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The European Journal of Public Health, Vol. 29, No. 3, 488–493

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doi:10.1093/eurpub/ckz002 Advance Access published on 3 February 2018

Debt and mental health: new insights about the relationship and the importance of the measure of mental health

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Background: Empirical research suggests that household debt and payment difficulties are detrimental to mental health. Despite well-known measurement problems that may contaminate analyses using subjective self-reported health measures, our knowledge is very limited concerning the effect of payment difficulties on 'objective' measures of mental health. Moreover, few studies use longitudinal data to examine the relationship. This study combines rich survey data and longitudinal data from administrative registers on a representative sample of the Swedish population to examine the relationship between payment difficulties and subjective and objective measures of mental health. **Methods:** We use data from a large survey of Swedish inhabitants (The Swedish Living Conditions Surveys) combined with data from administrative registers. We investigate both directions of the relationship between mental ill health and payment difficulties, controlling for previous mental health status and previous experiences of payment difficulties. We compare the association between payment difficulties and a self-reported measure of anxiety with the associations between payment difficulties and objective measures of mental ill health from a register of psychopharmaceutical drug consumption. **Results:** Payment difficulties associate with subjectively reported mental ill health, but less to psychopharmaca use. For objective measures, we find stronger evidence of a link running from mental ill health to later payment difficulties. **Conclusions:** Self-reported and objective measures of mental problems may convey different messages regarding the impact of payment difficulties on mental health. Policy measures depend on whether the primary target group is individuals with severe mental problems or individuals with mild anxiety.

Introduction

Debt problems often relate to unsecured debts and often affect low income earners, lacking a financial buffer.^{1–5} Being in arrears may have negative consequences for the individual's mental wellbeing, as indicated by the higher prevalence of anxiety, depression and other common mental disorders among over indebted individuals.^{6–16}

Previous research relies on self-reported and subjectively assessed measures of mental health to study the association between debt and mental health. Although the individual's own experience is crucial to diagnose mental disorders, there are nonetheless methodological limitations associated with the use of survey data to measure the prevalence of mental problems. Survey questions may capture not only severe mental problems, but also mild and transitory mood dips of limited clinical relevance. Self-reported health measures may further be contaminated with measurement errors, as individuals report problems that they do not have, fail to report health issues that they do have, or just do not respond truthfully.^{17–20} Also, individuals interpret and respond to a given *de facto* economic situation differently,² suggesting that analyses of subjective and objective health measures may produce different results regarding the relationship between debt and mental health.

This study examines the association between payment difficulties and mental health and how it varies across self-reported and objective mental health measures. We take advantage of panel data including subjective reports of mental health status and register

information on psychopharmaceutical consumption for a large and representative sample of the adult Swedish population. We study both the link between earlier payment difficulties and future mental ill health and the link between earlier mental problems and future payment difficulties, as the causal relationship may run in both directions.^{10,11,14,21,22} Our rich register data also allow us to account for historical experiences of severe mental health problems—psychopharmaceutical consumption the year before and psychiatric hospitalizations up to 9 years before the reported arrears—to a considerably higher degree than most other observational studies. This access to historical data is important to mitigate the potential selection bias driven by confounding factors related to payment difficulties and mental health risks.

Methods

Data sources and participants

We use a micro dataset combining survey and register data for a population consisting of the respondents of the 2006–07 waves of a large, population-representative survey of Swedish inhabitants (ULE, the Swedish Living Conditions Surveys). Of the 5583 interviews conducted in 2006, around half were conducted in person and half by telephone. All the 5629 interviews in 2007 were conducted by telephone (landline or mobile). The overall response rate was 73% in both waves and for both survey modes, and the reasons for non-response were similar (see Supplementary table S1).

Supplementary tables S4 and S5 report results from a multiple imputation exercise, showing that results are not biased by selective non-response and missing data.

Using unique personal identification numbers, we augment the survey data with data from official registers. We add information from the Prescribed Pharmaceutical register (July 2005 to December 2008), covering all consumption of prescribed drugs; the Inpatient register (1997–2007), covering dates and diagnoses of all hospitalizations; and Statistics Sweden's longitudinal database Longitudinell Integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier (LISA), including information about individual background characteristics. Our annual register data cover a period from up to 10 years before the interview (the exception is pharmaceutical data, only available from 2005) to the year after.

Given the longitudinal approach, it is important to keep track of the point in time when the dependent and independent variables are measured. The survey questions are phrased to measure the respondents' situation at the time of the interview, or the whole year (t). Thanks to the rich register data, we can construct independent and dependent variables measured either the years before ($t - 1$, $t - 2$ etc.) or the year after ($t + 1$) the interview.

The study and the data were granted approval by the Regional Ethics Board in Lund (Dnr. 2013/447).

Variables

Payment difficulties

The dummy variable 'payment difficulties' takes a value one for respondents who answered yes to the question: 'during the past 12 months, have you experienced troubles with covering your regular expenses for food, rent, bills etc?', and zero otherwise; 92% responded to this question.

Mental health

Our first measure of mental health is a dummy, 'anxiety', which equals one for respondents who answered yes to the survey question: 'are you bothered by feelings of anxiety or distress?', and zero otherwise; 96% responded to this question. We further use three dummies indicating whether the individual consumed a specific psychopharmaceutical drug: 'antidepressants' (ATC code N06A), 'anxiolytics' (ATC code N05B) or 'hypnotics' (sleeping pills, ATC code N05C), in a given year ($t - 1$, t or $t + 1$) according to the pharmaceutical register. We select these particular substances because they relate to the mental problems indicated by previous research.^{6–16} We also construct a dummy equalling one if the individual consumed any of the three substances—'psychopharmaca'. With information from administrative registers, we have no missing data for the objective mental health measures.

Our final mental health measure is the individual's history of hospitalizations due to depression or anxiety (ICD10: F32–F33, F41, F43). A dummy indicates hospitalizations during the survey year (t) and another dummy indicates the hospitalizations during any of the 9 years before the survey ($t - 9$). With low prevalence of such hospitalizations, we do not use these variables as dependent variables, only as covariates.

Other health measures

We also use information from LISA on benefit receipt from the social insurance system due to health related income losses to control for more general health problems. 'Sickness (disability) benefit' is paid when the individual's work ability is temporary (permanently) disabled. We use dummies to indicate benefit receipt during the survey year (t) and before the interview year. Because the benefit types reflect health conditions of different duration, we account for disability benefit the year prior to the interview ($t - 1$)

and for sickness benefit in any year in a 5-year period prior to the interview ($t - 5$).

Background characteristics

LISA includes a rich set of background variables. One set of covariates is measured before the interview: two variables indicating if the individual received unemployment benefit or social welfare benefit during any of the 5 years before the interview; two variables indicating if the individual received old age pension or parental leave benefit during the year before the interview, two variables indicating if the individual lived in a single person household or had children of age below 18 in the household, and a variable measuring the household's disposable income. We lag these variables as the values in t may be correlated with the payment difficulties arising during the interview year.

The remaining LISA covariates are time-invariant or refer to the situation during the survey year: age, and dummies indicating female, highest educational attainment, metropolitan place of residence, and foreign background (foreign born or parents non-Swedish citizens). We also use covariates from the ULF survey: dummies for the type of housing (own house, cooperative apartment, or tenancy and other housing forms) and a dummy indicating the interview year.

Models and empirical strategy

We first examine if earlier payment difficulties influence future mental health and then whether earlier mental problems associate with future payment difficulties. In both cases, we estimate OLS regressions of the following type:

$$y_{i,t} = \alpha + \beta * T_{i,t-1} + \gamma * X_{i,t-1} + \epsilon_{i,t}$$

where y is the dependent variable (mental health or payment difficulties) measured for individual i at time t . α is a constant and ϵ is a random error term. T is the variable of interest (a dummy for individuals with payment difficulties or mental problems, respectively) measured at time $t - 1$. X is a vector of covariates at time $t - 1$ or earlier and includes a rich set of ill health proxies. β and γ are coefficients, each capturing the association between an independent variable and the dependent variable, holding all other predictors constant. All dependent variables are binary, so with an interest in correlations (rather than distributions) OLS performs well relative to probit and logit models.²³ Supplementary tables S2 and S3 show that the baseline results hold when using logit.

We estimate up to five models, successively accounting for more confounding factors in the relationship between mental health and payment difficulties. In the final models, we augment the regression with interaction terms between T and a lagged measure of the concept under study (either psychopharmaca or payment difficulties). For example, when $y_{i,t}$ is a dummy for consumption of antidepressants in year t , the dummy for payment difficulties the year before ($T_{i,t-1}$) is interacted with a dummy indicating whether the individual consumed psychopharmaca in the previous year ($y_{i,t-1}$) and with other indicators of earlier mental health status:

$$y_{i,t} = \alpha + \beta_1 * T_{i,t-1} + \beta_2 * T_{i,t-1} * y_{i,t-1} + \gamma * X_{i,t-1} + \epsilon_{i,t}$$

Here β_1 measures the association between earlier payment difficulties and later mental problems for individuals with no history of mental problems, while β_2 measures the additional association for individuals with previous mental problems. In the converse scenario where $y_{i,t}$ is a dummy for payment difficulties, we cannot estimate the exact equivalent of the above interaction specification because we only observe payment difficulties once. In that case, we instead interact the variable of interest ($T_{i,t-1}$; now a dummy for earlier psychopharmaceutical consumption), together with other indicators of earlier mental health status, with a

Table 1 Descriptive statistics by payment difficulties status in year *t*

Variable type	Variable name	No payment difficulties			Payment difficulties		
		<i>N</i>	Mean	SD	<i>N</i>	Mean	SD
Health (<i>t</i>)	Anxiety (<i>t</i>)	9661	0.178	0.383	1289	0.431	0.495
	Antidepressants (<i>t</i> + 1)	9689	0.086	0.280	1299	0.158	0.365
	Anxiolytics (<i>t</i> + 1)	9689	0.054	0.227	1299	0.079	0.270
	Hypnotics (<i>t</i> + 1)	9689	0.100	0.300	1299	0.107	0.309
	Psychopharmaca (<i>t</i> + 1)	9689	0.174	0.379	1299	0.223	0.417
	Psychopharmaca (<i>t</i>)	9689	0.165	0.371	1299	0.234	0.424
	Hospital depression (<i>t</i>)	9689	0.001	0.038	1299	0.004	0.062
Health (<i>t</i> - 1)	Sickness benefit (<i>t</i>)	9647	0.084	0.278	1295	0.151	0.358
	Disability benefit (<i>t</i>)	9647	0.058	0.233	1295	0.127	0.334
	Psychopharmaca (<i>t</i> - 1)	9689	0.147	0.354	1299	0.212	0.409
	Hospital depression (<i>t</i> - 9)	9689	0.007	0.082	1299	0.026	0.160
Background	Sickness benefit (<i>t</i> - 5)	9689	0.257	0.437	1299	0.366	0.482
	Disability benefit (<i>t</i> - 1)	9643	0.059	0.236	1295	0.117	0.321
	Unemployment benefit (<i>t</i> - 5)	9689	0.148	0.356	1299	0.300	0.459
	Welfare (<i>t</i> - 5)	9647	0.047	0.211	1295	0.260	0.439
	Old age pension (<i>t</i> - 1)	9643	0.312	0.464	1295	0.095	0.293
	Parental benefit (<i>t</i> - 1)	9643	0.140	0.347	1295	0.205	0.404
	Single adult household (<i>t</i> - 1)	9643	0.520	0.500	1295	0.725	0.447
	Children 0-17 (<i>t</i> - 1)	9643	0.525	0.918	1295	0.820	1.117
	Log disp. income (<i>t</i> - 1)	9625	8.023	0.722	1290	7.659	0.783
	Age (<i>t</i>)	9689	51.460	18.820	1299	39.982	14.868
	Female	9689	0.512	0.500	1299	0.584	0.493
	Primary education (<i>t</i>)	9634	0.226	0.418	1297	0.180	0.384
	Secondary education (<i>t</i>)	9634	0.455	0.498	1297	0.513	0.500
	Tertiary education (<i>t</i>)	9634	0.319	0.466	1297	0.307	0.461
	Metropolitan area (<i>t</i>)	9689	0.341	0.474	1299	0.381	0.486
	Foreign born (<i>t</i>)	9647	0.127	0.333	1295	0.236	0.425
Parents non-Swed. citizens (<i>t</i>)	9662	0.111	0.314	1293	0.220	0.415	
House-owner (<i>t</i>)	9663	0.552	0.497	1296	0.279	0.448	
Coop. apartment (<i>t</i>)	9663	0.169	0.375	1296	0.139	0.346	
Tenant (<i>t</i>)	9663	0.273	0.446	1296	0.569	0.495	

Table 2 Correlations between subjective mental health [anxiety (*t*)] and objective mental health measures

Psychopharmaca (<i>t</i> +1)	0.253
Antidepressants (<i>t</i> +1)	0.252
Anxiolytics (<i>t</i> +1)	0.192
Hypnotics (<i>t</i> +1)	0.139

variable plausibly correlated with payment difficulties: earlier uptake (in any year from *t* - 5 to *t* - 1) of social welfare benefits.

Results

Table 1 shows descriptive statistics. The prevalence of payment difficulties during the year preceding the survey was 11.8% (11.8% = 1299 of 10 988 respondents); 20.8% report feelings of distress or anxiety at the time of the survey (20.8% = 0.178 * (9661/10 950) + 0.431 * (1289/10 950)), and 17.9% use at least one of the three studied substances (antidepressants 9.5%; anxiolytics 5.7%; hypnotics 10.1%) the year after the interview. Notably, the prevalence of self-reported mental health is considerably higher than the prevalence of the objective measures for individuals with payment difficulties [McNemar's $\chi^2(1) = 1.00$, $P = 0.316$], while there is no difference between the prevalence of subjective and objective mental problems for individuals with no payment difficulties [McNemar's $\chi^2(1) = 159.74$, $P = 0.000$]. The subjective and objective mental health measures are positively but only weakly correlated, at most $r = 0.253$ (table 2). The strongest association is between anxiety and antidepressants use.

Do payment difficulties precede mental problems?

Table 3 shows the estimated associations between recent payment difficulties and future mental problems. Model 1 displays the difference between the groups with and without payment difficulties without controls; Model 2 adjusts for background characteristics; Model 3 also accounts for health problems that were present already before the interview year; Model 4 additionally accounts for health problems present during the interview year, and finally, Model 5 captures the association between previous payment difficulties and future mental health for the sub group of individuals who had no history of mental problems at the time of the survey interview (β_1 in the interaction specification).

The first row of table 3 indicates that the probability of self-reported anxiety is 25.2 percentage points (ppts) higher in the group with payment difficulties (Model 1). The difference between the groups decreases to 19.6 ppts when we account for background characteristics (Model 2), and to about 16 ppts when adjusting for already present health differences (Models 3 and 4). Even when considering only the subset of individuals with no history of mental health problems (Model 5), the risk of reporting mental problems around the time of the interview is 14.1 ppts higher for the group that experienced payment difficulties during the year of the interview. The increase is substantial: it corresponds to a 67.8% increase from the baseline rate (20.8%). Due to the formulation of the survey questions, we cannot rule out that the payment difficulties arose just around the time of the interview, that is, within the period as the self-reported mental problems.

The next rows of the table present the associations between recent payment difficulties and future consumption of psychopharmaceutical substances. As these variables are measured the year after the interview, we are certain that the payment difficulties occur before the mental problems. As seen from Model 1 in the second row, individuals with payment difficulties have a 4.9 ppts

Table 3 Associations between future mental health problems and earlier payment difficulties

Dependent variable	1	2	3	4	5	N without/with covariates
Anxiety (t)	0.252*** (0.000)	0.197*** (0.000)	0.166*** (0.000)	0.160*** (0.000)	0.141*** (0.000)	10 950/10 765
Psychopharmaca (t + 1)	0.049*** (0.000)	0.064*** (0.000)	-0.000 (0.985)	-0.013 (0.145)	0.003 (0.733)	10 988/10 801
Antidepressants (t + 1)	0.072*** (0.000)	0.062*** (0.000)	0.020** (0.032)	0.012 (0.161)	0.000 (0.991)	10 988/10 801
Anxiolytics (t + 1)	0.025*** (0.002)	0.031*** (0.000)	0.010 (0.204)	0.007 (0.368)	0.004 (0.601)	10 988/10 801
Hypnotics (t + 1)	0.007 (0.442)	0.030*** (0.001)	-0.005 (0.567)	-0.011 (0.190)	0.010 (0.244)	10 988/10 801
Background char.	No	Yes	Yes	Yes	Yes	
Health at t - 1	No	No	Yes	Yes	Yes	
Health at t	No	No	No	Yes	Yes	
Interaction with health at t - 1	No	No	No	No	Yes	

Simple (unadjusted) and multivariate (adjusted) OLS regression analyses.

Exact *P*-values in parentheses. The covariate types in Models 2–5 are listed in table 1. Interaction with health at *t* - 1 indicates that we consider the interaction effect between previous health status and payment difficulties. The estimate in Model 5 captures the association between payment difficulties and later mental problems for individuals with no previous health problems.

*: *P* < 0.1.

** : *P* < 0.05.

***: *P* < 0.01.

Table 4 Associations between future payment difficulties and earlier mental health problems

Independent variable	1	2	3	4	N without/with covariates
Psychopharmaca (t - 1)	0.052*** (0.000)	0.065*** (0.000)	0.050*** (0.000)	0.043*** (0.000)	10 988/10 801
Antidepressants (t - 1)	0.108*** (0.000)	0.097*** (0.000)	0.078*** (0.000)	0.074*** (0.000)	10 988/10 801
Anxiolytics (t - 1)	0.078*** (0.000)	0.074*** (0.000)	0.059*** (0.000)	0.057*** (0.001)	10 988/10 801
Hypnotics (t - 1)	0.008 (0.472)	0.038*** (0.000)	0.025** (0.021)	0.020* (0.055)	10 988/10 801
Background char.	No	Yes	Yes	Yes	
Health at t - 1	No	No	Yes	Yes	
Interaction with earlier welfare	No	No	No	Yes	

Simple (unadjusted) and multivariate (adjusted) OLS regression analyses.

Exact *P*-values in parentheses. The covariate types in Models 2–5 are listed in table 1. Interaction with earlier welfare indicates that we consider the interaction effect between previous mental problems and a dummy for having received social welfare benefit in any of the 5 years before the interview. Model 4 shows the associations between previous mental problems and later payment difficulties for individuals with no history of social welfare benefits in any of the last 5 years.

*: *P* < 0.1.

** : *P* < 0.05.

***: *P* < 0.01.

higher risk of overall 'psychopharmaca' use, but, adjusting for the individual history of mental problems, the significant association disappears (Models 3–5). In sharp contrast to the results for the self-reported anxiety measure, individuals with payment difficulties do not seem to increase their use of psychopharmaceutical substances. This conclusion holds also when considering antidepressants, anxiolytics and hypnotics separately.

Do mental health problems precede payment difficulties?

Next, we analyse how earlier mental problems relate to future payment difficulties. To ensure that the mental problems are measured before the payment difficulty status, we only consider objective information about psychopharmaceutical substances and do not analyse self-reported anxiety. In table 4, Model 1 refers to a specification without any covariates, Model 2 adjusts the estimates for systematic differences in background characteristics and Model 3 also adjusts for other kinds of health problems (measured by

hospitalization due to mental problems during any of the nine years before, and the uptake of sickness or disability benefits). In our most elaborate empirical specification (Model 4), we interact the mental health variables with the dummy for social welfare benefit uptake; here, the table presents the association between earlier mental problems and future payment difficulties for people with no history of social welfare benefits (β_1 in the interaction specification).

Table 4 gives a uniform message: the risk of running into payment difficulties is higher for individuals that have previously suffered from mental problems, no matter if these problems relate to depression, anxiety or sleeping problems. Furthermore, Model 4 suggests that the association persists even when we only examine the subgroup that had no previous experience of economic scarcity, at least to the extent that uptake of social welfare benefit reflects scarcity. Thus, people seem to run a higher risk of encountering payment difficulties following mental problems, even if their economic situation was manageable to begin with.

To illustrate the magnitudes of the estimated effects, the risk of experiencing payment difficulties is 36.4% higher for individuals who have used any of the substances than the baseline risk of 11.8% (table 4, Model 4). Comparing the estimates for the individual substances in Model 4, we see that the association with the payment difficulty risk is the strongest for antidepressants and the weakest for hypnotics. When comparing the 36.4% risk increase with the estimates in the previous section, it seems as objectively measured mental problems are important for future payment difficulties, while a person's history of payment difficulties says less about his or her risk for future consumption of psychopharmaceutical drugs.

The variance inflation factors of the independent variables in tables 3 and 4 range between 2.669 and 5.466. Standard errors of the variable of interest (payment difficulties in table 3, mental health variables in table 4) are also very similar in models including and excluding covariates. Thus, multicollinearity does not seem to be a problem in our models.

Discussion

We use longitudinal data from survey and multiple administrative registers to examine the relationship between payment difficulties and mental health in both directions using both subjective and objective mental health measures. Like previous studies, we find a strong and significant association between payment difficulties and self-reported anxiety. In contrast, we find a much weaker association between payment difficulties and future consumption of psychopharmaceuticals; rather, we find more support for a relationship between earlier psychopharmaceutical consumption and future payment difficulties. Although our results are consistent with the hypothesis that mental problems induce payment difficulties, we stress that our observational study captures correlations, not causation. For instance, people with anxious personalities may be more likely to recall and/or report that they have experienced payment difficulties. Moreover, we can only control for past mental health problems reflected in healthcare or drug use, meaning that one should be cautious against interpreting the association between payment difficulties and self-reported anxiety as causal. Further, the interaction specification in our analysis of future payment difficulties may not fully account for earlier experiences of scarcity, as one may have small margins without seeking social welfare. We control for other factors related to payment difficulties (such as uptake of other social insurance benefits), but we cannot rule out that people with recent mental problems did not simultaneously experience more scarcity. Notably, similar limitations apply to most empirical studies of the debt and health relationship.

Using objective mental health measures, our analyses add to previous research based on self-reported health measures. Our analyses illustrate that the distinction between objective and subjective measures is of importance. The main drawback of subjective measures is that they may pick up mental problems that are relatively mild and may not warrant policymakers' attention. On the other hand, a drawback of using psychopharmaceutical consumption as a measure of mental health is that it fails to capture individuals with severe mental problems who abstain from seeking treatment. In this regard, it is noteworthy that in the Swedish context, physician visits and prescribed drugs are subsidized and that the maximum annual individual copayments are EUR100 and EUR200, respectively. Also, individuals with insufficient income and no assets may apply for social welfare benefit to cover healthcare and drug expenses. Thus, we do not believe that payment difficulties stop individuals from accessing psychopharmaceuticals.

A limitation of our analysis is that the measure of 'payment difficulties' does not discriminate between long term, severe difficulties and short-term difficulties. As it is reasonable to

assume that transitory scarcity generally has negligible effects on mental health, we may underestimate the association with future mental health for people with very severe payment difficulties. Another limitation is that we only have a single subjective measure of mental health. Recognizing the measurement problems of subjective measures, we note that a more complete picture may require a larger set of subjective measures. Notwithstanding these limitations, the measures at hand allow us to illustrate the contrast between subjective and objective health measures.

To address the issue of payment difficulties and mental health, policymakers ought to consider whether the primary target group is individuals with severe mental problems or the larger group of individuals with mild anxiety. For the former group, our results suggest that policy interventions improving mental health should be of highest priority. For the second group, our findings do not indicate whether interventions to relieve payment difficulties or mental ill health should be given priority.

Supplementary data

Supplementary data are available at *EURPUB* online.

Funding

The authors gratefully acknowledge funding from the Jan Wallander and Tom Hedelius Foundation [P2017-0081: 1]. U.-G.G. is grateful for financial support from the Swedish Research Council (2014-646). The Health Economics Unit at Lund University also receives core funding from Government Grant for Clinical Research (ALF F 2014/354) and Region Skåne (U.-G.G.).

Conflicts of interest: None declared.

Key points

- We find a strong association between payment difficulties and mental health problems, using self-reported measures of health.
- We find much weaker associations between payment difficulties and later mental problems, using register data on psychopharmaceutical consumption to measure health.
- For the objective health measures, we find stronger associations between previous mental health problems and later payment difficulties.
- Self-reported and objective measures of mental problems may convey different messages regarding the impact of payment difficulties on mental health.

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