

Published in final edited form as:

Soc Sci Med. 2013 August ; 91: 94–100. doi:10.1016/j.socscimed.2013.05.009.

The High Price of Debt: Household financial debt and its impact on mental and physical health

Elizabeth Sweet^a, Arijit Nandi^b, Emma Adam^{c,d}, and Thomas McDade^{d,e}

Elizabeth Sweet: e-sweet@northwestern.edu; Arijit Nandi: arijit.nandi@mcgill.ca; Emma Adam: ekadam@northwestern.edu; Thomas McDade: tmcdade@northwestern.edu

^aNorthwestern University Feinberg School of Medicine, Department of Medical Social Sciences, Abbott Hall, 710 N. Lake Shore Drive, Suite 729, Chicago, IL 60611, tel: 312-503- 0352

^bMcGill University, Institute for Health and Social Policy, Meredith Charles House, 1130 Pine Ave West, Montreal, Quebec, H3A 1A3

^cNorthwestern University, School of Education and Social Policy, Annenberg Hall Room 108, 2120 Campus Drive, Evanston, IL 60208

^dNorthwestern University, Cells to Society (C2S): The Center on Social Disparities and Health, at the Institute for Policy Research, 2040 Sheridan Road, Evanston, IL 60208

^eNorthwestern University, Department of Anthropology, 1810 Hinman Ave, Evanston, IL 60208

Abstract

Household financial debt in America has risen dramatically in recent years. While there is evidence that debt is associated with adverse psychological health, its relationship with other health outcomes is relatively unknown. We investigate the associations of multiple indices of financial debt with psychological and general health outcomes among 8400 young adult respondents from the National Longitudinal Study of Adolescent Health (Add Health). Our findings show that reporting high financial debt relative to available assets is associated with higher perceived stress and depression, worse selfreported general health, and higher diastolic blood pressure. These associations remain significant when controlling for prior socioeconomic status, psychological and physical health, and other demographic factors. The results suggest that debt is an important socioeconomic determinant of health that should be explored further in social epidemiology research.

Keywords

Financial debt; socioeconomic status; social determinants of health

It is difficult to miss the growing impact of financial debt in the everyday lives of Americans. Since the 1980s overall debt in American households has tripled (Harvey, 2010). Between 1989 and 2006, total consumer credit card debt rose from \$211 billion to \$876 billion (2006 dollars), and the proportion of indebted households carrying over \$10,000 in credit card debt rose from 3% to 27% (Garcia, 2007). Home foreclosures have also

© 2013 Elsevier Ltd. All rights reserved.

Correspondence to: Elizabeth Sweet, e-sweet@northwestern.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

skyrocketed; recent foreclosure rates are nearly 5 times higher than at any other time since 1979 (Gruenstein Brocian et al., 2010). And, widely publicized in March of 2012, Americans' student loan debt recently surpassed \$1 trillion (Mitchell & Jackson-Randall, 2012). Concomitant with these rises in debt, credit industry deregulation, including key legislative decisions in 1978 and 1996, have led to widespread increases in loan fees and interest rates and a relaxation of loan granting conditions (Garcia, 2007). The resulting "democratization" of credit availability has meant that segments of the American population previously excluded from many forms of credit now have more equal opportunities to accumulate debt. In short, financial debt has become a fixture of the American household economy.

Despite the growing significance of indebtedness in the economic lives of Americans, financial debt is largely neglected in research on social and economic determinants of health. This is surprising since debt is clearly an increasingly important category of socioeconomic experience. The link between socioeconomic status (SES) and health has long been recognized (Adler et al., 1994; Adler & Stewart, 2010), but so too have the inadequacies of standard SES indices – income, education, and occupation – to fully capture the meaning of socioeconomic experience (Adler, 2009; Braveman et al., 2005; Shavers, 2007; Sweet, 2011). Other factors are important constituents of socioeconomic position, such as wealth, assets, symbolic capital and, notably, debt, but these are rarely considered in health research (Adler, 2009; Sweet, 2011). Drentea and Reynolds (2012) recently made a call for greater attention to household debt in work on the social determinants of health. Here we echo that sentiment and offer evidence that debt is indeed an important predictor of health outcomes.

To date, existing research on the health consequences of debt has focused largely on psychological health. Historical and ethnographic research has characterized the severe social stigma and psychological burden associated with being indebted (Dossey, 2007; Dudley, 2000; Graeber, 2011; Williams, 2005, 2008). And indeed several empirical studies have found that financial strains such as personal debt and home foreclosures are strong predictors of depression, general psychological distress, mental disorders, and suicidal ideation and behavior (Bridges & Disney, 2010; Brown et al., 2005; Drentea & Reynolds, 2012; Jenkins et al., 2008; McLaughlin et al., 2011; Meltzer et al., 2011; Pollack & Lynch, 2009; Reading & Reynolds, 2001; Selenko & Batinic, 2011). These findings highlight the psychological potency of being indebted and, as others have noted, have implications for other health consequences of debt (Dossey, 2007; Drentea & Lavrakas, 2000).

Psychosocial factors, including stress and its mental health correlates like depression and anxiety, are thought to be key mechanisms through which SES "gets under the skin" to impact health and health disparities, and a substantial body of work has now investigated this pathway (reviewed in: (Matthews & Gallo, 2011)). The experience of stress is known to lead to short- and long-term physiological changes that play key roles in several disease processes, particularly those involving metabolic and cardiovascular systems (McEwen, 2004). Stress can also impact health indirectly by influencing health behaviors, including diet, physical activity, and substance use (McEwen & Seeman, 1999). Therefore, considering the ample evidence that debt has psychological consequences, it is possible that it could also impact other health outcomes through psychosocial pathways.

Remarkably few studies, however, have explicitly examined financial debt in relation to health. Drentea and Lavrakas (2000), in an Ohio-based study of credit card debt, stress, and health, found debt-to-income ratio and debt-related stress to be associated with worse self-reported health and physical functioning. Subsequent studies have explored debt only indirectly, finding that debt-related financial stress is associated with worse self-reported

health (Kim et al., 2003; O'Neill et al., 2006), and that clients of credit counseling services have higher odds of being overweight or obese than the general population (Munster et al., 2009). Clearly, more work is needed to confirm and better understand the relation of financial debt to health, including clarifying the measures of debt that matter for health and well-being and investigating their impact on a broader array of health outcomes.

Moreover there is a need to more fully account for prior conditions and experiences that may complicate the association of debt with health. Drentea and Lavrakas (2000) have suggested that debt “may be a more sensitive barometer of financial well-being than income” because it represents accumulated hardships over time. While this observation reinforces the likely importance of debt as a socioeconomic indicator, it also points to the potential confounding that arises from longitudinal accumulation of debt. Personal financial debt may result from acute life events, such as job loss, divorce, or medical emergencies, which may themselves be psychosocial stressors or health determinants. Accounting for prior psychosocial, socioeconomic and health conditions is therefore critical for understanding the relationship between financial debt and health.

In this paper we aim to bring greater attention to debt as a social determinant of health by exploring its association with both psychological and general health outcomes. Specifically, we explore the relationship of personal financial debt with health outcomes in young adults (aged 24 – 32 years) in the National Longitudinal Study of Adolescent Health (Add Health). This nationally representative cohort study has followed participants for over 15 years and is thus an excellent data source for examining the association of debt with health while accounting for prior conditions and events. Further, the Add Health study contains data on multiple indices of debt, including subject-reported absolute levels of household debt as well as perceptions of debts relative to assets. We therefore explore the association of multiple measures of debt with health outcomes in order to isolate dimensions of debt that matter most for health. Furthermore, we explore the association of debt with multiple measures of health: to establish consistency with prior findings, we examine two outcomes related to psychological health – perceived stress and depressive symptoms; we also expand our investigation to test the impact of debt on three additional health outcomes – self-reported general health, systolic and diastolic blood pressure. By exploring basic health impacts of financial debt, we aim to establish a baseline from which future research can further investigate this relatively neglected socioeconomic health determinant.

Methods

Study Design and Sample

Add Health is a nationally representative cohort study with four waves of in-home interviews conducted since its initiation in school year 1994/1995. At Wave I, approximately 20,000 adolescents in grades 7 – 12 participated in in-home interviews. A clustered sampling design was utilized, in which an 80-school sample was selected that was nationally representative in terms of ethnicity, urbanicity, school size, type, and US region. Within these schools, students were randomly chosen within grade and sex strata. Some sub-groups of students were over-sampled, including African American adolescents from higher-educated families. Wave II was conducted one year after Wave I. While 15,000 of the original respondents were re-interviewed at Wave II, those who had graduated were not included. Wave III data collection took place in 2002/2003 and included 15,170 of the original respondents plus 1,507 partners of those respondents. The most recent wave of data collection (Wave IV) took place in 2007/2008 when the cohort was 24 – 32 years old, and included 15,701 of the original respondents.

In all waves in-home interview data was collected via computer-assisted personal interview/computer-assisted self-interview (CAPI/CASI). Interview questions covered participant demographic and socioeconomic conditions, as well as psychological and general health, health services use, behavior, and extensive social relationship information. In Wave IV measures of blood pressure and other cardiovascular and metabolic biomarkers were introduced, as were questions about household and personal financial debt.

In this paper we restrict our analyses to data from Waves I, III, and IV. All key independent (debt) and dependent variables (health outcomes) are from Wave IV. Data on sociodemographic, psychosocial, and general health from Waves I and III which could influence both debt and health status at Wave IV are also included in analyses as control variables. Since Wave II was conducted only one year after Wave I and excluded all graduating seniors, we do not use data from that wave. All original Wave I respondents were eligible to participate at Wave IV, and therefore the most recent wave of data collection includes some respondents who did not participate in Wave III. Our analytic sample is thus smaller than the full Wave IV sample since it includes only those respondents who participated in each of the three waves of data that we are using (Waves I, III, and IV) and who are not missing sampling weight information (n=9421). Further, we exclude respondents with missing data on key independent and dependent variables (described below). Our final analytic sample includes 8400 respondents.

Debt

Personal financial debt was measured at Wave IV in two ways. First, a subjective assessment of net status asked respondents to “suppose you and others in your household were to sell all of your major possessions (including your home), turn all of your investments and other assets into cash, and pay off all of your debts. Would you have something left over, break even, or be in debt?” We dichotomized this variable to represent those who said that they would still be in debt after liquidating all assets (i.e. had high subjective debt-to-asset ratio, or relative debt) versus those who would not still be in debt. Second, respondents were asked to “Think about all your debts besides any mortgage on your home. How much do you and others in your household owe altogether? Include all debts, including all types of loans, credit card debt, medical or legal bills, etc.” Response categories ranged from “less than \$1000” to “\$250,000 or more”. To ease interpretation responses were transformed to reflect the midpoint of each category and rescaled to tens of thousands of dollars. In addition to these two measures, total household assets (excluding home equity) were reported in dollars. The ratio of reported absolute debts (in dollars) to assets was computed and used as an additional independent variable in analyses.

Perceived Stress

Perceived stress was measured at Wave IV with four items from the Cohen Perceived Stress Scale (Cohen et al., 1983). The questions measure respondents’ feelings of stress and lack of control over the preceding month. Summed scores across the four questions range from 0 to 16.

Depressive Symptoms

Symptoms of depression were measured at all waves using questions from the Center for Epidemiologic Studies Depression (CES-D) Scale (Radloff, 1977). The number of CES-D questions administered at each wave of data collection varied; at Wave I a 19-item version was used, at Wave III a 9-item version, and at Wave IV a 5-item version was administered. All questions assess symptoms of depression experienced during the preceding week. For each wave responses were reverse coded as appropriate and summed to create a total depressive symptoms score.

General Health

General health was assessed at all waves using a single self-report question in which participants rated their health on a five-point scale. Response options ranged from “excellent” (1) to “poor” (5). Higher scores on this scale thus indicate worse general health.

Blood Pressure

Systolic and diastolic blood pressure was measured at Wave IV using a Microlife BP3MC1-PC-IB oscillometric blood pressure monitor. Respondent arm circumference was measured prior to blood pressure readings to ensure that appropriate cuff sizes were used with the monitor. Respondents rested in a seated position for five minutes, after which field interviewers administered three consecutive systolic and diastolic readings at 30-second intervals. The average of the second and third of these readings was used to construct systolic and diastolic blood pressure variables (Entzel et al., 2009).

Wave I Psychological, Health, and Socio-demographic Variables

Participants reported socio-demographic information as well as general and psychological health problems and risk factors at Wave I (during adolescence) that could influence both health and debt status later in life (at Wave IV). Health conditions and risk factors measured at Wave I include: regular smoking (at least one cigarette per day for 30 days), presence of major physical limitations (difficulty using hands, arms, legs, or feet because of a permanent physical condition), physical activity (a summary measure of how often they reported engaging in various activities, such as bicycling, dancing, and playing sports, in the previous week), self-reported general health (described above), depressive symptoms (measured by the CES-D, described above), and dietary quality (how often they ate fruits, vegetables, and sweets during the day prior to the Wave I interview). Participants also reported their race (white, black, Asian, Native American, or Other) and Hispanic ethnicity, as well as whether or not they had a physical medical exam in the preceding year. Self-reported height and weight were used to calculate participant body mass index (BMI, kg/m²) at Wave I. In addition to information reported by participants themselves, parents of participants reported their highest educational attainment (coded as less than high school, high school, some college, college degree, and post-college).

Wave III Psychological, Health, and Socio-demographic Variables

At Wave III participants again reported health and demographic information that could be associated with future health and economic status, including: number of hospitalizations in the preceding 5 years, whether they smoke regularly, depressive symptoms, general health status, number of diseases ever diagnosed with, exercise in the previous week, whether they had a physical medical exam in the past year, the number of months in the past year they had health insurance, and whether they had skipped medical care when they needed it for any reason in the past year. Self-reported height and weight were again used to calculate BMI. Participants also reported their highest level of education, their household income (in dollars), and whether they owned or were buying a home.

Wave IV Socio-demographic Variables

Wave IV annual household income was reported in dollars (less than \$5000 through \$150,000 or more) and re-scaled to reflect thousands of dollars. Other self-reported variables include highest level of education attained, age in years, sex, the number of adults and children living in the household, whether they had ever been married, whether they smoke regularly, their level of regular physical activity, the number of months in the past year they had health insurance, whether they had lost a job in the previous 5 years, and whether they own their home.

Analysis

Descriptive statistics, including means, standard errors, ranges and percentages were calculated for key independent (Wave IV subjective relative debt, absolute debt, and calculated debt-to-asset ratio) and dependent (Wave IV perceived stress, depressive symptoms, general health, SBP and DBP) variables as well as Wave IV socio-demographic factors (age, race/ethnicity, sex, household income, assets, education, health insurance, and home ownership). Relationships among independent variables were assessed using Pearson's coefficients of pairwise correlations.

For each dependent variable, a series of ordinary least squares (OLS) multiple regression models were run. Model 1 tests the unadjusted association of each debt variable with each dependent variable. In Model 2 all Wave I and Wave III socio-economic, psychological, and health factors (general health, depressive symptoms, medical exams, health insurance, skipped medical care, disease diagnoses, hospitalizations, exercise, smoking, diet, BMI, income, education, parental education, home ownership, and race/ethnicity) that could influence the association between debt and health at Wave IV are added. In Model 3 all concurrent Wave IV socioeconomic and demographic factors (number of people in the household, education, income, smoking, physical activity, marital status, health insurance, job loss, and home ownership) that could confound the association of debt with health are added (for calculated debt-to-asset ratio models, the main effects of Wave IV household debts and assets are omitted). All descriptive statistics and analyses were conducted using STATA 11.0 (StataCorp., 2009) and weighted using appropriate sampling weights to account for the complex sample design, selection, and nonresponse.

Results

Table 1 presents descriptive statistics for the key Wave IV predictors, health outcomes, and socio-demographic variables. This young adult sample (average age just under 28 years) was 47% male and 70% non-Hispanic white. Respondents' mean household income was reported at just over \$62,000 and mean assets were \$85,500. Mean non-mortgage household debts were just under \$30,000, and the mean calculated ratio of household debts to assets was 2.5. Just over 20% of respondents reported that they would still be in debt if they liquidated all of their assets (i.e. have high subjective relative debt).

Correlations among independent variables and other relevant Wave IV socioeconomic indicators are summarized in Table 2. All debt-related and socioeconomic variables are significantly correlated, with the strongest correlation between household income and assets ($r=0.423$). Of note, absolute household debt is positively correlated with other socioeconomic indicators, such that those with higher household incomes and assets also have higher household debt. Also, subjective debt-to-asset ratio and calculated debt-to-asset ratio are significantly but not highly correlated ($r=0.338$).

Table 3 presents results from OLS regressions of total household debts, calculated debt-to-asset ratio, and subjective debt-to-asset ratio on health outcomes. Total household debt is an inconsistent predictor of outcomes across the three models. In unadjusted models (Model 1), higher total debt is not significantly associated with any outcome, except for better self-reported general health. With the addition of Wave I and Wave III control variables, associations between household debt and several health outcomes change direction, and with the addition of other Wave IV socioeconomic variables total household debt becomes a significant predictor of higher perceived stress and depressive symptoms, and worse self-reported general health.

In unadjusted models (Model 1), a higher calculated ratio of household debts compared to assets is associated with higher perceived stress and depressive symptoms and worse general health, but is not associated with either systolic or diastolic blood pressure. With the addition of Wave I, Wave III, and Wave IV control variables (Models 2 and 3), associations with perceived stress, depression and general health remain significant.

Reporting high subjective debt-to-asset ratio (still being in debt after liquidating all assets) is associated with significantly higher perceived stress and depressive symptoms and worse self-reported general health in unadjusted models (Model 1). Additionally, while not associated with SBP, high subjective debt-to-asset ratio is associated with significantly higher DBP in unadjusted models. All significant Model 1 associations remain significant after adjustment for Wave I and III socioeconomic, psychological and health factors (Model 2) and after further adjustment for Wave IV demographic and socioeconomic factors (Model 3).

Discussion

Our results show that, among young adults in the nationally representative Add Health Study, household debt is a significant independent predictor of health outcomes. This finding is an important contribution to research on socioeconomic disparities in health, since household debt is rapidly rising in this country and studies exploring its general health impact are scarce. However, our findings also suggest that how debt is operationalized matters for its association with health; this speaks to its social patterning as well as its complex nature as both a positive and negative socioeconomic attribute.

While debt can be thought of as a negative socioeconomic attribute, in the Add Health dataset absolute household debt is positively correlated with other SES variables, such as income and assets. This is not surprising when considering the possible ways in which credit can function as a status attainment vehicle as well as how credit access is structured in this country. To obtain most types of loans, recipients must typically demonstrate ability to meet loan terms; credit scores, which are increasingly criticized as representing ambiguous and possibly biased calculations of credit worthiness, are now used to determine eligibility for almost every type of credit, from home mortgages to credit cards and even hospital billing plans (Fremstad & Traub, 2011). In short, some level of capital is typically necessary to accumulate large amounts of debt, and thus debt would be expected to correlate with other aspects of SES. Furthermore, particularly in this young adult sample, debt may be a vehicle for accumulating other forms of socioeconomic status. For instance, high absolute levels of debt may reflect student loans or other education-related debts, which while high represent a beneficial personal socioeconomic investment. Or high debt could reflect consumer spending that enhances symbolic capital and is thus an investment in social prestige and status (Sweet, 2011).

In light of the potential of debt to reflect higher SES, it is perhaps not surprising that absolute debt was associated with better self-reported general health in unadjusted models. When other socioeconomic variables were included in the models, however, absolute debt emerged a significant independent predictor of higher perceived stress and depression and worse general health. This suggests that absolute debt alone, particularly absent information about how that debt is constituted, is an unreliable socioeconomic determinant of health. It also suggests that debt has the most utility as a health predictor when considered in relation to the broader household financial context.

We considered the broader financial context in this study by exploring debt in relation to another household socioeconomic attribute – assets – with the expectation that debt will be

most problematic when it exceeds other household resources. Indeed we found that high relative debt (debt-to-asset ratio), whether subjectively assessed or calculated based on reported debt and asset values, was associated with higher perceived stress and depression and worse self-reported general health, even when accounting for life-course health and economic conditions and other indices of current socioeconomic position. The magnitude of the effect of high relative debt in adjusted models was substantial; on average, individuals with a high compared to low subjective relative debt reported 0.55 higher symptoms of perceived stress in adjusted models (representing an 11.7% increase relative to the mean) and 0.33 higher depressive symptoms (a 13.2% increase relative to the mean).

However, with respect to blood pressure, the operationalization of the independent variable mattered. While calculated debt-to-asset ratio was not associated with blood pressure, higher subjective relative debt was significantly associated with higher diastolic blood pressure in both unadjusted and adjusted models (a 1.3% increase in DBP relative to the mean in fully adjusted models). While this effect is relatively small, it is clinically significant; a 2 mmHg increase in DBP, for instance, is associated with 17% higher risk of hypertension and 15% higher risk of stroke (Cook et al., 1995). These findings indicate that high relative debt is associated with worse psychological and general health, but that with respect to blood pressure the psychological feeling of being indebted may be more salient than actual financial standing. We should note however, that our measure of subjective relative debt does not capture individual psychological perceptions, such as attitudes towards debt and feelings of indebtedness and financial strain, which may be important to the way in which debt impacts health. Future research should aim to better tease apart the effect of having debt from the perception of being in debt and its associated emotional responses.

Limitations of the data could also influence interpretation of the findings. In theory our subjective and calculated debt-to-asset variables are indexing the same underlying condition, however these variables were only 34% correlated. This could be for several reasons. First, subjective assessment of one's financial situation may not accurately reflect the objective situation. Second, reporting of absolute amounts of household debts and/or assets may be inaccurate. Third, respondents were asked to exclude both mortgage debt and home equity from reported absolute debt and asset amounts, but to include home equity in their subjective assessment of their net status. Property-related debts and assets likely play a large role in the financial situations of many households, and thus the modest correlation between subjective and calculated debt-to-asset ratios and their differential associations with some health outcomes could be due to this discrepancy in question phrasing. Our current data does not allow us to disentangle these possibilities, but future work should aim to clarify these issues.

Furthermore, the Add Health cohort we examined is relatively young (aged 24 – 32 years), and life course position has important implications for debt. Our young sample, for instance, may not yet have accumulated enough of a debt burden to allow us to see the full impact of debt on health. Or, conversely, large levels of debt in young adults may be less meaningful for health than among older adults. The permanent income hypothesis (Friedman, 1957) and related life-cycle theory of consumption (Modigliani & Brumberg, 1954) suggest that consumption decisions that may lead to debt are based on anticipated long-term household economic prospects more than immediate realities (i.e. the practice of 'consumption smoothing' over the life course). Under this hypothesis, instances of high debt, even relative to assets, in this young adult sample may not truly index financial strain. The permanent income hypothesis, however, has been poorly supported by evidence and criticized for oversimplifying the complex realities and social contexts of household consumption decisions (Alvarez-Cuadrado & Long, 2011; Palley, 2010; Wisman, 2009). Furthermore, we found relative debt to be predictive of health outcomes even after adjusting for early life

SES, which can be seen as a proxy for life course socioeconomic expectations. This speaks to the apparent psychological potency of debt despite rational economic justifications. This does not, however, diminish the need for future research to address the issue of life course status and the position of debt within broader socioeconomic trajectories.

Along similar lines, while we explored three different indices of debt in this paper, additional work is needed to elaborate and understand the impacts of diverse dimensions of debt on health. Prior studies have focused separately on credit card debt, home foreclosures, debt-related stress, and participation in credit counseling (Drentea & Lavrakas, 2000; McLaughlin et al., 2011; Munster et al., 2009; O'Neill et al., 2006), but the comparative effects of these different dimensions with respect to health outcomes are unknown. Furthermore different types of debt may have different material, psychological and social meanings, and may occur in different contexts. Payday loans, for instance, have been singled out as particularly socially stigmatized. These short-term, revolving high-interest loans are more common in lower income and minority neighborhoods, where mainstream banking facilities have been replaced with non-traditional lending outlets (Barr, 2004; Logan & Weller, 2009; Williams, 2008). Payday loans are generally considered highly predatory and have been described as symbols of “a devalued place occupied by devalued people” (Williams, 2005). Thus, while the relative size of payday or other short-term loans may be small compared to a home mortgage or student loan, their psychosocial impact could be much greater. It will be important for future research to account for these potential differences in types of debt as well as the different sociocultural, political-economic, and even national contexts in which they occur. While our discussion and analyses are specific to the United States, debt is a global phenomenon. The ways in which debt is differentially structured and experienced in other regions and countries (Alfaro & Gallardo, 2012; Aniola & Golas, 2012) and its consequent impact on health should also be examined.

Finally, future work should aim to specify the mechanisms through which debt impacts health. Considering the established evidence of the psychological impact of debt, mechanisms involving physiological and behavioral consequences of chronic stress are likely candidates. Dysregulation of basal cortisol rhythms, elevations in blood pressure and inflammatory markers, and metabolic alterations associated with health behaviors are all linked with chronic stress exposure and are important indicators of disease susceptibility (McEwen, 1998, 2003). Identifying the relationship of debt to these biomarkers would shed valuable light on the pathways through which debt becomes embodied. Furthermore, being in debt or perceiving oneself to be indebted may limit access to health resources or impact health decision-making. Indeed, one third of indebted households have been found to regularly forego medical care in efforts to reduce family expenses (Garcia & Draut, 2009), and two-thirds of individuals with medical debt have reported changing their medical care seeking behavior as a result of their debt (O'Toole et al., 2004). Clearly, this is another pathway through which debt can influence health and should be explored to fully understand debt's impact.

In this paper we have provided evidence that, in addition to known associations with psychological health, financial debt is associated with worse self-reported physical health and blood pressure. In testing multiple indices of debt, we found high household debts relative to assets to be the most consistent and robust predictor of health outcomes. We also found that a high subjective assessment of indebtedness was the strongest predictor of blood pressure, suggesting that psychological dimensions of debt may be particularly salient when it comes to cardiovascular health. Importantly, we used longitudinal data to control for prior health related and socio-demographic factors that could influence the relationship of debt with health. Much additional work is needed, though, to better elucidate the mechanisms

through which debt may impact health and to operationalize the types of debt that matter most for health.

Acknowledgments

This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (<http://www.cpc.unc.edu/addhealth>). No direct support was received from grant P01-HD31921 for this analysis. Support for the analyses presented in this paper was provided by grant # 1R01 HD053731-01 (McDade) from the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

References

- Adler NE. Health Disparities Through a Psychological Lens. *American Psychologist*. 2009;663–673. [PubMed: 19899862]
- Adler NE, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, et al. Socioeconomic status and health. The challenge of the gradient. *Am Psychol*. 1994; 49:15–24. [PubMed: 8122813]
- Adler NE, Stewart J. Health disparities across the lifespan: meaning, methods, and mechanisms. *Ann N Y Acad Sci*. 2010; 1186:5–23. [PubMed: 20201865]
- Alfaro R, Gallardo N. The Determinants of Household Debt Default. *Revista de Analisis Economico*. 2012; 27:55–70.
- Alvarez-Cuadrado F, Long NV. The relative income hypothesis. *Journal of Economic Dynamics and Control*. 2011; 35:1489–1501.
- Aniola P, Golas Z. Differences in the Level and Structure of Household Indebtedness in the EU Countries. *Contemporary Economics*. 2012; 6:46–59.
- Barr MS. Banking the Poor. *Yale Journal on Regulation*. 2004; 21:123–128.
- Braveman PA, Cubbin C, Egerter S, Chideya S, Marchi KS, Metzler M, et al. Socioeconomic status in health research: one size does not fit all. *JAMA*. 2005; 294:2879–2888. [PubMed: 16352796]
- Bridges S, Disney R. Debt and depression. *J Health Econ*. 2010; 29:388–403. [PubMed: 20338649]
- Brown S, Taylor K, Price SW. Debt and distress: Evaluating the psychological cost of credit. *Journal of Economic Psychology*. 2005; 26:642–663.
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983; 24:385–396. [PubMed: 6668417]
- Cook NR, Cohen J, Hebert PR, Taylor JO, Hennekens CH. Implications of small reductions in diastolic blood pressure for primary prevention. *Arch Intern Med*. 1995; 155:701–709. [PubMed: 7695458]
- Dossey L. Debt and health. *Explore (NY)*. 2007; 3:83–90. [PubMed: 17362842]
- Drentea P, Lavrakas PJ. Over the limit: the association among health, race and debt. *Soc Sci Med*. 2000; 50:517–529. [PubMed: 10641804]
- Drentea P, Reynolds JR. Neither a Borrower Nor a Lender Be: The Relative Importance of Debt and SES for Mental Health Among Older Adults. *J Aging Health*. 2012; 24:673–695. [PubMed: 22330730]
- Dudley, KM. *Debt and Dispossession: Farm Loss in America's Heartland*. Chicago: University of Chicago Press; 2000.
- Entzel, P.; Whitsel, EA.; Richardson, A.; Tabor, J.; Hallquist, S.; Hussey, J., et al. *Add Health Wave IV Documentation: Cardiovascular and Anthropometric Measures*. Chapel Hill, NC: Carolina Population Center; 2009.
- Fremstad, S.; Traub, A. *Discrediting America: The Urgent Need to Reform the Nation's Credit Reporting Industry*. New York, NY: Demos; 2011.
- Friedman, M. *A Theory of the Consumption Function*. Princeton: Princeton University Press; 1957.

- Garcia, J. *Borrowing to Make Ends Meet: The Rapid Growth of Credit Card Debt in America*. New York: Demos; 2007.
- Garcia, J.; Draut, T. *The Plastic Safety Net: How households are coping in a fragile economy*. New York: Demos; 2009.
- Graeber, D. *Debt: The First 5,000 Years*. New York: Melville House; 2011.
- Gruenstein Brocian, D.; Wei, L.; Ernst, KS. *Foreclosures by Race and Ethnicity: The Demographics of a Crisis*. Washington, D.C: Center for Responsible Lending; 2010.
- Harvey, D. *The Enigma of Capital and the Crisis this Time*. American Sociological Association Annual Meeting; Atlanta. 2010.
- Jenkins R, Bhugra D, Bebbington P, Brugha T, Farrell M, Coid J, et al. Debt, income and mental disorder in the general population. *Psychol Med*. 2008; 38:1485–1493. [PubMed: 18184442]
- Kim J, Garman ET, Sorhaindo B. Relationships Among Credit Counseling Clients' Financial Well-Being, Financial Behaviors, Financial Stress Events, and Health. *Financial Counseling and Planning*. 2003; 14:75–87.
- Logan, A.; Weller, CE. *Who Borrows from Payday Lenders? And analysis of newly available data*. Center for American Progress; 2009.
- Matthews KA, Gallo LC. Psychological perspectives on pathways linking socioeconomic status and physical health. *Annu Rev Psychol*. 2011; 62:501–530. [PubMed: 20636127]
- McEwen BS. Stress, adaptation, and disease. Allostasis and allostatic load. *Ann N Y Acad Sci*. 1998; 840:33–44. [PubMed: 9629234]
- McEwen BS. Interacting mediators of allostasis and allostatic load: towards an understanding of resilience in aging. *Metabolism*. 2003; 52:10–16. [PubMed: 14577057]
- McEwen BS. Protection and damage from acute and chronic stress: allostasis and allostatic overload and relevance to the pathophysiology of psychiatric disorders. *Ann N Y Acad Sci*. 2004; 1032:1–7. [PubMed: 15677391]
- McEwen BS, Seeman T. Protective and damaging effects of mediators of stress. Elaborating and testing the concepts of allostasis and allostatic load. *Ann N Y Acad Sci*. 1999; 896:30–47. [PubMed: 10681886]
- McLaughlin KA, Nandi A, Keyes KM, Uddin M, Aiello AE, Galea S, et al. Home foreclosure and risk of psychiatric morbidity during the recent financial crisis. *Psychol Med*. 2011:1–8.
- Meltzer H, Bebbington P, Brugha T, Jenkins R, McManus S, Dennis MS. Personal debt and suicidal ideation. *Psychol Med*. 2011; 41:771–778. [PubMed: 20550757]
- Mitchell J, Jackson-Randall M. Student Loan Debt Tops \$1 Trillion. *Wall Street Journal*. 2012
- Modigliani, F.; Brumberg, R. Utility analysis and the consumption function: an interpretation of cross-sectional data. In: Kurihara, KK., editor. *Post Keynesian Economics*. New Brunswick: Rutgers University Press; 1954.
- Munster E, Ruger H, Ochsmann E, Letzel S, Toschke AM. Over-indebtedness as a marker of socioeconomic status and its association with obesity: a cross-sectional study. *BMC Public Health*. 2009; 9:286. [PubMed: 19664214]
- O'Neill B, Prawitz AD, Sorhaindo B, Kim J, Garman ET. Financial Distress/Financial Well-Being for Debt Management Program Clients. *Financial Counseling and Planning*. 2006; 17:46–62.
- O'Toole TP, Arbelaez JJ, Lawrence RS. Medical debt and aggressive debt restitution practices: predatory billing among the urban poor. *J Gen Intern Med*. 2004; 19:772–778. [PubMed: 15209592]
- Palley TI. The Relative Permanent Income Theory of Consumption: A Synthetic Keynes-Duesenberry-Friedman Model. *Review of Political Economy*. 2010; 22:41–56.
- Pollack CE, Lynch J. Health status of people undergoing foreclosure in the Philadelphia region. *Am J Public Health*. 2009; 99:1833–1839. [PubMed: 19696373]
- Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1:385–401.
- Reading R, Reynolds S. Debt, social disadvantage and maternal depression. *Soc Sci Med*. 2001; 53:441–453. [PubMed: 11459395]

- Selenko E, Batinic B. Beyond debt. A moderator analysis of the relationship between perceived financial strain and mental health. *Soc Sci Med*. 2011; 73:1725–1732. [PubMed: 22019305]
- Shavers VL. Measurement of socioeconomic status in health disparities research. *J Natl Med Assoc*. 2007; 99:1013–1023. [PubMed: 17913111]
- StataCorp. Stata Statistical Software: Release 11. College Station, TX: StataCorp. LP; 2009.
- Sweet E. Symbolic capital, consumption, and health inequality. *Am J Public Health*. 2011; 101:260–264. [PubMed: 21164087]
- Williams, B. *Debt for Sale: A Social History of the Credit Trap*. Philadelphia: University of Pennsylvania Press; 2005.
- Williams, B. The Precipice of Debt. In: Collins, J.; di Leonardo, M.; Williams, B., editors. *New Landscapes of Inequality: Neoliberalism and the Erosion of Democracy in America*. Santa Fe: School for Advanced Research Press; 2008.
- Wisman JD. Household Saving, Class Identity, and Conspicuous Consumption. *Journal of Economic Issues*. 2009; 43:89–114.

Research Highlights

- US household financial debt has increased dramatically in recent years.
- The impact of financial debt on health is relatively under-explored.
- We find higher debt is associated with worse health in a national cohort.
- Debt should be further explored as a determinant of health and disparities.

Table 1

Sample Characteristics

Variable	Mean (s.e.) or %	Range
<i>High Subjective Relative Debt</i>	20.5%	
<i>Household Debts (\$ thousands)</i>	29.9 (0.77)	0.5 – 250
<i>Calculated Debt-to-asset Ratio</i>	2.5 (0.12)	0.0005 – 100
<i>Perceived Stress</i>	4.7 (0.05)	0 – 16
<i>Depressive Symptoms</i>	2.5 (0.04)	0 – 15
<i>General Health</i>	2.3 (0.02)	1 – 5
<i>Systolic Blood Pressure (mmHg)</i>	124.6 (0.22)	74 – 215
<i>Diastolic Blood Pressure (mmHg)</i>	79.0 (0.16)	30 – 147
<i>Age</i>	27.9 (0.11)	24 – 33
<i>Male</i>	47.6%	
<i>NH White</i>	70.1%	
<i>NH Black</i>	13.3%	
<i>NH Other</i>	5.0%	
<i>Hispanic</i>	11.6%	
<i>Household Income (thousands \$)</i>	62.2 (1.03)	2.5 – 150
<i>Household Assets (thousands \$)</i>	85.5 (3.2)	2.5 – 1000
<i>Education</i>	14.2 (0.08)	6 – 20
<i>Health insurance (months)</i>	9.2 (0.09)	0 – 12
<i>Own Home</i>	41.1%	
<i>N</i>	8400	

Table 2

Correlations among Wave IV socioeconomic variables

Correlations	Debts	Assets	Income	Education	Calc. Debt-Asset Ratio
<i>Household Debts</i>					
<i>Household Assets</i>	0.167**				
<i>Household Income</i>	0.203**	0.423**			
<i>Education (years)</i>	0.241**	0.116**	0.303**		
<i>Calculated Debt-to-Asset Ratio</i>	0.422**	-0.159**	-0.114**	0.087**	
<i>Subjective Relative Debt</i>	0.242**	-0.197**	-0.196**	0.039**	0.338**

Table 3

Unstandardized beta coefficients and (95% confidence intervals) for the association of debt with health outcomes

	Model 1	Model 2	Model 3
Total Household Debts			
<i>Perceived Stress</i>	-0.01 (-0.03, 0.01)	0.01 (-0.00, 0.03)	0.02 (0.01, 0.04)**
<i>Depressive Symptoms</i>	-0.00 (-0.02, 0.01)	0.01 (0.00, 0.03)*	0.02 (0.01, 0.04)**
<i>General Health</i>	-0.01 (-0.01, -0.00)**	0.00 (-0.00, 0.01)	0.01 (0.00, 0.01)*
<i>SBP</i>	-0.05 (-0.13, 0.02)	-0.01 (-0.08, 0.06)	-0.01 (-0.09, 0.06)
<i>DBP</i>	0.00 (-0.06, 0.06)	0.03 (-0.03, 0.10)	0.04 (-0.02, 0.11)
Calculated Debt-to-Asset Ratio			
<i>Perceived Stress</i>	0.03 (0.02, 0.05)**	0.02 (0.01, 0.03)**	0.02 (0.00, 0.03)**
<i>Depressive Symptoms</i>	0.02 (0.01, 0.04)**	0.01 (0.00, 0.03)*	0.01 (0.00, 0.02)*
<i>General Health</i>	0.01 (0.00, 0.01)**	0.00 (0.00, 0.01)*	0.00 (0.00, 0.01)*
<i>SBP</i>	-0.04 (-0.10, 0.00)	-0.01 (-0.06, 0.03)	-0.01 (-0.06, 0.03)
<i>DBP</i>	0.01 (-0.02, 0.04)	0.02 (-0.01, 0.05)	0.02 (-0.01, 0.05)
Subjective Relative Debt			
<i>Perceived Stress</i>	1.15 (0.92, 1.38)**	0.83 (0.64, 1.03)**	0.55 (0.34, 0.77)**
<i>Depressive Symptoms</i>	0.72 (0.50, 0.94)**	0.42 (0.23, 0.62)**	0.33 (0.15, 0.53)**
<i>General Health</i>	0.24 (0.17, 0.31)**	0.13 (0.08, 0.19)**	0.10 (0.04, 0.16)**
<i>SBP</i>	0.84 (-0.16, 1.85)	0.83 (-0.13, 1.79)	0.71 (-0.32, 1.75)
<i>DBP</i>	1.21 (0.41, 2.01)**	1.15 (0.33, 1.98)**	1.01 (0.13, 1.91)*

Model 1: unadjusted association between debt and health outcomes

Model 2: Model 1 + all Wave I and Wave III confounders

Model 3: Model 2 + concurrent Wave IV socio-demographic factors