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ORIGINAL ARTICLE

Over-indebtedness and chronic disease: a linked register-based study of Finnish men and women during 1995–2010

Jenni Blomgren · Nico Maunula · Heikki Hiilamo

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Abstract
Objectives More knowledge of the associations between over-indebtedness and health is needed. This study is the first longitudinal register-based study analysing long-term health consequences of severe over-indebtedness.
Methods Adult Finnish persons, identified in 2010 as having been over-indebted for at least 15 years, were compared with matched controls (total $N = 48{,}778$). The analyses utilized register data on socio-demographic and health-related factors. Incidence of chronic disease during 1995–2010 was measured with entitlements to special reimbursement for medicines for treatment of severe and chronic diseases. Incidence of all diseases was examined, as well as incidence of hypertension, diabetes, bronchial asthma and COPD, coronary heart disease, and psychoses. Multivariate analyses were conducted with the Cox proportional hazards method.
Results Severe over-indebtedness was associated with increased incidence of any chronic disease, and most notably with increased risk of psychoses and diabetes. The associations were stronger among women than among men.
Conclusions Over-indebtedness is associated with harmful health conditions. Policy makers should consider taking steps to prevent over-indebtedness and to increase the awareness of social and health service professionals of the problems associated with over-indebtedness.

J. Blomgren (✉) · N. Maunula
The Social Insurance Institution of Finland, Helsinki, P.O. Box 450, FIN-00101, Finland
e-mail: jenni.blomgren@kela.fi

H. Hiilamo
Department of Social Research, University of Helsinki, Helsinki, P.O. Box 54, FIN-00014, Finland

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Introduction

Throughout the 2000s, households' debt relative to disposable income has risen in most OECD countries (OECD 2014). In particular, the Great Recession of the first decade of the 2000s, preceded by easy access to credit and provision of new financial products, has raised concerns about over-indebtedness in Europe (European Commission 2008). The financial crisis may have long-lasting effects on health and well-being of especially those who have lost their property and/or income and ended up in excessive debt.

Some insight into the long-term consequences may be gained from past experiences induced by previous economic downturns. Finland, a Northern European welfare state with a population of 5.4 million, was hit by a severe economic recession in the early 1990s. During 1991–1993, the GDP dropped by 12 % and the unemployment rate rose from 3.5 to 18 % (Kalela et al. 2001). The crisis had the greatest impact on those who lost their job, their company, their property and/or their credit rating or who had guarantee liabilities. Many small businesses went bankrupt and left their previous owners with immense debts. Also people who had to sell their housing property due to unemployment and/or skyrocketing mortgage interests were left with large debts when housing prices went down. As a consequence, the number of over-indebted persons grew steeply during the early 1990s (Muttilainen 2002). In 1994, as many as 457,000 persons of a population of about 5.1 million were subject to enforcement activities (Muttilainen 2002). In the same year, 313,000 persons had a

payment default entry in the credit information register, meaning that the payment had been in arrears for, on average, 6–8 months (Rantala and Tarkkala 2009). In this paper, we study the association of over-indebtedness with incidence of chronic disease in a follow-up setting. Our study cohort includes severely over-indebted people whose debts originated mainly from the recession of the 1990s and who since then remained over-indebted for at least 15 years until their debts were forgiven due to legislative changes.

A large debt, as such, is not a sign of financial problems as it may indicate a high level of solvency. It is commonly agreed that over-indebtedness refers to a household's long-term inability to meet the expenses related to its contracted financial commitments without reducing its minimum standard of living (European Commission 2008). A key element in the administrative definition of over-indebtedness is an official entry concerning the failure to pay debts (Betti et al. 2001). In Finland, a payment default entry is the result of extended payment difficulties and is recorded when neglect of payment has been confirmed by a court decision or by the execution authority (Suomen Asiakastieto 2015). Over-indebted individuals may be subject to foreclosure if they have eligible income or assets, which can be distrained and garnished until the debt is eventually paid in full.

For some debtors, debt adjustment may be available presuming that certain criteria are met and the person is willing to apply for such arrangement. Uncertain income, acting against the interests of creditors, giving false statements to get credit, payment liabilities due to criminal activity, and recklessly incurred debt, for example, may prevent access to the programme. Following the agreed payment programme, normally for 5 years, results in erasing the rest of the debt (L 57/1993). The law on debt adjustment came into force in 1993. Between 1993 and 2010, about 101,000 new applications for debt adjustment arrived in the court of law. During 1993–2006, approximately 70,000 payment programmes were confirmed, and by the end of 2006, 68 % of them had ended successfully while 4 % had expired due to inability of the debtor to adhere to the programme, and the rest were still undergoing (Muttilainen 2007).

Over-indebtedness may be considered to be an indicator of socio-economic status and it is most often associated with low income (Drentea and Reynolds 2012; Münster et al. 2009), even though also well-off persons may end up in debt problems. The associations of low income and deprivation with health are well known (Imlach Gunasekara et al. 2013; Marmot 2002). Low income may affect health through poor material conditions and by hampering social participation and life control (Marmot 2002). In particular, over-indebtedness entails living under strong financial strain, which may be associated with not being able to consume health-enhancing food and services, to meet current health needs, to access health care, and to fully participate in social life (Drentea and Lavrakas 2000; Münster et al. 2009; Ochsmann et al. 2009). In addition, over-indebtedness is often accompanied with shame, fear of social stigma, anxiety and psychological distress (Hayes 2000; Fitch et al. 2007; Drentea and Reynolds 2012; Drentea and Lavrakas 2000), which may have adverse effects on both physical and mental health. Also, over-indebtedness, declared official through a payment default entry, affects creditworthiness and makes it more difficult to rent an apartment, to make other financial agreements, or to find employment (European Commission 2008).

Accordingly, previous studies have demonstrated associations between indebtedness and many types of mental disorders (Alley et al. 2011; Bridges and Disney 2010; Cannuscio et al. 2012; Drentea and Reynolds 2012; Jenkins et al. 2008; McLaughlin et al. 2012; Meltzer et al. 2013; Nettleton and Burrows 1998; Taylor et al. 2007) as well as physical health (Cannuscio et al. 2012; Drentea and Lavrakas 2000; Lenton and Mosley 2008; Münster et al. 2009; Ochsmann et al. 2009). In particular, according to a recent systematic review, over-indebtedness has most consistently been found to be associated with suicidal thoughts, depression, and self-rated health (Turunen and Hiilamo 2014).

Most studies have acknowledged the problem of reverse causality: excess debt may lead to poor health, but also those with poorer health are more likely to end up in excessive debt (Gathergood 2012; Meltzer et al. 2013). This problem is difficult to overcome especially in a cross-sectional setting. Moreover, measures of over-indebtedness are scarcely available in epidemiological surveys (Meltzer et al. 2013). This study adds to the previous literature by examining associations between over-indebtedness and chronic morbidity in a longitudinal setting, utilizing register data that cover more than 15 years.

We measure morbidity through entitlements to special reimbursements for costs of medicines that are prescribed by a doctor for treatment of certain chronic diseases. Against a relevant doctor's certificate, the patients get their medicine for free or for only a small out-of-pocket share (SIIF 2012). These entitlements, part of the Finnish National Health Insurance, may be granted universally to everyone solely according to health status, and are not dependent on income or other characteristics of the patient. Thus, they are often used as a proxy for chronic disease (Saastamoinen et al. 2012). The Finnish primary health care system consists of three parts: public, occupational and private health care (Teperi et al. 2009). Public health care, organized in health centres, is available to all with no

or very low user charges. Thus, treatment costs should not normally prevent people from seeking relevant doctor care when needed.

Methods

Sample

We utilize unique register-based longitudinal data on long-term over-indebted individuals and their controls. We linked registers of the Social Insurance Institution of Finland (SIIF), Finnish Centre for Pensions (FCP) and Suomen Asiakastieto Ltd, a company maintaining a database of consumer and business credit history in Finland. Information is collected from court proceedings and from the execution authority, and the record is comprehensive. We used a retrospective method to single out persons who had lived severely over-indebted for at least 15 years, after which their debts were erased in April 2010 from the credit information register due to outdated payment liability. The records of previously over-indebted persons were erased retrospectively following the amendment to the Credit Information Act taking effect on April 1, 2010, which stipulated that all outdated payment default entries had to be removed from the credit information register after the payment liability had been expired (L 527/2007a, b; L 933/2009). According to the Finnish Enforcement Code that took effect in 2008, the payment liability can be erased, i.e. debts can be forgiven, after 15 years from the judgment by court (L 705/2007).

Before that time, the debtors had lived under a lifelong payment liability with no expectations of pardon. Thus, debt records erased in 2010 concerned debts that had been judged by year 1995. Accordingly, we set the baseline of our analyses at the end of 1994. Our sample thus includes persons whose debts originated from the recession of the early 1990s, or from even earlier years, who had not finalized a debt adjustment programme and who had lived over-indebted until the first decade of the 2000s. These data included about 37,000 over-indebted persons. It is notable that even though the 15-year-old debts were forgiven in 2008, the negative consequences of a credit default entry were still valid until also the records were erased in 2010.

For each person identified as severely over-indebted, one control matched for age, gender, and place of residence was randomly sampled from the population data file of the SIIF, with the restriction that the controls did not have any removal of payment default entries in the credit information register in April 2010. However, we were not able to exclude persons who perhaps had been over-indebted at some time point but had been able to pay off their debt, or who may have undergone debt adjustment, or who had old unpaid debts that had not yet reached the 15-year limit. These limitations will be discussed later.

For internal consistency, the sample was restricted to those who were working-age adults both just before and throughout the recession of the 1990s and for whom a place of domicile could be found in Finland. The age limit was thus set to 25–64 in the end of 1994. Since over-indebtedness could only be concluded retrospectively, the sample included only persons who were still alive in 2010. For the statistical analyses of incidence of medicine reimbursement entitlements, the sample had to be further restricted to persons who did not have any of these entitlements at baseline. With this restriction, about 7000 persons (roughly the same number of over-indebted persons and their controls) were dropped from the analyses because they could no longer be susceptible to the event in interest. The final data set included 33,628 men and 15,150 women (Table 1).

Table 1 Characteristics of a sample of Finnish long-term over-indebted persons and their matched controls at baseline on December 31, 1994

	Men (%)	Women (%)
Over-indebtedness		
Over-indebted	50.0	50.0
Control	50.0	50.0
Age		
25–29	17.5	24.6
30–39	43.3	41.9
40–49	33.0	28.2
50–64	6.2	5.3
Marital status		
Married	43.8	47.4
Never married	37.8	29.8
Divorced or separated	18.0	21.3
Widowed	0.4	1.4
Region of residence		
Helsinki capital region and nearby region	32.6	33.9
Other Southern Finland	22.3	22.7
Western Finland	22.1	21.6
Northern and Eastern Finland	23.0	21.8
Pre-recession sickness allowance		
Did not receive sickness allowance	93.4	92.9
Did receive sickness allowance	6.6	7.1
Pre-recession disability pension		
Did not receive disability pension	98.0	98.0
Did receive disability pension	2.0	2.0
Total	100	100
N	33,628	15,150

Measures

The analyses were performed separately by gender. Demographic covariates, expected to be associated with both debt and health, were retrieved from the population register and included age, marital status and region of residence at baseline (see Table 1). In addition, information about receipt of sickness allowance was retrieved from the registers of the SIIF and information about disability pension benefits during 1989 or 1990 was retrieved from the registers of the SIIF and FCP. Sickness allowances and disability pensions are benefits that compensate for income losses due to short-term (normally up to a year) or long-term (more than a year) inability to participate in gainful activity such as work but are not fully correlated with medicine-treated chronic diseases that generally do not lead to work inability. These variables were used to adjust for pre-recession health conditions, i.e. from a time point before the assumed start of over-indebtedness. Distributions of the variables are shown in Table 1.

The indicator used for incidence of chronic disease was commencement of entitlements to special reimbursements for medicine expenses. We examine the incidence of any disease that may entitle to special medicine reimbursement, as well as the incidence of five most common disease groups for which these entitlements are granted in Finland. These are chronic hypertension, diabetes (mainly type 2 in these analyses), bronchial asthma and other obstructive pulmonary diseases, coronary heart disease, and psychoses (SIIF 2015). Previous studies on the consequences of over-indebtedness have only rarely included other health conditions than mental health problems.

Statistical analyses

The incidence of new entitlements was followed from baseline (end of 1994) until March 2010. The incidence of chronic disease among the severely over-indebted individuals and the controls was examined with Kaplan–Meier methods and with multivariate Cox regression, modelling the time in months from the start of the follow-up until the month in which the entitlement to medicine reimbursement for each disease took effect for the first time. If no entitlement appeared, the length of the follow-up was set as the number of months between the baseline and the end of the follow-up. Since the data set was constructed as a complete follow-up, there was no censoring before the end point. The analyses were performed with the SAS Enterprise Guide 4.3 software (SAS Institute Inc. 2011). The results of the Cox models are presented as hazard ratios (HR) with their 95 % confidence intervals (CI).

Results

Table 2 reports the cumulative incidence of chronic diseases among over-indebted men and women from the baseline until years 2000, 2005 and 2010. The cumulative

Table 2 Cumulative incidence of the most common chronic diseases for which special reimbursements of prescription medicines can be received

	Over-indebted			Controls		
	12/2000	12/2005	3/2010	12/2000	12/2005	3/2010
Men						
All diseases	6.1	14.1	21.9	6.4	14.3	21.1
Chronic hypertension	1.9	4.8	7.1	2.9	6.5	9.3
Diabetes	1.0	3.1	5.9	0.7	2.1	4.4
Bronchial asthma and COPD	0.7	1.6	2.9	0.7	1.5	2.3
Coronary heart disease	1.0	2.5	4.0	0.7	1.9	3.1
Psychoses	0.9	2.1	2.9	0.7	1.4	1.8
Women						
All diseases	7.6	16.7	25.3	6.4	12.8	18.7
Chronic hypertension	2.4	5.4	7.8	2.3	4.7	6.7
Diabetes	0.6	2.4	5.3	0.3	0.9	2.1
Bronchial asthma and COPD	1.9	4.2	6.3	1.5	2.7	3.8
Coronary heart disease	0.3	0.8	1.4	0.1	0.4	0.7
Psychoses	1.1	2.8	3.8	0.7	1.5	1.9

Finnish severely over-indebted men and women and their matched controls. Kaplan–Meier failure estimates on persons with no entitlements at baseline on December 31, 1994

proportion of holders of medicine reimbursement entitlements increased during the follow-up in all groups. Naturally, the increase was mainly associated with ageing: older people are more likely to have reimbursement entitlements than younger people (SIIF 2013).

When examining all diseases based on which entitlements to special medicine reimbursement may be received, the cumulative incidence for over-indebted women and their controls increasingly diverged over time, but over-indebted men differed only slightly from the control group (Table 2). Incidence of chronic disease was much higher among over-indebted women than among their controls in each specific disease group examined, while the difference was not nearly as large among men. In addition, among men, chronic hypertension showed a reverse association so that the incidence was higher among the controls than among the over-indebted. With regard to the diseases examined, the difference between the over-indebted persons and their controls was largest and most consistent for diabetes and psychoses. In addition to the five most common diseases entitling for special medicine reimbursement, other diseases were examined as a combined group. The differences in morbidity between over-indebted people and the controls were very small in these analyses (more detailed results are available from the authors).

Tables 3 (men) and 4 (women) present the hazard ratios (HR) for incidence of chronic disease for each disease group, first, including only over-indebtedness in the model (Model 1) and, second, adjusted for covariates (Model 2). Adjustments did not greatly affect the HR for over-indebtedness. The adjusted results were in line with the cumulative incidences in Table 2. Adjusted, the risk of any chronic disease was only slightly higher among the over-indebted men compared to their controls (HR 1.06). However, the risk was 40 % higher (HR 1.40) among the over-indebted women.

In all disease groups, with the exception for chronic hypertension among men, the risk of onset of disease was statistically significantly elevated among the over-indebted, and the difference between the over-indebted and their controls was much higher among women than among men. Greatest differences were found in psychoses and diabetes—for over-indebted men, the adjusted risk of developing psychosis was 1.70 times as high and the risk of developing diabetes 1.40 times as high as among the controls. The equivalent figures for women were even larger: 2.46 for psychoses and 2.65 for diabetes, respectively. However, among men, the incidence of chronic hypertension was one-fourth lower than for the controls (HR 0.75).

The associations of the other covariates with disease incidence were mostly in accordance with previous knowledge. With age, the risk of chronic disease increased, with the exception of psychoses among men. Estimates for marital status were mixed and mostly insignificant especially among women. The morbidity risk for people living in Northern and Eastern Finland was (with the exception of psychoses) higher than for those living in other regions. Men who had received pre-recession sickness allowance had, contrary to expectations, a lower risk of receiving medicine reimbursement entitlements. Being on disability pension prior to the recession increased the risk of incidence of any disease.

Discussion

To our knowledge, no register-based long-term follow-up studies on well-being of people who live with excessive debt have been conducted to date. Our study contributed to filling this gap by examining associations between health and severe over-indebtedness in a longitudinal setting. We analysed Finnish register-based data on long-term over-indebted persons and their matched controls to find out whether severe over-indebtedness was associated with incidence of chronic disease. Chronic disease was measured with entitlements to special reimbursement for expenses of medicines used to treatment of certain diseases deemed long-term and severe. To partly address the problem of reverse causality, we used measures to control for pre-existing health status.

The analyses showed that severe over-indebtedness had a clear association with increased psychological and physical morbidity. The results were thus largely in accordance with previous studies. The associations were stronger among women than among men. Nettleton and Burrows (1998) reached a similar result concerning the association between mortgage problems and worsening health. Over-indebtedness may have a greater impact on the well-being of women perhaps through perceived stress. Women have been shown to be more risk averse than men (Jianakoplos and Bernasek 1998). How a family copes in the midst of debt problems may have been more of a concern for women than for men, also in post-recession Finland—and if the woman is indebted in the household, the situation may have been more severe. Unfortunately, we do not have information on the total household debt. On the other hand, the gender difference may be partly explained by the fact that there were far less over-indebted women than men, and thus severely over-indebted women may have been more strongly selected according to socio-economic factors associated with morbidity. Men who became severely over-indebted during the recession may not have differed as much from the rest of the population as over-indebted women.

For both men and women, the difference between the over-indebted and the controls was particularly large for

Table 3 Hazard ratios (HR) for incidence of chronic diseases for which special reimbursement of medicines may be received, men

	All diseases HR (95 % CI)	Hypertension HR (95 % CI)	Diabetes HR (95 % CI)	Bronchial asthma and COPD HR (95 % CI)	Coronary heart disease HR (95 % CI)	Psychoses HR (95 % CI)
Model 1						
Over-indebted (ref. control)	1.04 (0.99–1.09)	0.75 (0.70–0.81)	1.36 (1.23–1.49)	1.24 (1.09–1.42)	1.31 (1.17–1.47)	1.81 (1.55–2.13)
Model 2						
Over-indebted (ref. control)	1.06 (1.01–1.11)	0.80 (0.73–0.86)	1.40 (1.27–1.55)	1.25 (1.08–1.43)	1.37 (1.22–1.55)	1.70 (1.44–2.01)
Age (ref. 25–29)						
30–39	1.44 (1.32–1.57)	1.98 (1.68–2.34)	1.81 (1.49–2.21)	1.21 (0.95–1.53)	3.02 (2.14–4.26)	0.82 (0.67–0.99)
40–49	2.46 (2.25–2.68)	3.87 (3.28–4.56)	3.41 (2.80–4.16)	1.77 (1.39–2.26)	8.00 (5.69–11.2)	0.61 (0.48–0.77)
50–64	4.10 (3.69–4.55)	4.93 (4.06–5.98)	5.19 (4.12–6.54)	2.80 (2.08–3.75)	17.5 (12.2–25.0)	0.49 (0.32–0.77)
Marital status (ref. married)						
Never married	0.85 (0.81–0.91)	0.76 (0.69–0.83)	0.85 (0.75–0.96)	0.73 (0.61–0.86)	0.74 (0.64–0.87)	1.68 (1.39–2.04)
Divorced or separated	0.93 (0.87–0.99)	0.85 (0.76–0.94)	0.90 (0.79–1.02)	1.04 (0.87–1.23)	0.89 (0.77–1.03)	1.30 (1.02–1.65)
Widowed	1.03 (0.75–1.40)	0.77 (0.44–1.36)	0.77 (0.38–1.55)	1.72 (0.85–3.47)	1.40 (0.79–2.48)	1.95 (0.62–6.14)
Region of residence (ref. capital and nearby region)						
Other Southern Finland	1.07 (1.00–1.14)	1.00 (0.89–1.12)	0.95 (0.83–1.08)	1.00 (0.82–1.23)	1.23 (1.05–1.44)	1.01 (0.82–1.24)
Western Finland	1.16 (1.08–1.23)	1.38 (1.24–1.53)	1.07 (0.94–1.21)	1.21 (1.00–1.47)	1.05 (0.89–1.24)	0.92 (0.74–1.14)
Northern and Eastern Finland	1.40 (1.32–1.49)	1.59 (1.44–1.75)	1.14 (1.00–1.29)	1.81 (1.53–2.16)	1.65 (1.42–1.91)	1.08 (0.88–1.32)
Did receive pre-recession sickness allowance	0.82 (0.74–0.91)	0.80 (0.68–0.95)	0.90 (0.74–1.09)	1.12 (0.87–1.44)	0.56 (0.42–0.74)	0.65 (0.45–0.92)
Did receive pre-recession disability pension	1.33 (1.16–1.53)	1.14 (0.90–1.45)	1.25 (0.95–1.65)	0.90 (0.57–1.42)	1.48 (1.10–1.98)	2.35 (1.62–3.43)

Cox regression analyses of a sample of Finnish over-indebted persons and their matched controls during 1995–2010, including those without the disease at baseline December 31, 1994. Men, $N = 33{,}628$

Table 4 Hazard ratios (HR) for incidence of chronic diseases for which special reimbursement of medicines may be received, women

	All diseases HR (95 % CI)	Hypertension HR (95 % CI)	Diabetes HR (95 % CI)	Bronchial asthma and COPD HR (95 % CI)	Coronary heart disease HR (95 % CI)	Psychoses HR (95 % CI)
Model 1						
Over-indebted (ref. control)	1.40 (1.31–1.50)	1.17 (1.04–1.32)	2.61 (2.17–3.14)	1.66 (1.44–1.92)	1.99 (1.44–2.75)	2.66 (2.10–3.36)
Model 2						
Over-indebted (ref. control)	1.40 (1.31–1.51)	1.18 (1.06–1.29)	2.65 (2.19–3.21)	1.58 (1.36–1.84)	2.08 (1.49–2.92)	2.46 (1.93–3.14)
Age (ref. 25–29)						
30–39	1.48 (1.33–1.64)	1.88 (1.52–2.33)	1.94 (1.45–2.60)	1.57 (1.27–1.64)	10.5 (2.53–43.5)	1.05 (0.80–1.38)
40–49	2.19 (1.97–2.44)	3.47 (2.81–4.30)	3.31 (2.46–4.45)	1.60 (1.27–2.02)	24.4 (5.94–100.3)	1.01 (0.74–1.37)
50–64	3.33 (2.88–3.85)	5.45 (4.20–7.07)	5.34 (3.72–7.66)	1.81 (1.29–2.19)	84.7 (20.4–352.1)	0.57 (0.30–1.09)
Marital status (ref. married)						
Never married	0.94 (0.86–1.02)	0.82 (0.70–0.97)	0.87 (0.69–1.09)	1.03 (0.86–1.24)	0.39 (0.22–0.70)	1.24 (0.95–1.61)
Divorced or separated	1.00 (0.92–1.09)	1.02 (0.88–1.18)	0.94 (0.77–1.15)	1.22 (1.02–1.46)	0.78 (0.54–1.11)	1.36 (1.04–1.78)
Widowed	1.16 (0.91–1.47)	1.27 (0.87–1.85)	0.70 (0.36–1.37)	2.08 (1.37–3.17)	1.24 (0.57–2.68)	1.05 (0.43–2.59)
Region of residence (ref. capital and nearby region)						
Other Southern Finland	1.03 (0.94–1.13)	1.00 (0.84–1.19)	1.03 (0.82–1.31)	1.18 (0.99–1.44)	0.72 (0.47–1.09)	0.63 (0.47–0.85)
Western Finland	1.20 (1.09–1.32)	1.36 (1.16–1.61)	1.25 (1.00–1.57)	1.26 (0.94–1.54)	0.57 (0.36–0.90)	0.62 (0.46–0.85)
Northern and Eastern Finland	1.35 (1.23–1.48)	1.62 (1.38–1.90)	1.31 (1.04–1.64)	1.62 (1.36–1.96	0.96 (0.65–1.43)	0.94 (0.72–1.22)
Did receive pre-recession sickness allowance	0.82 (0.72–0.94)	0.78 (0.61–1.00)	0.73 (0.52–1.03)	0.79 (0.64–1.05)	1.07 (0.64–1.80)	0.80 (0.52–1.22)
Did receive pre-recession disability pension	1.29 (1.07–1.57)	0.88 (0.60–1.29)	1.54 (1.04–2.29)	1.15 (1.03–1.74)	1.46 (0.74–2.89)	2.10 (1.28–3.46)

Cox regression analyses of a sample of Finnish over-indebted persons and their matched controls during 1995–2010, including those without the disease at baseline December 31, 1994. Women, $N = 15{,}150$

psychoses and diabetes. Also some earlier studies have found an association between debt problems and symptoms of psychosis (Jenkins et al. 2008) as well as with other mental health disorders (Bridges and Disney 2010; McLaughlin et al. 2012; Meltzer et al. 2013; Taylor et al. 2007). Research has also shown that health behaviour acts as a key intermediating variable between debt problems and health (Drentea and Lavrakas 2000). Our study also points towards the same association, as the onset of type 2 diabetes is mainly lifestyle related (Pajunen et al. 2010).

Although entitlements to special reimbursement for medicines are often used as a proxy of morbidity (Saastamoinen et al. 2012; SIIF 2013), examining them only highlights diseases for which medicines are within the scope of special reimbursement. For example, these entitlements cannot be used as an indicator for the incidence of depression because these entitlements are only granted for depression when it has psychotic characteristics (SIIF 2012). Furthermore, the criteria for receiving an entitlement to special reimbursement can differ from the prevailing diagnostic criteria, which is why the entitlement is not a completely reliable indicator of the incidence of a certain disease.

To receive an entitlement to reimbursement, the patients must also attend to their health at least to the extent of contacting a doctor to obtain a diagnosis and arrange appropriate treatment. It is possible and even probable that all diseases among severely over-indebted persons are not identified in their entirety if a higher than average number of over-indebted persons fail to seek treatment from a doctor due to poverty or life management problems.

Failing to seek treatment may also partly explain the unexpected result that severely over-indebted men had lower incidence of entitlements to special reimbursement for medicines to treat chronic hypertension than the controls—the disease may be underdiagnosed among the over-indebted. The result may also be explained in part by the fact that chronic hypertension is a rather common national disease in Finland—almost 10 % of the country's population had entitlements to special reimbursement for treatment of hypertension at the end of 2011 (SIIF 2015) and social background factors may not have selected people for this disease as strongly as for less common diseases.

Our data set did not include information about the amount of the original debt or reason for the payment default entry. As a result, persons who had been over-indebted but had been released from their debts through debt adjustment or who had managed to pay off their debts earlier were not included in the sample of over-indebted persons—but some of them may have been among the controls. Thus, it can be assumed that the over-indebted people included in our data were in a weaker position than those over-indebted people who had successfully managed to handle their debts. Those in our cohort of severely over-indebted persons had not got rid of their debts through debt adjustment, for example, which may not have been available to them due to some reasons related to not being qualified for the debt adjustment programme (such as recklessly incurred debt or lack of regular income) or to preferences or ability of applying for such arrangement. This may cause upwards bias in our estimates for over-indebtedness: instead of referring to all previously over-indebted persons, our estimates are specific to the hard-core of the over-indebted persons. On the other hand, the estimates can also be biased downwards since our sample included only those persons who had survived until 2010, and the over-indebted persons in our sample were thus probably in better health than those over-indebted persons who passed away during the follow-up period of 1995–2010. Also, the fact that the controls may include persons with some history of over-indebtedness is also a potential source for downward bias in the estimates.

Despite strong associations, the results cannot demonstrate a causal link between over-indebtedness and chronic disease. The severely over-indebted individuals were compared to controls matched for age, gender and place of residence, but the matching could not be done in relation to other factors associated with over-indebtedness. Thus, at least some of the difference between the over-indebted and the controls may be attributed to unmeasured factors such as earlier labour market position, income level and education. Also, differences in the tendency for risk taking may be associated with the risk of indebtedness, with the inability to access a debt adjustment programme as well as harmful health behaviour, which could partly explain the association between indebtedness and morbidity. Despite the fact that we had some controls for previous morbidity and focused on persons with no medicine reimbursement entitlements at baseline, it is possible that the persons may have already been ill or developing a disease. Ill health being one of the causes of over-indebtedness cannot be overruled as one explanation of the association (Meltzer et al. 2013). Even though our analyses cannot prove causation, the findings show a consistent association between over-indebtedness and health.

Future studies should continue to further map the associations of over-indebtedness with various health measures during a prolonged economic downturn. Both short- and long-term associations should be assessed. Furthermore, to our knowledge, no studies are available on changes in health status after release from debts.

In conclusion, over-indebtedness was found to be associated with higher incidence of chronic disease, especially among women. The association was particularly strong for psychoses and diabetes. It is noteworthy that associations between over-indebtedness and health are observed also in

a Nordic welfare state. Policy makers should consider taking steps to prevent over-indebtedness by regulating the supply of credit and by providing debt counselling, and to increase awareness among the social and health service professionals of the well-being problems associated with over-indebtedness to improve public health.

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Compliance with ethical standards

Ethics statement The study solely used secondary data retrieved from registers. Conventions of good scientific practice, data protection and information security have been applied in analysing the data and in presenting the results. The study was based on registries and thus ethics approval was not required according to Finnish law (FABRI 2015).

Conflict of interest The authors declare that they have no conflict of interest.

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