



How financial strain affects health: Evidence from the Dutch National Bank Household Survey



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ABSTRACT

The mechanisms by which financial strain affects health are not well understood. In this paper, we conduct a longitudinal mediation analysis of the Dutch National Bank Household Survey. To quantify the relative importance of biological and nonbiological pathways from financial strain to health, we consider smoking, heavy drinking and being overweight as plausible behavioural responses to financial strain but find that only 4.9% of the response of self-reported health to financial strain is mediated by these behaviours. Further analysis indicates that although financial strain increases impulsivity this has little effect on unhealthy behaviours. Economic stresses therefore appear to be distinct from other forms of stress in the relatively minor influence of nonbiological pathways to ill-health.

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1. Introduction

After the 2008 recession and subsequent sovereign debt crisis, almost half of Europeans stated that unemployment was the most important issue facing their country and, in 2013, 41% said they had difficulties paying bills at least some of the time (Eurobarometer, 2015). Financial worries not only negatively affect mental health but also worsen self-reported health, worsen health satisfaction and increase physical impairment and the recent financial crisis has been associated with a decline in health status at national level.

In this paper, we conduct a longitudinal mediation analysis of the Dutch National Bank Household Survey to better understand the causal pathways from financial strain to poor health. We first test for the degree to which the effects of financial strain on health are mediated through changes in health behaviours as opposed to direct effects on biological processes. We then analyse the links between financial strain, present-biases and changes in health behaviours in order to understand the lack of behavioural response to strain in our data given the extensive literature indicating the significance of this pathway.

Stress has been implicated as a risk factor in cardiovascular disease (Richardson et al., 2012), the progression of HIV/AIDS (Remor et al., 2007), wound healing response (Broadbent et al.,

2012), upper respiratory infections (Pedersen et al., 2010) and autoimmune diseases (Porcelli et al., 2016). Stress may directly interfere with the regulation of immune and inflammatory processes. Release of cortisol and catecholamines in response to stressful events can interfere with control of physiological processes such as anti-inflammatory responses; metabolism of carbohydrates, fats and proteins and gluconeogenesis as well as the regulation of cardiovascular, pulmonary, hepatic, skeletal muscle and immune systems resulting in increased disease risk (Cohen et al., 2007).

Stress is also associated with unhealthy behaviours such as snacking, smoking, drinking and substance use (Gerber and Pühse, 2009). Changes in time preferences could plausibly mediate this pathway as individuals become more present-biased when stressed (Haushofer et al., 2015) and higher rates of intertemporal discounting are associated with cigarette smoking (Adams, 2009), frequent alcohol consumption (MacKillop and Kahler, 2009), illicit drug use (Coffey et al., 2003), lack of physical exercise (Leonard et al., 2013) and health outcomes such as obesity (Ikeda et al., 2016) and mortality (Boyle et al., 2013).

Although these studies have made the association between financial difficulties and both biological and non-biological pathways to illness no study to date has quantified the relative importance of each of these pathways. This is critical for identifying interventions to mitigate the health consequences of economic downturns as well as austerity programmes. Also, this literature has indicated that both impulsivity and stress are risk factors for negative health behaviours but there has been little work on

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understanding the causal mechanism from stress to time discounting to worse health-related behaviour especially for economic stresses. This study aims to fill these gaps by testing for the degree to which the effects of financial strain on health are mediated through changes in health behaviours and then analysing the links between financial strain, present-biases and changes in health behaviours in order to better understand the behavioural response to financial strain. We use the Dutch National Bank Household Survey (DNB) which provides us with a large nationally-representative sample of over 40000 observations over a twenty-year period covering the years before and after the financial crisis.

This paper makes the following original contributions. First, we estimate the degree to which the response of health to financial strain is mediated by changes in health behaviours. Although many studies examine the behavioural sequelae of financial strain none quantify the relative importance of this pathway for health. We consider smoking, heavy drinking and being overweight as plausible behavioural responses to financial strain but find that only 4.9% of the response of self-reported health to financial strain is mediated by these behaviours. Second, we then examine the pathway from financial strain to changes in health behaviours to understand the lack of behavioural response. The DNB dataset is unique in that it collects individual time preference data annually permitting the analysis of variation in time preferences in response to fluctuating levels of financial strain. Using a number of different time preference measures, we find evidence that financial strain causes greater impulsivity but this does not lead to worse health behaviours. In this regard, economic stresses appear to be distinct from other forms of stress. Our third contribution is that we address methodological concerns in the literature linking stress and illness. Many studies do not clearly establish evidence for a causal relationship from stress to health (Berkman et al., 2014). Using longitudinal data in our study, we test for a temporal ordering that indicates causation from stress to health in our structural model. To avoid concerns about unmeasured confounders driving the relationship between financial strain and ill-health, we use prior levels of the dependent variable in models of all the key variables (Cole and Maxwell, 2003).

The paper is structured as follows. Section 2 details the data and statistical methods. Section 3 presents the results. In Section 4, we discuss our findings with reference to the literature and implications for policymakers.

2. Methods

In this paper, we use the Dutch National Bank Household survey which contains a large number of questions about the respondent's financial situation, financial attitudes and health and these questions are generally consistent over a long period of time. A measure of financial strain is constructed using two questions on the household's financial situation. A number of variables used elsewhere in the literature provide us with measures of time preferences. The health measures cover self-reported health, height and weight measurements as well as indicators of health behaviours including smoking and alcohol consumption. An extensive set of household characteristics allow us to control for many social and demographic factors. The longitudinal survey design allows us to test for mediation effects using the temporal ordering of the variables to account for potential reverse causation. Allowing for multiple mediators, we consider the causal relationship from financial strain to health and also the causal relationship from financial strain to changes in health behaviours. These relationships are then estimated over a twenty-year period. The literature on the health consequences of stress would indicate that economic stressors should also impact negatively on health and this effect

will be mediated through both nonbiological pathways captured by health behaviours and biological pathways indicated by the non-mediated direct effects. For the mediation analysis of the causal relationship between financial strain and health behaviours, the literature reviewed above would indicate a strong effect largely mediated by changes in time preferences.

The following sections describe the data source, variables used, variables constructed and the statistical methods used in the analysis.

2.1. Data

DNB is a panel survey that has been active since 1993. The survey, collected by CentER (Tilburg University, the Netherlands) gathers information annually from approximately 2000 households in separate questionnaires on general information, household and work, accommodation and mortgages, health and income, assets and liabilities and economic and psychological concepts. The survey is unique in that it contains repeated measures of time preferences in a nationally-representative sample. The household characteristics of participants are stored in a database while the household remains part of the panel and therefore this information is largely complete for all respondents. This study uses all waves of data from years 1996–2015 as data relevant to our models were particularly sparse in the earliest years of the survey.

The analysis of causal pathways requires repeated measures for individuals and, hence, individuals who did not participate in three consecutive waves of the survey were excluded from the dataset (34945 observations) leaving a dataset of 43858 observations for individuals in participating households aged 16 or over.

2.2. Measurement

2.2.1. Health measures

Our smoking variable is constructed from responses to the question 'Do you smoke cigarettes at all?' A response of 'no' was coded as zero in our variable, 'yes, every now and then' and 'yes, every day' were coded one. Responses to the question 'On average, do you have more than four alcoholic drinks a day?' provide a dichotomous indicator of heavy drinking (Popova et al., 2007). Body mass index was calculated from self-reported responses to questions on height and weight. Respondents with a BMI of over 25 kg/m² were considered overweight. Our main measure of health is self-assessed health, which is derived from the question 'In general, would you say your health is?' Answers are given according to a five-point ordinal response scale with categories '5-poor', '4-not so good', '3-fair', '2-good' and '1-excellent'. Self-assessed health has been proven to have value in predicting objective health outcomes, morbidity and mortality (Idler and Benyamini, 1997; Franks et al., 2003). Although, self-reported health assessments are principally assessments of the respondent's physical functioning they are also influenced by negative affective states but to a much lesser degree (Mavaddat et al., 2011). A binary variable was created which was one for those reporting their general health as 'excellent' or 'good' and zero otherwise.

2.2.2. Time preferences

In the economics literature, time preferences are conventionally represented by time discounting rates derived from experimental elicitation procedures ideally involving real monetary incentives (Frederick et al., 2002). In the absence of such time discounting data over the duration of the period of interest, we used measures of time horizons, preference for spending over saving, difficulty controlling expenditure and future orientation as proxy measures of time preferences. We expect that financial strain increases time

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