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

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ABSTRACT

Background: A record number of older individuals have household debt, but little is known about possible links between debts 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 by 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 quartiles 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 of mortgage and non-mortgage debt measures with 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 quartile 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 of these changes with 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.

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 to 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 & Pivetti, 2008; Dwyer, 2017; Rona-Tas & 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 Authori, 2017; Harari, 2018). This phenomenon is not restricted to younger people: according to the Wealth and Assets Survey conducted between 2016 and 2018, there are a record number of four million adults over 54 years of age and with 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 individual level, such as its effects on mental wellbeing, are much less 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, Bassett, & Davey, 2011; Richardson et al., 2013; Turunen & Hiilamo, 2014). Convincing preliminary evidence exists that unsecured debts and debt problems may have causal effects on mental disorders among the young and middle-aged (Gathergood, 2012; Hojman et al., 2013; Lee, 2019; Ong et al., 2019).

However, very little is known about indebtedness and mental health among those the aged of 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 & Prattley, 2020). Drawing on the English Longitudinal Study of Ageing, this paper aims to fill this research gap. It investigates to what extent different aspects of indebtedness predict mental wellbeing – depressive symptoms and 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 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 more into unsecured lending to cover their basic living expenses (Dagdeviren, Balasuriya, Luz, Malik, & Shah, 2020). 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, are more debtor-friendly than in many European countries (Hoffmann, 2012). The number of persons 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 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 have asymmetric effects on mental wellbeing.

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 inadequate 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, without much choice, 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 (Dagdeviren et al., 2019; Sweet, 2018).

Debts also function in these ways for older people, who may use them to maintain the 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 in 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, pp. 160–217). 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 as an imbalanced and distinct *social arrangement* between a creditor and debtor (Dwyer, 2017; Hodson et al., 2014; Sweet et al., 2018), characterised by future repayment obligation, where failure can cause increased stigma, stress and debt collection actions. Having debts implies that a household has always a creditor and some prospective restrictions to future cash flows. Stress may arise from these restrictions, from the feeling of an 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; Purdam & Prattley, 2020; Sweet, 2018; Sweet et al., 2018). The attitudes towards those with debt problems may not be understanding. Unmanageable debt burdens may also harm social relations, including partnership stability (Dew, 2011; Dew & Yorgason, 2010). For older adults, it can be speculated, being in debt may cause additional feelings of shame due to failure in not being able to fulfil their obligations in the later parts of their life, and increase risk of conflict within family or with the potential guarantors.

The distinct financial and social dimensions of debt make it a "double-edged sword" (Hodson et al., 2014). Debts may provide financial resources for desirable purchases or urgent payments when needed, on the one hand, and they may also cause potential social stress, stigma, shame, despair and economic difficulties, on the other (Hodson 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 a distinction between useful/manageable and stressful/unmanageable debt. There is a risk of diabolizing all debts without considering the underlying heterogeneity, and come to misleading conclusions and implications.

When studying 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, Rossi, & Ping Yin, 2007), and previous studies have used varying measures (Turunen & Hiilamo, 2014). Unlike other socioeconomic markers, such as income, household debt amount 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 the borrowers. An often-used approach to measure repayment ability is to use 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 adequate 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 & Holt, 2001), the SES measures often used for young and middle-aged populations may not be well suited for older populations, which may also be the case for debt burden. In particular, it is not evident to what extent debt-to-income measures are able to capture the mental burden of debts in later life. The reason for this is that older persons 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 the 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 body of cross-sectional and longitudinal studies have found that having debts, debt problems, number of different debt accounts or the amount of debt are, independently from 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 illnesses (Blomgren et al., 2017; Hojman, Miranda, & Ruiz-Tagle, 2016; Meltzer, Bebbington, Brugha, Farrell, & Jenkins, 2013; Richardson et al., 2013; Turunen & Hiilamo, 2014; Warth 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 (Berger et al., 2016; Gathergood, 2012; Keese & Schmitz, 2014). In contrast, the association with long-term secured debt (mainly mortgage and student loans) is less evident (Berger et al., 2016; Dunn & Mirzaie, 2016; Hojman, Miranda, & Ruiz-Tagle, 2016; McCloud & Bann, 2019).

Although these observational, mostly cross-sectional, associations between debt and mental wellbeing can 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 et al., 2013; Lee, 2019; Leung & Lau, 2017; Ong et al., 2019). For example, Gathergood (2012), exploiting exogenous variation in local housing prices, aimed to estimate causal effects of self-assessed debt problems on mental health (Gathergood, 2012). This study also adds some indication on 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 (Drentea & Reynolds, 2015; Frankham et al., 2019; Meltzer et al., 2011).

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 (Drentea & Reynolds, 2012; Gillen et al., 2017; Hiilamo & Grundy, 2020; Kaji et al., 2010; Zurlo et al., 2014). 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 & Reynolds, 2012).

Second, there is no systematic investigation on different measures of debt burden as 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 & Hiilamo, 2014) with only a few studies testing the robustness of their findings with alternative debt measures (Berger et al., 2016). However, given the contradictory nature of indebtedness and its complex relation with 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 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 to what extent 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 to what extent 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.

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 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 elsewhere (Steptoe, Breeze, Banks, & Nazroo, 2012).

The dataset for the present analyses 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 or 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 Fig. 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 on mental wellbeing. Focusing on depression is important due to its enormous public health and economic burden but not alone sufficient 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 by 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 much. 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, Higgs, & Blane, 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 0–57. The measure and its theoretical and statistical properties are described in detail elsewhere (Hyde et al., 2003; Hyde, Higgs, Wiggins, & Blane, 2015). As the score was obtained from a self-completion questionnaire instead of the 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,[1] (ie. 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, & Ruiz-Tagle, 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 quartiles 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

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 equivalized, 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 following closely the ILO employment definition was also included; being 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 debts predict mental wellbeing. Descriptive and regression analyses were conducted without weights.

In the first approach, parallel to 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:

$$y_{it} = \beta_t \text{wave}_t + \beta_2 \text{ non\_mortgage\_debt}_{it} + \beta_3 \text{ mortgage}_{it} + f_\theta(\text{age}_{it})$$
$$+ \beta_k \text{covariates}_{it} + \varepsilon_{it} \tag{1}$$

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[1] The definition used by the Department for Work and Pensions for official statistics.

where $\beta_t wave_t$ 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 $(f_\theta(age_{it}) = \beta_4 \, age_{it} + \beta_5 age_{it}^2)$. 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 (ie. individuals/couples) 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 & Skrondal, 2012):

$$y_{it} = \beta_t wave_t + \beta_2 \, non\_mortgage\_debt_{it} + \beta_3 \, mortgage_{it} + f_\theta(age_{it})$$
$$+ \beta_k covariates_{it} + \alpha_i + \varepsilon_{it} \tag{2}$$

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).

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 the present 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 on 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.

Results

Descriptive findings

The descriptive statistics of all observations, regardless of wave, are shown in Table 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,

Table 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	3118	4	6	3
Second	3108	4	7	3
Third	3110	4	6	3
Fourth	3111	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	4986	7	10	5
Second	4994	7	8	6
Third	4981	7	9	5
Fourth	4982	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	8334	11	14	10
4 or more	4669	6	11	4
Employment status				
Employed	20,130	28	39	19
Self-employed	5221	7	9	6
Seeking work	579	1	1	1
Sick and not seeking	3280	5	6	4
Retired	38,824	53	37	65
Unoccupied	4666	6	8	5
Marital status				
Married or cohabiting	50,682	70	73	66
Single/never married	3598	5	5	5
Widowed	11,301	16	12	19
Divorced or separated	7119	10	10	10
Mental wellbeing				
Mean CES-D 8		1.46	1.52	1.59
Mean CASP-19		41.7	42.3	40.7

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 persons 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 2). However, many of these differences were reflected partly by the fact that those with debts were much younger. There were 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 had also mortgage debt. Nevertheless, the people with household mortgage debt had higher income, education level and gross non-housing wealth, and were more likely to 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.

Table 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	2588
Mean	0	4696	6094
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 equivalized 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
Single/never married	5	3	4
Widowed	20	4	7
Divorced or separated	9	10	13
Number of observations			
n	47,208	12,447	19,943

However, in Fig. 1, these dichotomous debt measures hid a more nuanced relationship between different levels of debt and mental wellbeing. The debt *amount* quartiles 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 quartiles (and debt-to-income to a lesser extent) and mental wellbeing. The lowest debt-to-wealth quartiles were linked to higher mental wellbeing. In contrast, the highest quartiles 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 quartile, which may explain the patterns observed above (Supplementary Tables 3 and 4). For example, the highest non-mortgage debt-to-wealth quartile 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 quartile, the median amount of non-housing debt was the highest at around £13,000 but the individuals in this quartile had higher incomes and education qualifications than those in the highest quartiles of the other two debt measures.

Between-observation associations between debts and mental wellbeing

The covariate adjusted between-observation association between these different debt measures and mental wellbeing are shown in Fig. 2 (number of depressive symptoms) and Fig. 3 (quality of life). The coefficients of other sociodemographic and -economic variables, which were in line with previous findings, are shown in supplementary materials (Supplementary Table 9). Observations with some non-mortgage debt had a higher number of depressive symptoms on an 8-item scale (unstandardized 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 with 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 to −0.12]).

For both outcomes, a higher quartile 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 quartiles 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 were reversed (or attenuated to zero in mortgage debt) when observable confounder variables were adjusted for.

Within-individual associations between debts and mental wellbeing

Fig. 4 (number of depressive symptoms) and 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
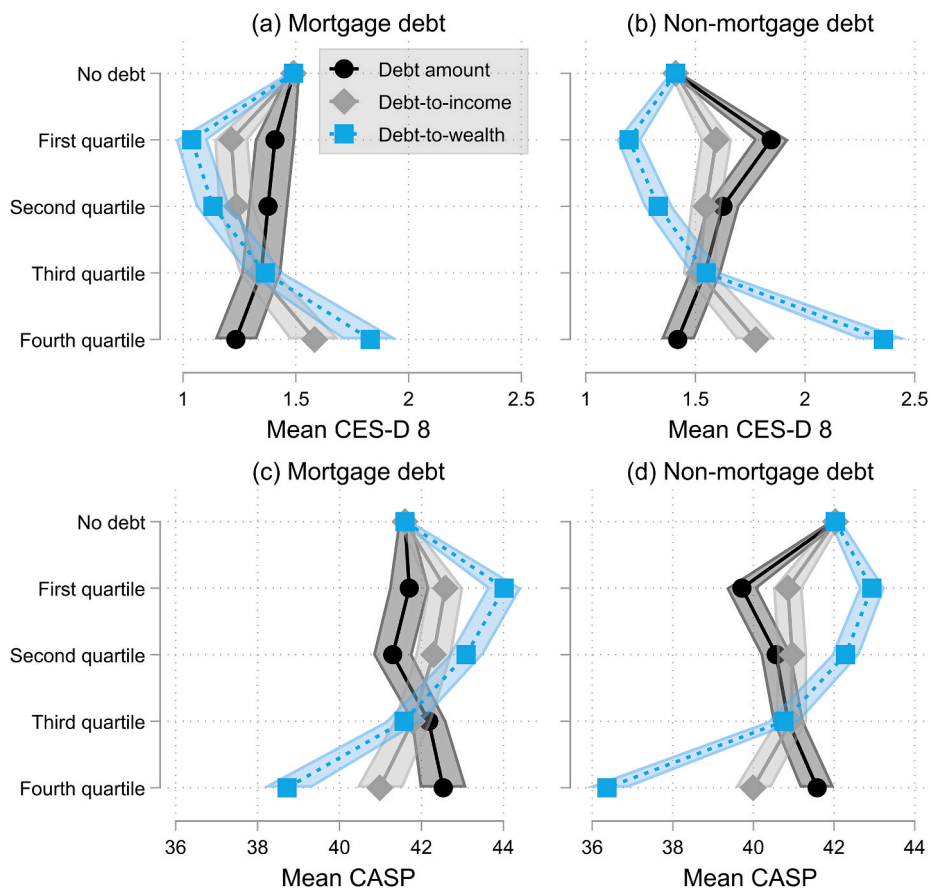
Fig. 1. Unadjusted mean levels (and their 95 confidence intervals corrected for clustering) of mental wellbeing by different mortgage (panels a and c) and non-mortgage debt (panels b and d) measures.
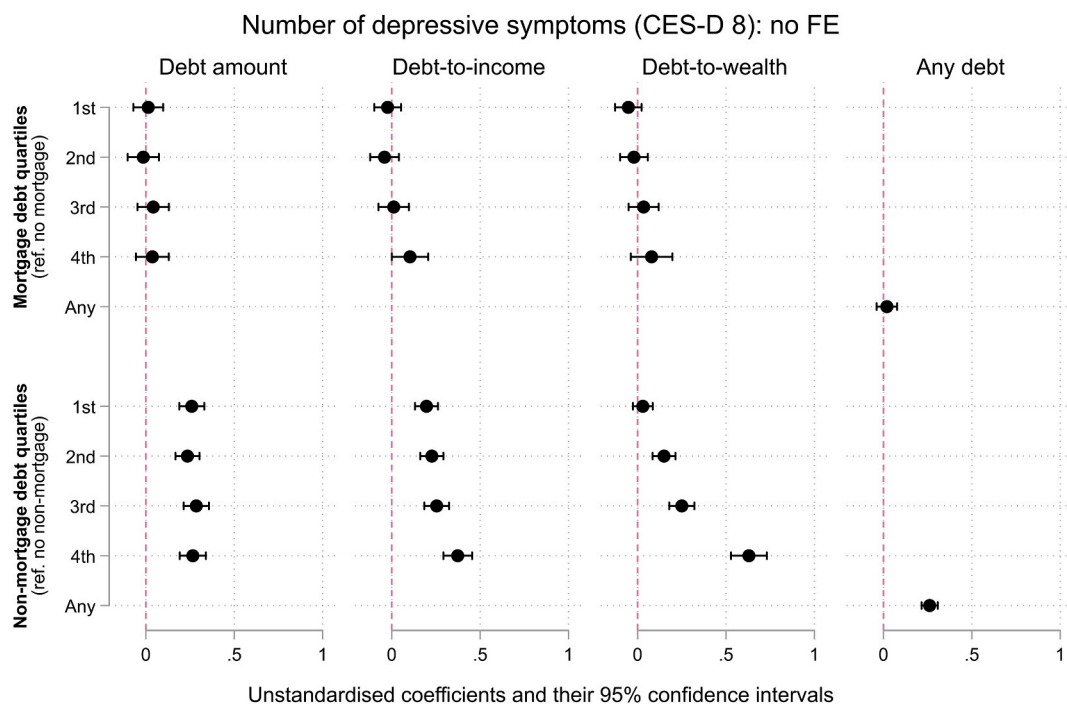

Fig. 2. Results from linear regression models without person fixed effects for the associations between household debts and number of depressive symptoms (CES-D 8). Results from four regression models with different debt measures are presented: 1. Debt amount quartiles (first subgraph) 2. Debt-to-income 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.
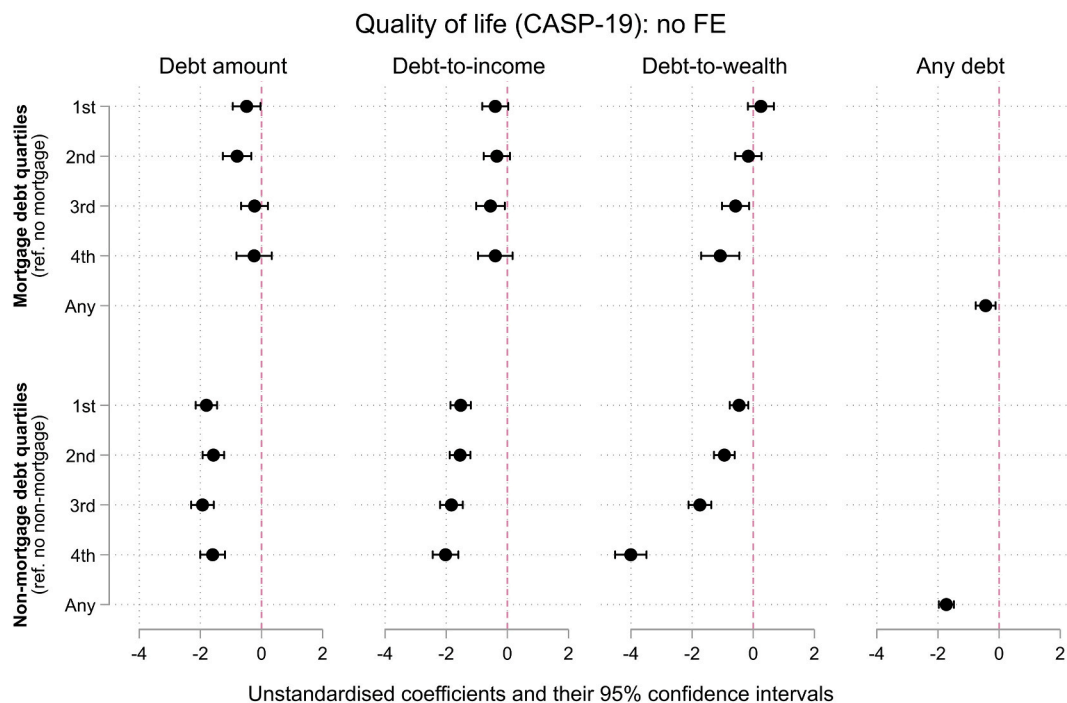
Quality of life (CASP-19): no FE

Fig. 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.

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 to -0.15]) on the periods 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 to −0.14]) while its estimate for depressive symptoms was around zero (b = 0.00 [-0.05 − 0.05]) (Fig. 5).

For both outcomes in this within-individual approach, the quartiles of non-mortgage debt-to-wealth measures had the steepest gradient in the coefficients. The magnitude of the top quartiles was substantial. For
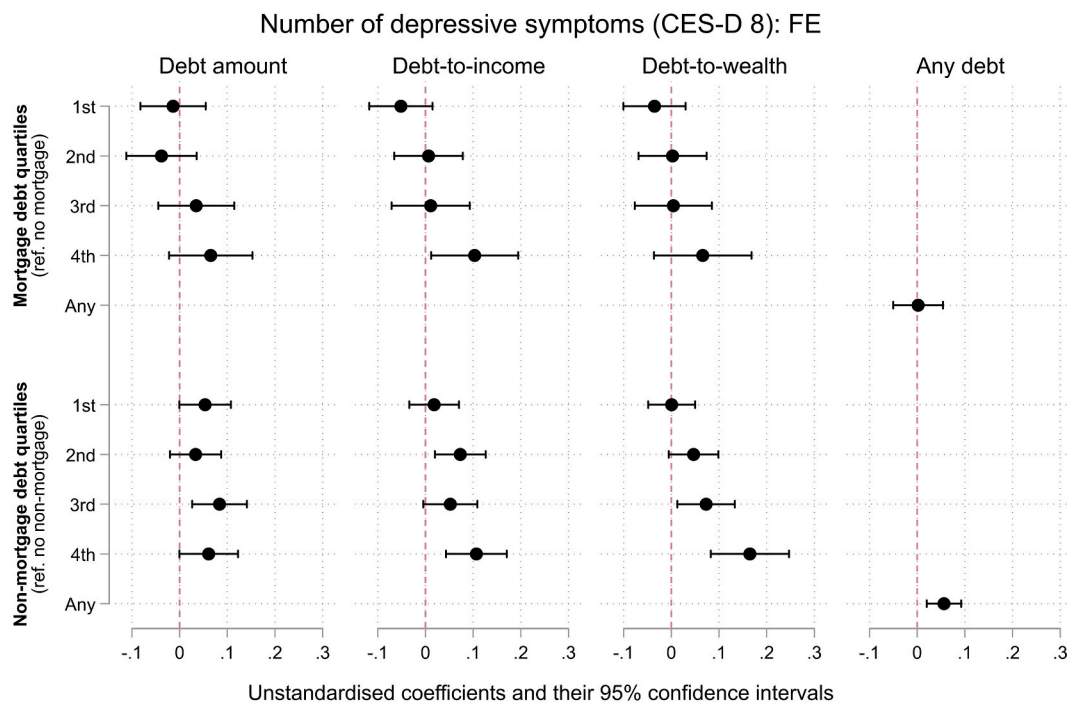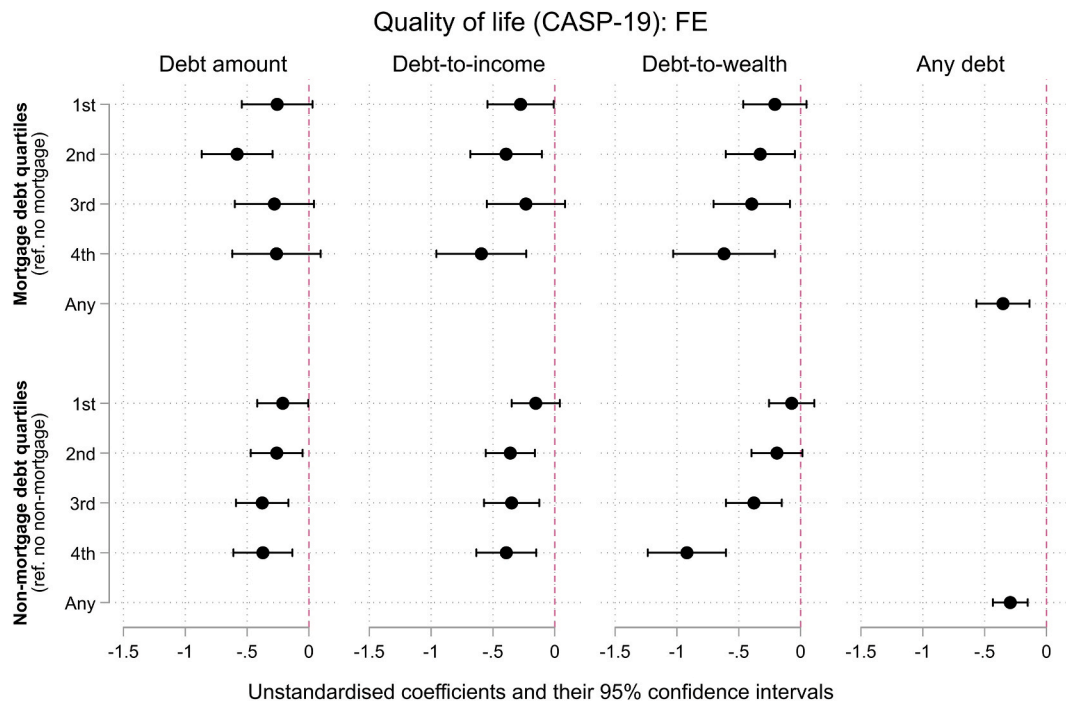
Number of depressive symptoms (CES-D 8): FE

Fig. 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.

Fig. 5. Results from linear regression models with person fixed effect 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.

example, the fixed effect estimate of the top quartile of non-mortgage debt (b = −0.92 [-1.24 to −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 quartiles produced coefficients of similar size as the dichotomous debt versions.

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 the asymmetric effects was found (Table 3). The models showed that getting rid of non-mortgage debt during the study period were linked to an improvement (0.35 [0.18–0.52] for quality of life and −0.06 [-0.10 to −0.02] for depressive symptoms) and acquiring new debt predicted deterioration in mental wellbeing (−0.20 [-0.39 to −0.00] and 0.05 [-0.00 – 0.10], respectively) with no consistent evidence of asymmetric effects.

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 Waves 6

Table 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 to −0.00]
Negative change (getting rid of debts)	−0.06**	0.35***
95% CI	[-0.10 to −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.

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 income and possibly greater feeling 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 co-efficients 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 quartile with depression symptoms were $b = 0.16$ before and $b = 0.11$ after adjusting for gross wealth measures).

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 paper 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 size. Both getting rid of and acquiring new non-mortgage debts were linked, respectively, to increase and 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 et al., 2013; Turunen & Hii-lamo, 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 for 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* quartiles did not differ from dichotomous debt status when predicting mental wellbeing. The *debt-to-wealth* quartiles 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 & 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 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 et al., 2011, 2013). These findings, and the complex relation between debts and other socioeconomic factors discussed earlier, suggest for subsequent research in this field that going 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 did not only differ 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 et al., 2016; Hojman, Miranda, & Ruiz-Tagle, 2016). This may be related to differences in the selection process into these two debt types or differences in their (speculative) causal effects. Getting mortgage loans typically requires some forms of assets (normally deposits or guarantors), which are, in contrast, not always required for non-mortgage debts, such as credit card debt. Those in socioeconomically less 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 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, while 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 association 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 (Berger et al., 2016; Gathergood, 2012), 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 et al., 2019). One could expect that similar asymmetric effects can 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 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 have lower levels of mental wellbeing on 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 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 here. These include, for example, problem gambling or lending for 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 the reverse-causality exist, such as bipolar disorder symptoms, in which mania periods cause excess spending and lending (Richardson et al., 2018, 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 & Reynolds, 2015; Purdam & Prattley, 2020; Sweet, 2018); 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, show 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 turn to "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 understanding the mechanism through which debts 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, such as interest rates, of non-mortgage debts causes 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 only debt amount when looking at unadjusted levels of mental wellbeing. This is because debt amount and debt-to-income/wealth-based measures may provide conflicting conclusion 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 a substantially lower mental wellbeing may highlight the need for actions targeted at this population group. It is also important that the potential measures targeting debt problems look not just the debt amounts people hold but also people's ability to cope with their debts. This is because those with seemingly low amounts of debts 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 issues of debt 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 "Tally man". 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 taking on 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 of taking on debts and getting rid of them.

Furthermore, this study did not take into consideration business

debt. 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 potential employees' employment prospects are at risk.

Lastly, this study is subject to the usual caveats of longitudinal survey data, namely non-response bias and non-random attrition (Steptoe et al., 2012). Non-differential dropout by outcome (depression or well-being) is a concern that could potentially affect substantially 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 as does non-housing wealth.

Conclusion

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

Author statement

Aapo Hiilamo: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/ Writing - original draft; Writing - review & editing.

Data availability

The English Longitudinal Study of Ageing data analysed for this study are available in the UK Data Service (https://beta.ukdataservice. ac.uk/datacatalogue/series/series?id=200011). The Stata 15 do-files that replicate these results are available in the Open Science Framework repository (https://osf.io/t3vj4/).

Ethical statement

All participants of the ELSA study have provided informed consent. Ethical approval was approved by the London Multicentre Research Ethics Committee (MREC/01/2/91).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi. org/10.1016/j.ssmph.2020.100658.

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