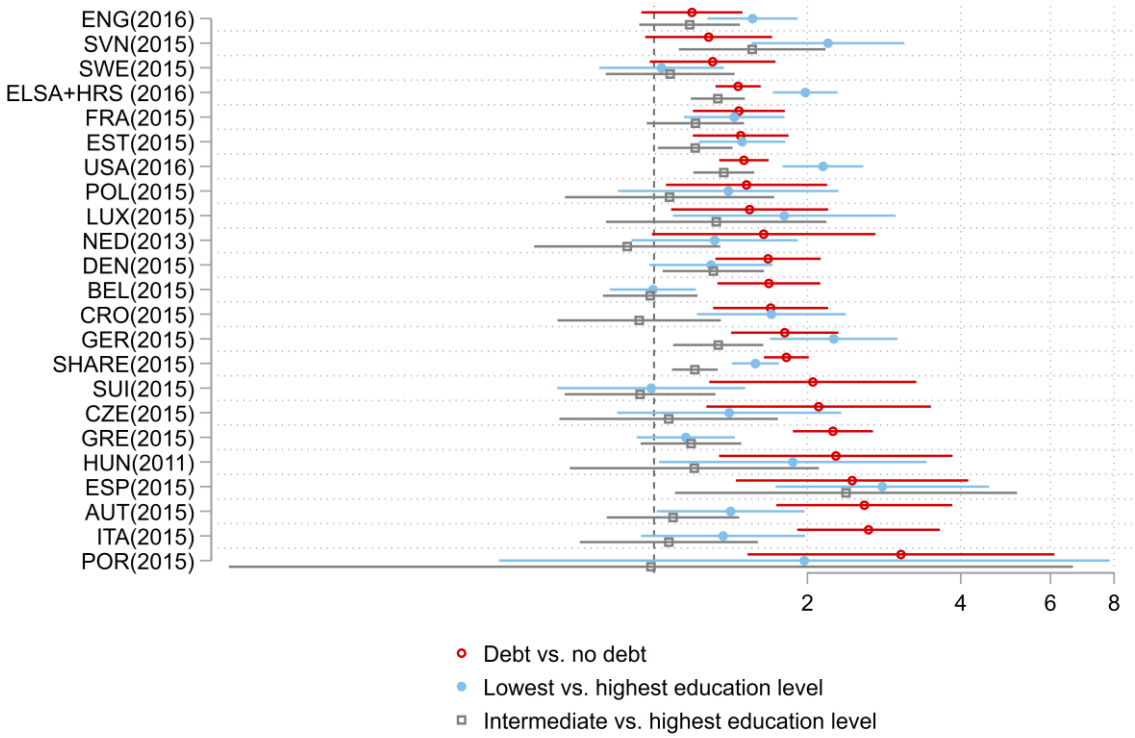
(individual or spouse), not individual, context. This is in line with studies focusing on wealth or income which measure these variables at the household level. However, some effects of debts, such as stigma, may affect household members differently. The measure used here, one can speculate, is a less severe measure of indebtedness, and the associations might be stronger with an individual-level debt measure.

The implication of this paper for health inequality research is that the increasing reliance on household debt to finance goods and services should be viewed as an upstream determinant of mental health. The link between debt and mental health occurs across time and space, but some countries are better placed to mitigate the social risks linked to increasing debt availability than others. Researchers and policy makers should aim to recognise and adopt effective policy measures to prevent the mental consequences of indebtedness. It is essential to find effective measures to improve the mental health of people with debts.

Supplementary materials for the third paper

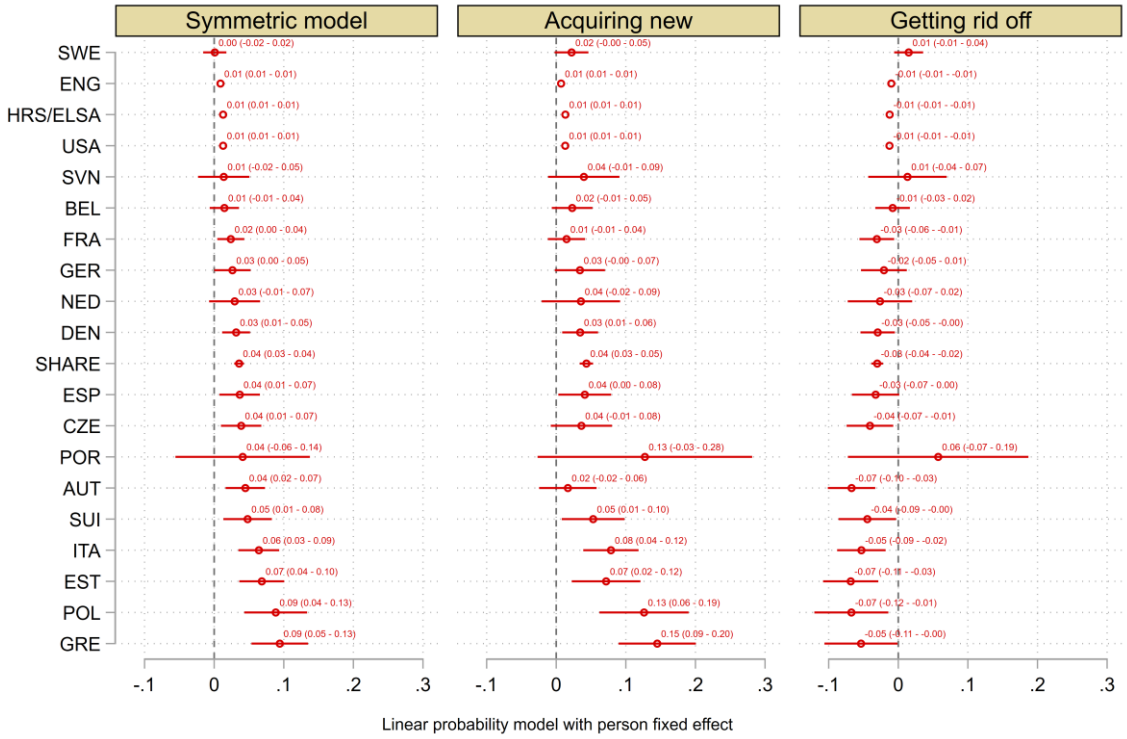


Supplementary Figure 1. Country-specific associations between non-mortgage debt and depression. Results from country-stratified logistic regression models predicting odds of depression. Predicted probability differences (and their 95% confidence intervals) are presented. All models are controlled for socioeconomic and demographic variables. Only cross-sectional sample in 2015/6 in most of the countries. Models are weighted. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). In the right panel, larger X presents a larger debt-to-wealth quartile.

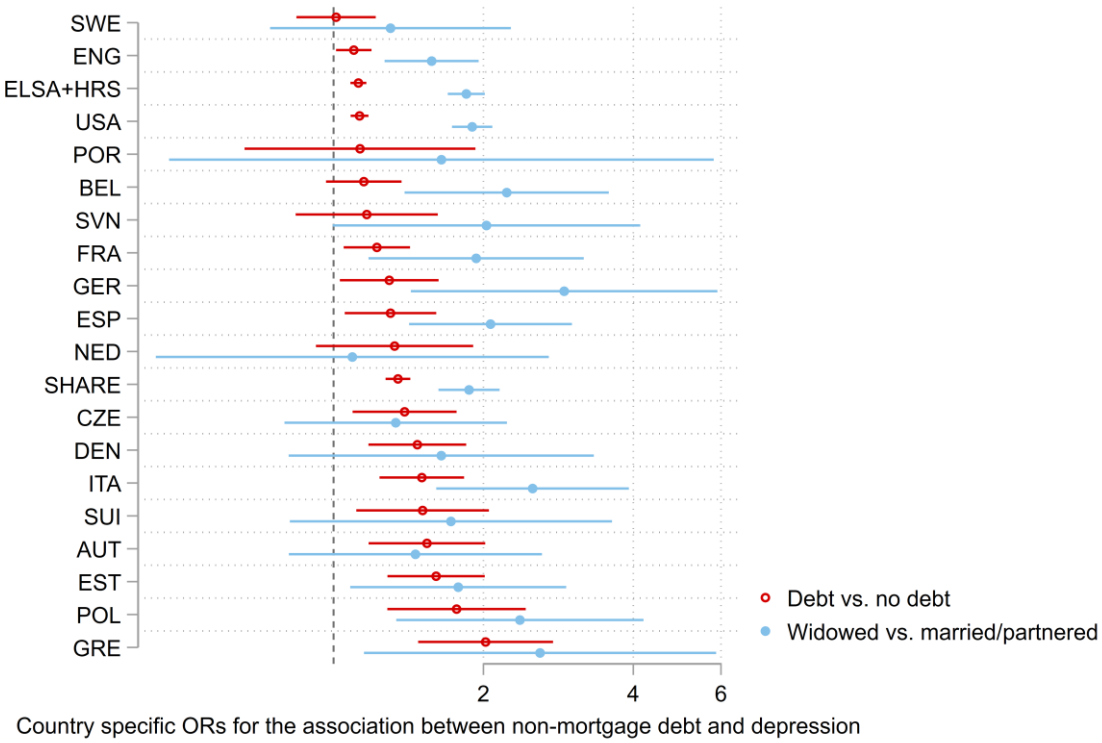


Supplementary Figure 2. Country-specific associations between non-mortgage debt and depression, compared to the association between education and depression. Results from country-stratified logistic regression models predicting odds of depression. Odds ratios (and their 95% confidence intervals) are presented. All models are controlled for socioeconomic and demographic variables. Only cross-sectional sample in 2015/6 in most of the countries. Models are weighted. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). In the right panel, larger X presents a larger debt-to-wealth quartile.

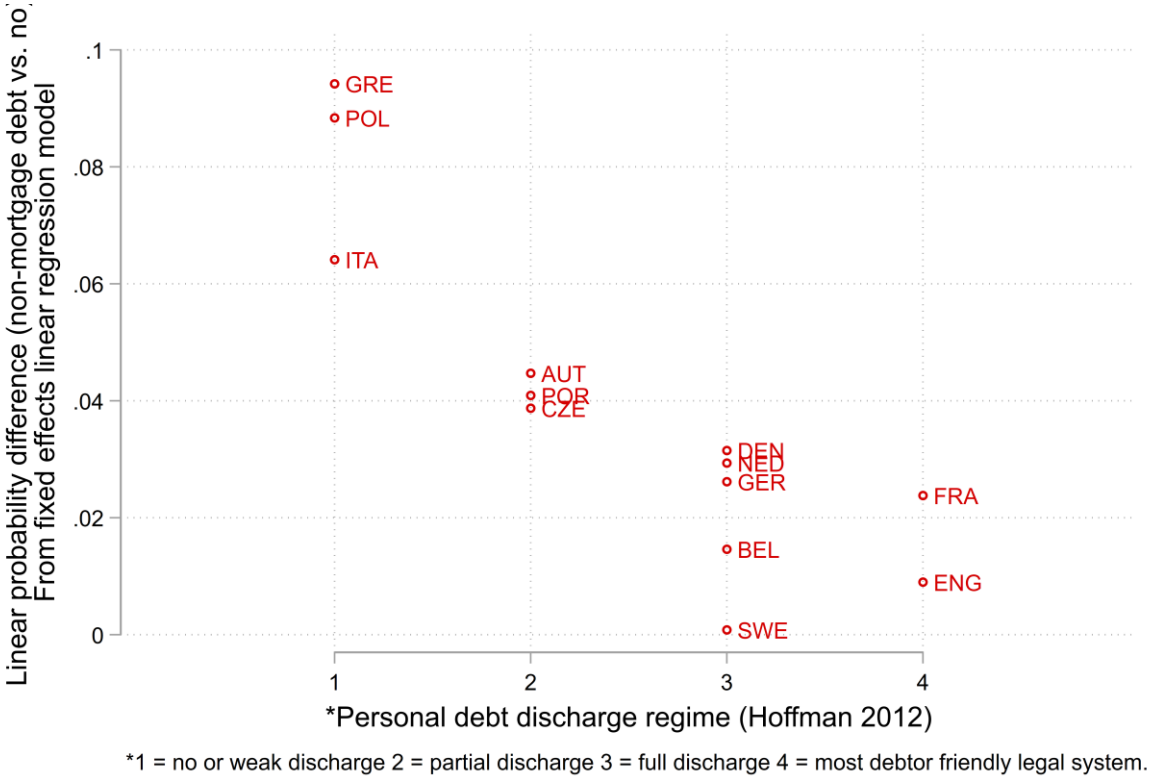
Supplementary Figure 3. Country-wave- specific associations between non-mortgage debt and depression, compared to the association between education and depression. Results from country-wave-stratified logistic regression models predicting odds of depression. Odds ratios (and their 95% confidence intervals) are presented. All models are controlled for socioeconomic and demographic variables. Models are weighted. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). In the right panel, larger X presents a larger debt-to-wealth quartile.



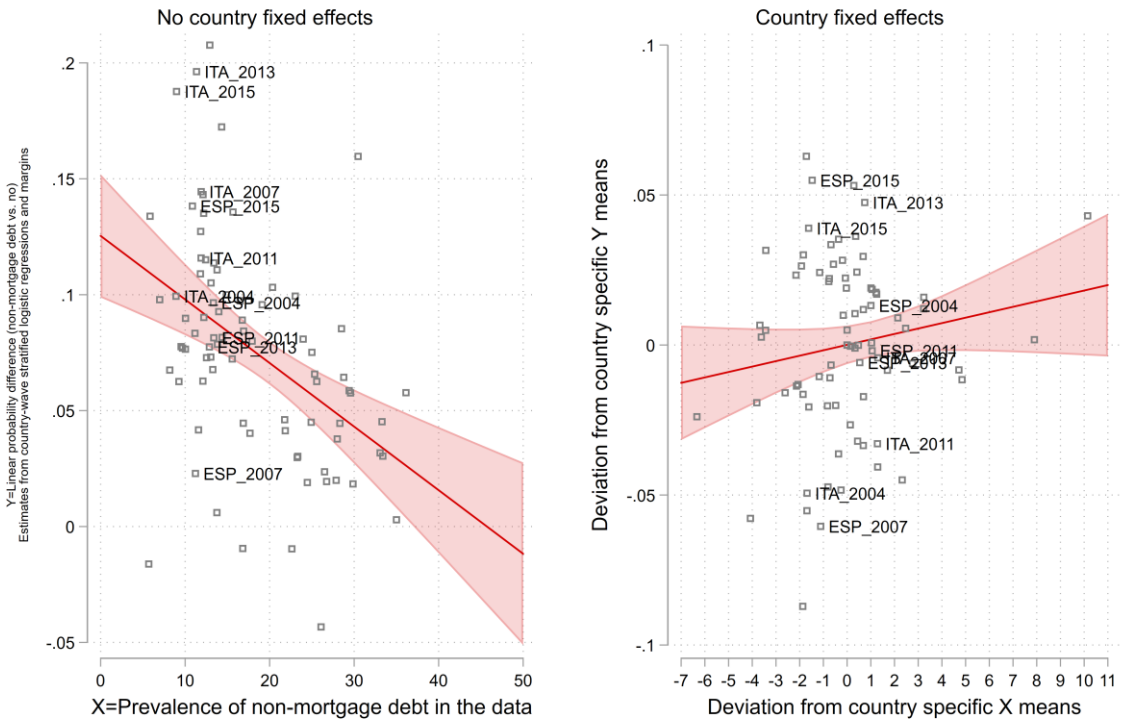
Supplementary Figure 4. Country-specific associations between non-mortgage debt and depression from normal and asymmetric fixed effects linear regression models. Linear probability differences (and their 95% confidence intervals) from pooled and country-stratified models. All models are controlled for socioeconomic and demographic variables. Note that Luxembourg was included in the pooled model but not in the country-specific because the longitudinal sample size was too small. No weights. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3).



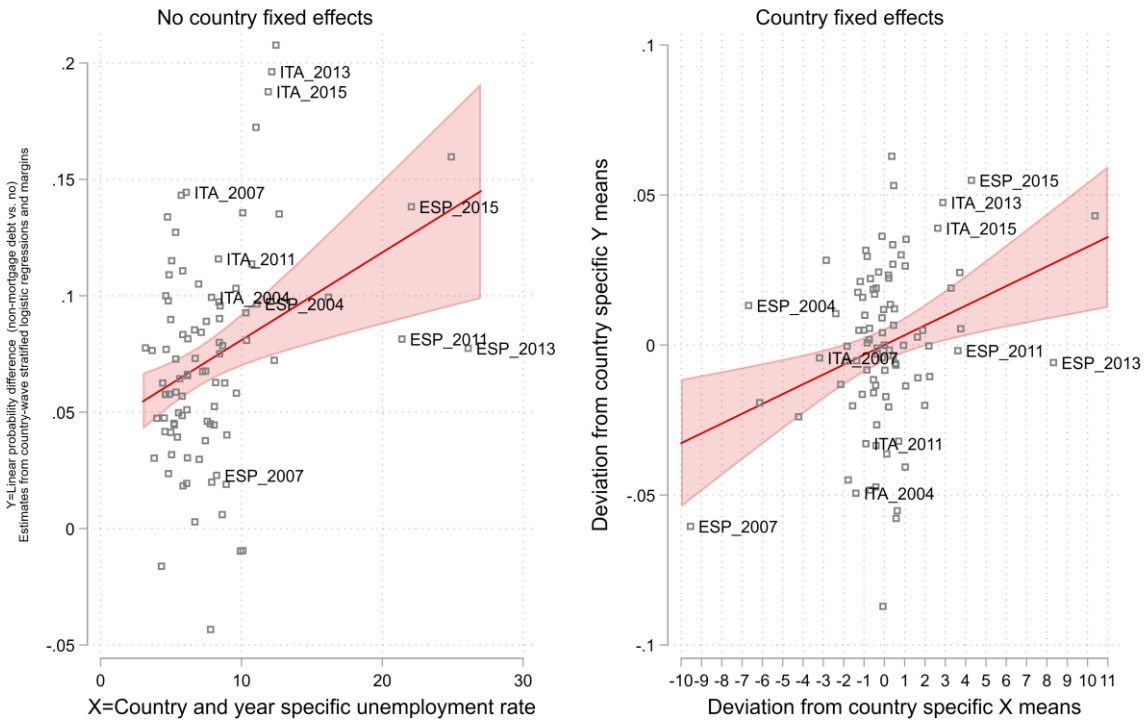
Supplementary Figure 5. Country-specific associations between non-mortgage debt and depression from normal and asymmetric fixed effects logistic regression models. The ORs of widowed vs. married/partnered showed in comparison. Odds ratios (and their 95% confidence intervals) from pooled and country-stratified models. All models are controlled for socioeconomic and demographic variables. Note that Luxembourg was included in the pooled model but not in the country-specific because the longitudinal sample size was too small. No weights. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3).



Supplementary Figure 6. Moderation of personal debt discharge regimes in the association between non-mortgage debt and depression. Y-axis presents country-specific coefficients for the association between non-mortgage debt and depression obtained from separate linear fixed effect regression models (also presented in Figure 3). X-axis presents debt discharge regime rank obtained from Hoffman 2012. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3).



Supplementary Figure 7. Moderation of social norms in the association between non-mortgage debt and depression. Y-axis presents country and wave specific predicted probability difference for the association between non-mortgage debt and depression obtained from separate logistic regression model (also presented in Figure 2). X-axis presents the prevalence of non-mortgage debt in each country and wave point calculated from the weighted data. Fitted line and its predicted 95% confidence intervals are obtained from linear regression model. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). Spain and Italy are highlighted.



Supplementary Figure 8. Moderation of the unemployment rate in the association between non-mortgage debt and depression. Y-axis presents country and wave specific predicted probability difference for the association between non-mortgage debt and depression obtained from separate logistic regression model (also presented in Figure 2). X-axis presents the unemployment rate (provided by the OECD) in each country and wave. Fitted line and its predicted 95% confidence intervals are obtained from linear regression model with robust standard errors. *In the US and England, depression measured with CESD-D (>2). In other countries, with EURO-D (>3). Spain and Italy are highlighted.

Chapter 7

7 Conclusion

This thesis aimed to investigate the ways in which debts link to the mental wellbeing of people aged 50 years and over in England and elsewhere in Europe and the US. This topic was prompted by the substantial levels of indebtedness in western countries today. In the past 50 years, the levels of household indebtedness have increased more rapidly than the typical income. At the same time, the population aged 50 years and over has increased substantially. This population age group is projected to make around 40 per cent of the total population in the UK before 2030. There have been similar trends in many western countries. It is therefore likely that more older adults will hold some form of debt in the future. If policymakers aim to improve the mental wellbeing of their ageing populations, the mental wellbeing links to debts among older adults should also be taken seriously. In this context, it is important to approach mental wellbeing in terms of both negative mental health (depressive symptoms) and positive mental health (quality of life) because these are separate dimensions of mental health. That is to say mental wellbeing is more than an absence of undesired mental disorders.

This thesis has attempted to unpack the links between debt and mental wellbeing from different viewpoints in three distinct but connected papers. The three papers all focused on people aged 50 and over, all analysed mental wellbeing outcomes, and all used forms of household debt as main predictors. However, as explained below, each paper provided additional and novel evidence. This concluding chapter discusses these individual contributions, the overlapping findings, and potential implications for policy and future research.

It is worth reiterating that this thesis did not evaluate any specific social or public policies. Nevertheless, the extent to which the findings provide indirect insights into social policy are considered in this concluding chapter.

The structure of this chapter is as follows. It first summarises the key findings and contributions of the three papers. It then goes on to discuss implications for future research and policy. Finally, the findings are briefly discussed in the context of the COVID-19 pandemic.

7.1 Summary of the key findings and contribution

The first paper provided a descriptive analysis of the dynamics of debt in later life and subsequently analysed the extent to which different types of debt measures are associated with two mental wellbeing outcomes. The second focused on moderation and analysed the extent to which non-mortgage debt links to mental wellbeing from population description and causal perspectives. The third paper investigated how the country context may determine the extent to which debt links to mental depression. Rather than repeating the key findings in the order of the papers, the key insights are summarised thematically below.

Several important descriptive findings arose from these three papers. First, demonstrated in the first paper, while in the English Longitudinal Study of Ageing, debt seemed to be a fluid social exposure, people take on debts and get rid of their debts dynamically in later life. A substantial proportion of the people in the sample had some form of debt in the period during which they participated in this longitudinal study, but some 90 per cent of the people also had at least one observation without these debts. Persistent, non-mortgage indebtedness is rare in this age group. People were mostly paying off their debts during the study period.

Unsurprisingly, mortgage debt changed less during the study period than non-mortgage debt. These findings suggest that the complex nature of debt should be taken into consideration in empirical analysis, including when investigating it as a potential determinant of mental health. For example, as discussed below, subsequent studies may find it useful to focus on the longitudinal nature of debt in their analyses.

The second important descriptive finding was that there was substantial variation in the prevalence of debt across socioeconomic groups and – demonstrated in the third paper – country contexts. People with debts had higher incomes, were more likely to be employed and had higher education qualifications than people without debts. But these differences reflected the fact that people with debts were much younger than people without. In terms of the country context, the use of non-mortgage debt was more common in the UK and US compared to southern or eastern European countries. The third important descriptive finding was that people with non-mortgage debt tend to have lower mental wellbeing on both outcomes than their peers without this debt. The

second paper found that people with debts have lower mental wellbeing among those in employment and those retired, but that this association was particularly strong for jobless people (not working, not retired).

The thesis covered several issues related to measurement of debts and methodological issues. There were important differences in how mortgage and non-mortgage debt linked to mental wellbeing. In the first paper, in the between-observation type comparison in which the mental wellbeing of observations with debt and without were compared after several socioeconomic and demographic variables were adjusted for, non-mortgage debt, particularly when substantial compared to available assets, had a robust link to both mental wellbeing outcomes. Mortgage debt was linked to a lower quality of life, but no association of this debt type with depressive symptoms was observed. The first paper showed that these associations, however, varied significantly in how debt burden was operationalised. Higher debt amount did not imply lower mental wellbeing, but a higher debt burden measured as debt-to-available assets and, to a lesser extent, to income, were linked to lower mental wellbeing among the indebted group.

The thesis revealed several interesting aspects of the debt-mental wellbeing link while taking advantage of the longitudinal nature of the datasets used. In the first paper, in-person fixed-effect regression analysis, in which each person was used as her/his control, similar findings were observed to those reported above; non-mortgage debt was linked to both outcomes and mortgage debt only to lower quality of life. However, these associations were of a much smaller magnitude than the ones observed in between-person comparison analysis. This longitudinal approach showed that people reported better mental wellbeing after getting rid of their debts and, separately, lower mental wellbeing after acquiring debts. The reason for this discrepancy between the two analytical strategies – between-individual and within-individual comparisons – arises from the fact that people with debt also had elevated levels of poor mental wellbeing on the occasions when they did not have debt. This indicates the role of confounding, that is, time-stable characteristics contribute to both mental wellbeing and a predisposition to take on debt. Similar findings were observed in the third paper, in which the odds of elevated levels of depressive symptoms were compared across people and within them over time. In almost all countries, people had higher odds of depression when they were

in debt compared to themselves when they were debt free, but these associations were smaller in magnitude than those observed in a between-person type comparison. This finding suggests that the findings of the first paper, set in the UK, are applicable to a larger set of countries.

The thesis also took advantage of the longitudinal dimension of the data by using a target trial framework, in which observational data are used to mimic an imagined intervention. The second paper aimed to minimise confounding bias by using inverse probability treatment weighting and techniques to study the heterogeneity of the effects of getting rid of debt on mental wellbeing. The results relied on a critical assumption of no unmeasured confounding. Under this assumption, getting rid of debts was linked to a reduced number of depressive symptoms only among people who are jobless, while no link was observed for people in the other two categories. Getting rid of debts improved quality of life was observed for all.

The thesis revealed the role of contextual factors in the extent to which debt links to mental wellbeing among people aged 50 and older. The third paper showed that in all countries included in the study, people with non-mortgage debt had higher odds of depression than those without debt, after adjusting for several other variables. However, the strength of this association varied considerably. Debt was particularly linked to depression in countries with a less debtor-friendly legal system and low levels of indebtedness. This finding supports the social norm hypothesis, according to which social norms and stigma related to debt may determine its mental health implications. Another finding was that, within countries, the association became stronger in periods of high unemployment. This finding, in turn, supports the idea that poor economic times make holding debts more depressing. The reason for this, one can speculate, may relate to economic constraints and general pessimism regarding repayment ability.

Next, the contributions to the literature are discussed. The key novelty of this thesis is in being, to the best of the author's knowledge, the first to establish that debt is an important predictor of mental wellbeing among people aged 50 and older in England. Here, England is a particularly interesting study context due to its distinct institutional arrangements (described further below) and wide availability and use of debts. Nevertheless, the findings are in line with a large body of studies documenting a relationship between debt and mental wellbeing in the general population and in other

countries. The findings are also in line with both the social selection and causal process theory of the debt-depression association, although the papers cannot provide definite evidence on either.

The thesis also confirmed the finding of a much smaller body of studies, focusing on younger study populations in the UK and elsewhere, that the association is also observed within individuals. This is to say that people tend to have lower mental wellbeing when they are in debt, compared to themselves when they are debt free. This provides insight into the role of confounding factors; characteristics that simultaneously cause debt and poor mental health are likely to partly explain the link between debt and mental health. The findings indicate that much of the worse mental wellbeing reported by people with debt is likely due to some other factors than the debt per se. However, confounders that did not vary over time did not explain all of the results, which supports the causal link hypothesis.

The thesis also contributed to the literature on a conceptual level. The conceptual contribution of the second paper to the literature on debt and mental wellbeing was to make a clear distinction between population inference and causal questions. The second paper explained extensively the differences between the two analytical perspectives – population description and causal inference – and their varying policy implications. In the social and health sciences, concerns have been raised about "euphemisms" in causal language in studies using observation data. The avoidance of causal language, it is increasingly argued in different research fields, leads to unclear research aims and quantities of interest, and thus inappropriate analytical strategies (Hernán 2018, Lundberg, Johnson et al. 2021). Against this backdrop, the paper used bluntly causal language, despite being a non-experimental observational study. This approach was not just a grandiose label for some predictions of an outcome for specifically defined subgroups. Instead, the target trial framework helped to formulate a clear causal question. While the idea of analysing observational studies to mimic an actual randomised trial is old (Cochran 1965), in social policy, observational studies are still often analysed without clear causal questions, despite studies often adjusting for other variables. This paper may thus shed light for subsequent research studying a similar question and defining similar, or improved, target trials.

From a substantive perspective, the novelty of the second paper is to show that employment status may be a key moderating factor in the debt-mental wellbeing nexus. This is, of course, hardly surprising considering that people with different labour market statuses have different levels of income which may be used to pay off their debts, and different prospects. Nevertheless, subsequent studies may benefit from this finding, for example, when designing potential debt relief programmes and their targets. For example, planners of a randomised trial may consider targeting their debt relief trials at people who are or have been jobless.

The third paper expanded scientific understanding of the link between debt and depression on several important fronts. It supported existing findings on the link between debt and mental health in a number of countries, but also showed that debts link to depression in a number of countries not previously explored. Another contribution of this paper was being the first to explore the role of country-level variables in this association. This supports the idea discussed by Sweet that debt should not be decontextualised (Sweet 2018). Perhaps the individual-level variables, such as debt severity, often used in the research to date, are not the only important ones. Rather the environment may influence when debt is problematic and when it is not.

Together, the three papers of this thesis shed light on the link between debt and mental wellbeing among people aged 50 years and older. The common contribution of these papers is to establish an association between debt and mental health among older adults across a range of countries and employment categories. This is an important finding because much of the previous research has focused on younger populations. The first paper showed that non-mortgage debt in particular (in contrast to mortgage debt) is linked to lower mental wellbeing, the second continued from this by showing that non-mortgage debt among the jobless in particular is linked to lower mental wellbeing, and the third paper established that this debt type is linked to depression in all countries, with interesting differences in the magnitude of the association. The three papers made a series of methodological contributions in measurement of debt, study design, and investigating the role of contextual variables. Finally, the papers also sought, from different perspectives, to contextualise debt beyond dichotomous debt status and thereby highlighted nuances in the debt-mental wellbeing link.

7.2 Implications for research

In this section, the implications of this thesis for health inequality research in general are considered. The section also suggests some unexplored yet important research areas, and discusses measurement issues of debts and data availability.

Implications for health inequality research

The overarching finding that debt links to lower mental wellbeing consistently across a range of settings implies that debt should be not ignored as a distinct socioeconomic variable in analyses of health inequalities and their underlying processes. An interesting direction of research would be to conceptualise debts as mechanisms through which power structures intensify health inequalities. As discussed in the introduction chapter of this thesis, debts and economic inequalities go hand in hand, coproducing one another. Negative debt burdens tend to be concentrated in population groups that are predisposed to other socioeconomic disadvantages. In contrast, people with advantages are indirectly on the lenders' side or have access to "better" credit.

An example of this type of analysis is a US study by Batomen et al (2021) (Batomen, Sweet et al. 2021). The authors found that household debt burden explained education-based inequalities in coronary heart disease and hypertension. Similar inquiries are needed in different country contexts and with a richer set of debt burden measures. For example, the extent to which the association found in this thesis between debt and mental wellbeing can plausibly explain the widely reported income, education or occupational class-related inequalities in mental wellbeing at a later age remains unknown. It would also be helpful to know whether addressing debt problems may help to alleviate health inequalities on a national scale.

This thesis, particularly the causally oriented analysis in paper two, provides tentative support for a causal mechanism from debts to mental wellbeing, but more rigorously conducted causal studies are needed. While causal questions are difficult to address using observational data, experimental studies on debt relief are plausible, albeit expensive to conduct. An example of this experimental research is "The Burden of Medical Debt and the Impact of Debt Forgiveness" study currently being undertaken in the US. This study, in collaboration with RIP Medical Debt (a charity that buys chunks

of medical debts and then discharges them), will abolish randomly selected individuals' medical debt (Kluender, Mahoney et al. 2020). These types of trials should assess the mental health benefits of debt relief programmes. Large-scale trials of debt relief may be useful in countries where no effective debt forgiveness policy measure currently exists. These could provoke policy debates assessing the need to reform debt-related institutional structures.

Unexplored areas

There remain several little-explored yet important research areas. A critical area of research is the dynamics of debt and mental health within couples and the spillover effects of debt and intergenerational causes and consequences of debts. The links between debts and mental wellbeing are likely to extend beyond the debtor. The debt problems of the renter may have spillover effects on the private landlord. The debt problems of a family member may cause mental and social strain due to informal lending requests. There is evidence that parents' debt problems may link to children's mental wellbeing in the US (Berger and Houle 2016), but research on this issue in other country contexts is needed. The reason for this is that, as the third paper in this thesis showed, country context may significantly moderate the association. It is also important to point out that parents may be affected by their adult children's debts. Parents may be guarantors for their children's debts, or financial help may place a strain on their relationships. Examining this is important for future research. For example, a mixed-method study by Pudam and Prattley (2020) describes how older women experienced significant economic difficulties, including debt problems, because of the provision of financial assistance to their children. This intergenerational aspect could not be investigated in this thesis because of the lack of detailed data on other family members. More research is necessary to explore the extent to which debts link to a broader set of outcomes, such as anxiety disorders and measures of sleep.

Subsequent research is needed with a debt policy evaluation focus. The first paper showed that people with debts and low mental wellbeing often had seemingly low amounts of debt but little available assets and income. What would be the most beneficial debt solution for this group, if any? What are the mental health benefits of debt relief orders that are targeted to this group? Another policy-relevant area for

subsequent research is how debt collectors could be more mindful of the mental health of people in problem debt. For this task, qualitative investigations in particular are needed on people's experiences of debt collection action.

Lastly, it is important to highlight here that not all debts should be deemed harmful from a mental health perspective. This thesis showed that even small amounts of non-mortgage debts are linked to worse mental wellbeing, but some studies claim that access to credit may be beneficial for health. For example, Ibrahim et al, drawing on qualitative evidence from Glasgow, United Kingdom, emphasise the possible role of responsibly delivered microcredit as a "public health initiative and the need to support 'alternative' economic spaces in the UK to serve the financially-excluded" (Ibrahim, McHugh et al. 2021). A challenging task when assessing the usefulness of debt is conceptualising the potential counterfactual of not taking on debts. For many, the counterfactual of not taking on debts may translate into severe immediate financial shortages and material hardship. There is thus a need for research looking at positive types of lending, such as social lending, credit unions and fair types of lending practices. It is important that these nuances are kept in mind in subsequent research.

Measurement of debts

From a broader perspective, debts are often ignored in social and economic research. Debt is ignored not just as a predictor of mental wellbeing, but also as a mechanism through which existing power structures intensify social inequalities. For example, in the Ninth Meeting of the Society for the Study of Economic Inequality in 2021, of the 252 papers presented, none mentioned "household debt" or "over-indebtedness" in their titles.

Why do scholars interested in social inequalities ignore debts? One reason is certainly data availability. Data on debts are difficult to obtain and are often unreliable. People are often unwilling to talk about their debts (Purdam and Prattley 2020). When data on debts are available, debts are often in broad categories without details. Surveys often contain much more detailed information on sub-brackets of income, specific labour market status and multiple measures of education but little on debts. Debt is a complex social exposure to measure and operationalise. More consideration should be given to the measurements and properties of debt. Subsequent research is needed with

more detailed information on debt sources, qualities of debts, and creditors. It is important that surveys include these measures, or that specific financial surveys include some information on the mental wellbeing of their respondents.

Another issue is the low frequency at which surveys, often conducted several years apart, can provide information on debts. As the first paper of this thesis found, debt is very much a fluid exposure. Due to this low frequency of data collection, it remains unknown whether debts have differential effects over their life course. For example, does debt provide immediate mental health benefits when acquired but become mentally stressful after a certain period? Dwyer (2017) has argued that administrative register data may be useful in overcoming these issues. A fruitful approach is merging data *"from courts, social welfare systems, and educational institutions to individual survey data, linking the lived experience of credit with the institutional structures in which individuals are embedded" (p.254).* However, privacy and consent issues are obstacles to such research.

7.3 Implications for policy

This thesis did not assess specific social policies. Instead, it focused on population associations and the effects of debt on mental wellbeing. What follows is a review of potential policy implications that arise from the investigated link between debt and mental wellbeing. The negative implications of debt for mental wellbeing are a policy problem that needs attention. This section draws on, and critically assesses, previous policy reports, NGOs' documents, and policy assessments. It follows the typology used in Jenkins at al (Jenkins, Fitch et al. 2009). The section considers potential (1) actions within debt and mental health sectors, (2) multisector actions, and (3) government policies. Only fairly broad comments on these policy considerations are given here. While the policy measures here focus on the UK, these are also relevant to other country contexts. In fact, European countries may have much to learn from the UK experience. This is because debts are widely used in the UK and several innovative policy measures have emerged to address issues relating to debts.

Actions within debt and mental health sectors

In terms of health care sectors, the potential clinical implications of debt are discussed in the clinical psychology literature. This thesis supports the claim that debts should be recognised as a determinant of mental health in clinical practice (Fitch, Chaplin et al. 2007). For example, the Royal College of Psychiatrics recognises this and provides an accessible information leaflet on debt and mental health. Richardson et al suggest, in their systematic review, that therapies may be useful in reducing "worry about finances and catastrophizing, and thus attenuate the impact of debt on mental health" (Richardson, Elliott et al. 2013). However, studies have not considered this in the population group of 50 years of age and over. This is a serious limitation because, as this thesis has shown, debt is an important determinant of mental wellbeing among older age groups.

Thomson suggests that therapies should be coupled with "an approach based explicitly on de-shaming" (Thompson 2015). This is suggested in the context of Thomson's findings that people with debt tend to report feelings of shame about their situation. Jenkins et al (2009) propose that social and health care professionals should routinely ask about financial difficulties. Several scholars have proposed similar approaches. While this is certainly useful, its implementation is critical in that there is risk that people may avoid consulting a health or social care worker if they are unwilling to talk about their finances. Nevertheless, as recommended before, a fruitful approach, regardless of the goal, is to embrace the idea that issues with debts are asked about and shared openly without shaming. This idea is supported by the thesis. The third paper of the thesis provides tentative support for the previously suggested theory that social norms are a key mechanism between debt and mental wellbeing.

In terms of the debt advice, concerns have been raised about the unmet need for formal debt advice in the UK context. The Money and Pension Service estimates that the unmet demand for debt advice was almost two million clients in 2019 in the UK (Money & Pensions Service 2019). There are no precise estimates of how well debt advice serves older adults, a significant issue that receives little research attention. Any debate about the financing of debt advice should also consider the potential mental health benefits of debt advice. Several studies have aimed to assess the impact of debt

advice on debtors' mental wellbeing. A policy document drawing on survey data claimed that debt advice was linked to a reduced risk of depression, anxiety and panic attacks, thus alleviating health care costs (Economics 2018). However, caution should be applied when interpreting such observational estimates in causal terms. Nevertheless, similar positive mental health effects of debt advice have been reported in Australia (Brackertz 2014). A recent longitudinal observational study from the UK reported that formal debt help has significant health benefits (Fumagalli, Lynn et al. 2021). Knapp (2011) suggests that debt help may thus provide significant savings to health and social care sectors (Knapp, McDaid et al. 2011). Thus, funding adequate debt advice is important and may help to decrease the mental health burden of people with debts. One key issue, however, is how to encourage people to seek formal debt advice. A recent study indicated that nudge type interventions to encourage people to seek debt advice may not increase the use of formal debt advice among the over-indebted (Fumagalli, Lynn et al. 2021).

Causes of debt problems are multifaceted and difficult to address. Responsible lending practices are nevertheless vital. As argued in several policy proposals (Money and Mental Health 2019, Bond and Holkar 2020), the conditions of debt products should be made as clear as possible.

Cross-sector actions

Close collaboration between debt help, mental health support and the financial industry are needed. Some efforts have been made to increase co-operation between these sectors. For example, it is argued that the mental health of debtors should be taken into consideration in debt recovery efforts. In this context, Fitch et al have put forward The Debt and Mental Health Evidence Form (DMHEF), which "aims to standardise the existing situation where creditors encounter individuals experiencing debt problems who self-report a mental health condition is affecting their ability to repay" (Fitch, Chaplin et al. 2010). Such a systematic effort to increase awareness among creditors of debtor mental health is also needed in other countries.

Government action

The UK offers a wide range of tailored debt solutions. Contemporary issues with these policies, such as inadequate supply, are discussed elsewhere (Collard, Kinloch et al. 2018), but there are a number of policy innovations worth considering in other European countries.

One is Debt Relief Orders (DROs), which are administratively based, low cost debt relief mechanisms for people with low amounts of debt and little available assets and income (Conway 2021). Such debt solutions for the no-income-no-asset debtors (NINA) are not available in many European countries (Heuer 2020). Debt Relief Orders are applied for through an authorised debt advisor. Debtors must meet strict criteria to be eligible for a DRO – they should generally have less than £30,000 worth of debt, and little or no surplus income and assets. For a 12-month period following a successful DRO application, creditors cannot recover their debts, after which debts are written off if the debtor's circumstances have not changed. Several types of debt, such as court fines, child maintenance payments and student loans, cannot, however, be written off. This policy is a particularly relevant policy tool for people with mental wellbeing issues and debts. As shown in the first paper of this thesis, the link between non-housing debt and mental wellbeing is particularly strong among NINA debtors, that is, when people have a seemingly low amount of debt but no liquid assets (this group often also had small incomes).

Another innovative governmental policy is a breathing space scheme. The UK government launched legislation on the Debt Respite Scheme (Breathing Space Moratorium and Mental Health Crisis Moratorium) in England and Wales (Conway 2021). This policy measure provides over-indebted debtors with "breathing space" during which a debtor has time to access formal debt advice without accumulating debts and facing enforcement actions. Breathing space can only be accessed via a debt advisor in a debt advice organisation. It freezes most interest rates, fees and penalties, and provides legal protection for the debtor from creditors' debt collection action and contacts. People experiencing mental health crises, certified by an Approved Mental Health Professional, are eligible for mental health crisis breathing space, which lasts for the duration of the person's mental health crisis (plus an additional 30 days). This policy tool was welcomed by the debt advice sector and, from the perspective of the general findings of this thesis that debt and poor mental wellbeing coincide, it is a promising

tool. However, subsequent evaluation reports are needed to assess its implementation. It is crucial to monitor the extent to which debtors, mental health professionals and GPs are aware of this opportunity. Nevertheless, this UK policy may guide similar policy development in other countries.

Regulation of credit is a difficult policy area. The landscape of debt products is constantly changing. Regulation is often unable to keep up with fast changing financial products. An example of this is Buy Now Pay Later (BNPL) credit products. In an era of online shopping, an increasing number of people are using BNPL credit to split their payments for goods and services or to delay them altogether with low or no interest. BNPLs are often used for purchases of smaller amounts, particularly electronics and goods and services, and thus, it can be argued, do not offer the traditionally viewed benefits of credit of consumption smoothing over a long period of time. A survey conducted in early 2021 commissioned by debt charity, Citizen's Advice, estimated that some 27% of UK adults had used BNPL in the past 12 months (Poll and Byrne 2021). This survey suggests that BNPLs are particularly used by people with mental health problems. Worryingly, the charity claims, adverts for these credit products "often encourage unaffordable spending" and that "often there isn't enough information to make an informed decision". While these debts are targeted towards young people, they are also often used by people over the age of 50. The survey estimated that some 11 per cent of over 55s have used these products. (Poll and Byrne 2021)

Internet shopping is a quick and easy way to spend money, or to borrow, but purchasing goods and services online poses risks for many. Online shopping sites use a range of behavioural nudges – highly personalised recommendations, time pressure and notifications, among others – making it harder to resist spending. Some people have reported that they find it almost impossible to control their spending when they are mentally unwell. The Money and Mental Health Institute has recommended that consumers should have the option to turn off nudges, providing more control to customers, and that online retailers should also offer spending limits and ensure clear visibility of spending. (Holkar and Lees 2020) These recommendations should be given serious consideration.

On a broader level, a model in which economic growth is characterised by the increasing indebtedness of households as a coping mechanism for stagnating median

incomes may be detrimental for population mental wellbeing. This thesis argues that the distribution of mental wellbeing is partly driven by debt levels. There is thus a need to examine more long-term and institutional causes of indebtedness and poor mental wellbeing in older people. Among older adults, low benefit rates (especially under the state pension), age discrimination in employment settings, and lack of affordable housing or support with housing costs may have pushed older adults into debt problems. The empirical evidence on these channels is still incomplete and more research is needed. The extra costs of disability, and the lack of compensation for such costs, may cause elevated risk of debt problems among specific population groups. These issues are complex, and no policy solutions can be given here, but policy makers should keep in mind that their effect on increasing debt problems may introduce additional mental strain.

7.4 Findings in the COVID-19 and post-COVID-19 contexts

The COVID-19 pandemic has changed the economic landscape in the UK and elsewhere, but it is reasonable to suspect that the main findings of this thesis will be relevant in the post-Covid era.

To address the health risks, consequences that followed economic changes, job losses and general insecurities, governments have put forward an extensive set of policy measures in record speed. However, there is no sign of an increase in immediate debt problems or in the amount of unsecured debt at the time of writing in December 2021 (Francis-Devine 2021). The aggregate level of unsecured debt has declined since the onset of the pandemic (Francis-Devine 2021), but these trends may hide important changes in the distribution of debt.

Why have these statistics indicated no exacerbated debt problems yet? A number of speculative reasons can be put forward. On the saving side, the UK government introduced several social policy emergency measures, including but not limited to, job support, increases to universal credit, reduced conditionality of benefits, protection from eviction and a number of debt policies. On the consumption side, there have been fewer opportunities to consume. These two effects have been more important than the temporary decline in incomes due to job losses etc. The question, however, is whether

we are 'sleep-walking' into a personal debt crisis, which remains to be seen as freezes on evictions are removed and the universal credit uplift is withdrawn from out of work claimants. Nevertheless, subsequent investigations are needed to assess whether debt problems, and the mental health problems related to them, have been exacerbated as countries start to reopen.

7.5 Conclusion

In this concluding chapter, the key contributions of this thesis, research implications and suggestions for policy have been discussed. The thesis aimed to understand how different debt measures relate to mental wellbeing among people aged 50+, how the association between debt and mental wellbeing varies by labour market status, and how this association manifests in countries with different socioeconomic landscapes. The thesis found that debt, particularly non-housing debt, is an important determinant of poorer mental wellbeing, particularly among people who are outside work. Policy makers should consider policies to alleviate mental pain linked to debt among people aged 50+. There is also a case for preventing further escalation of debt problems on public health grounds.

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