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# Debt and Foregone Medical Care

**Lucie Kalousova[1] and Sarah A. Burgard[1]**

## Abstract

Most American households carry debt, yet we have little understanding of how debt influences health behavior, especially health care seeking. We examined associations between foregone medical care and debt using a population-based sample of 914 southeastern Michigan residents surveyed in the wake of the late-2000s recession. Overall debt and ratios of debt to income and debt to assets were positively associated with foregoing medical or dental care in the past 12 months, even after adjusting for the poorer socioeconomic and health characteristics of those foregoing care and for respondents' household incomes and net worth. These overall associations were driven largely by credit card and medical debt, while housing debt and automobile and student loans were not associated with foregoing care. These results suggest that debt is an understudied aspect of health stratification.

## Keywords

credit card, debt, foregone care, medical debt, SES, stratification

Since the 1950s, the amount of debt held by U.S. households has risen from negligible levels to approximately $13 trillion (Federal Reserve Bank of St. Louis 2012). The Survey of Consumer Finances reports that 77 percent of Americans held some type of debt in 2007 (Bucks et al. 2009). Taking on debt has become a critical part of how many individuals achieve valued social statuses, such as becoming a homeowner or a college graduate, as well as how they may obtain material goods and services, including health care, when the costs exceed their immediate financial resources. Debt is a fundamental part of financial lives in the United States, but we have only a very limited understanding of what debt means for well-being.

While debts that are beyond a debtor's means to repay are always problematic, acquiring debts that are perceived as investments for the future, for example, educational loans, is less socially sanctioned and even encouraged. These "good debts" may have relatively low interest rates and are expected to be paid back over long periods of time. Paradoxically, acquisition of this preferred type of debt is closely linked to having other assets, a history of financial prudency, or financially stable collateral. On the other end of the debt spectrum are the so-called bad debts, for example, credit card debt. These "bad debts" have higher interest rates, and falling behind scheduled payments brings more rapid financial penalties and legal ramifications. The slogan "Everybody qualifies" has become synonymous with poor-quality loans because unlike good debts, such bad debts have lower barriers to access and can provide quick help at a time when an individual or a family need funds immediately, but they may become a long-term burden. Debts are therefore financial products that are heterogeneous in their implications and consequences. Debt portfolios of Americans are socially stratified and can perpetuate inequality between

[1]University of Michigan, Ann Arbor, MI, USA

**Corresponding Author:**
Lucie Kalousova, Department of Sociology, University of Michigan, 500 South State Street, Ann Arbor, MI 48103, USA.
E-mail: luciekal@umich.edu

those who have access to good debt versus those who may take on unmanageable bad debt (Sullivan, Warren, and Westbrook 2000).

In this article, we assess whether holding various types and amounts of debt may influence access to medical care. Scholars have long observed disparities in health and health behaviors by socioeconomic position, but a new wave of research has called for attention to a broader array of socioeconomic indicators than income and education (Braveman et al. 2005; Conley 1999; Duncan et al. 2002; Herd, Goesling, and House 2007; Schnittker 2004). Other material resources, such as wealth, may enable access to care even net of income. For example, people who own stocks can choose to liquefy these in times of financial need. However, findings for a relationship between wealth and health have been mixed. Several studies suggest that wealth disparities at least partially explain racial disparities in health (Schoenbaum and Waidmann 1997; Wenzlow, Mullahy, and Wolfe 2004); others claim that the evidence for such mechanisms is not sufficiently strong to be conclusive (Ostrove, Feldman, and Adler 1999; Rodriguez et al. 1999). Some scholars have argued that higher assets are positively associated with better mental health net of income (Muntaner et al. 1998), while others have found no evidence for such relationship (Kahn and Fazio 2005). In this article, we consider wealth as an important part of individuals' financial portfolios but focus on how it and other resources, like income, are constrained by debt, an aspect of financial portfolios that has been examined by only a handful of sociologists of health (Drentea 2000; Drentea and Reynolds 2012; Ross and Huber 1985).

A few sociological studies have shown that debt is associated with poorer health and harmful health behaviors, even net of some other measures of socioeconomic status. Drentea and Lavrakas (2000) demonstrated links between credit card debt and risky health behaviors, such as smoking or excessive alcohol consumption. Other studies have documented strong associations between carrying any debt or worrying about holding debt and poor mental health outcomes, such as anxiety, anger, or depression (Drentea and Reynolds 2012; Reading and Reynolds 2001). Such studies have implicated the stress associated with carrying debt as the mechanism linking it to risky health behaviors or poorer mental health (Brown, Taylor, and Wheatley Price 2005; Chan et al. 2005; Drentea 2000). These prior studies have often focused on particular types of debt, such as credit card debt, but have not considered other common debts, such as mortgages, auto loans, or medical debt. Additionally, they have been unable to adjust for some of the financial resources that could be used to service debt, often lacking measures of wealth. Moreover, extant studies have focused on mental health and the stress of debt holding; we know little about how debt might affect other relevant outcomes or operate via other pathways.

In this article, we argue that debt may also be linked to health via another mechanism: material constraint. To do so, we turn to a health-relevant behavior, health care seeking, a more proximal outcome and one that could contribute to the health status or behavior differences other studies have linked to debt. We study foregone medical care, which surveys frequently define as not going to the doctor (or other health care provider) for cost reasons when the respondent felt that they needed to go. Prior studies of the predictors of foregone care have considered the role of income or health insurance status but have not considered debt. Indebtedness could increase the likelihood of foregoing care because it may constrain the use of financial resources, but the association could vary depending on the type of debt under consideration. Extant studies have suggested that unpaid credit card balances generate stress, so individuals may allocate resources to pay it back at the expense of other things they need. However, other forms of debt could signal positive financial standing, because the ability to take on some kinds of debt depends on credit worthiness and collateral. Many individuals with substantial debt due to a sizeable home mortgage loan are capable of servicing this kind of secured debt because they earn high incomes or have sufficient assets. Debts that simply reflect credit worthiness and are affordable given financial resources should not be associated with foregoing needed medical care.

These potentially varying meanings and motivations associated with debt mean that we must consider the magnitude of debt, how it stacks up against income and wealth, and potential variation across a range of different types of debt when we assess links with medical care access. In this study, we assess the links between debt and foregone medical care using new data collected in the wake of the late 2000s recession, an economically unstable time when many Americans were forced to rely on credit cards (Meier and Sprenger 2010) and spend down retirement savings to meet ordinary living expenses (Helman et al. 2009). These data are from the Michigan Recession and Recovery

Study (MRRS), a population-based survey of working-age adults living in the metropolitan Detroit area in late 2009. We examine information about the presence and magnitude of housing, auto loan, student loan, credit card, medical, and other kinds of debt and adjust estimates of links with foregone medical care for household income and net worth (assets minus debts). This study adds further support to emerging arguments for the importance of considering debt when assessing the links between social position and health by extending the focus to health care access and highlighting the constraints posed by credit card and medical debt.

## BACKGROUND

### *Prior Studies of Material Resources and Foregone Medical Care*

According to the U.S. Centers for Disease Control (CDC 2010), in 2010, approximately 11 percent of working-age Americans decided to forego a doctor's visit they knew they needed because of cost. The figure was approximately three times higher among adults with no health insurance (31 percent) and reached 61 percent among adults with a disability but no health insurance coverage (CDC 2010). Understanding these high levels of foregone care is important because not attending to urgent medical needs leads to worse health outcomes (for examples, see Osterberg and Blaschke 2005), and those who forego care thus face greater total financial burdens in the future (Epstein et al. Robin 2005; Kane and Shaya 2008). Missed medical care also imposes costs on society at large by increasing rates of emergency room admissions and hospitalizations (Dimatteo et al. 2002; Epstein et al. 2005). However, while there seems to be a link between affordability and foregoing needed medical care in the United States, we still have a relatively limited sociological understanding of how individuals navigate the decision in light of their overall financial situation.

Prior studies have shown that those foregoing medical or dental care have lower incomes (Mielck et al. 2009; Wallace and MacEntee 2012) or are more likely to fall below the poverty line (May and Cunningham 2004). Foregoing care for cost is a persistent problem even in countries operating health care systems with strong emphasis on equity. For example, findings from a Swedish study suggest that those who perceived their financial situation as poor were more likely to forego care (Elofsson, Undén, and Krakau 1998). Other studies have focused on the role of health insurance and types of health insurance coverage in predicting foregone care. Factors consistently associated with foregone care are gaps in coverage (Callahan and Cooper 2007) and high deductibles that covered individuals cannot afford (Kullgren et al. 2010). Although income and health insurance coverage characteristics are clearly important factors, debt may also influence the decision to forego needed care.

### *Debt and Foregone Medical Care*

Studies of health care access typically operationalize financial resources by measuring income, which can be used directly to purchase health care and pursue healthy lifestyles. In recent years, researchers have begun to recognize the potential harm of ignoring other aspects of resource portfolios, such as wealth, when trying to understand the social causation of health (Braveman et al. 2005; Drentea and Reynolds 2012). Nonetheless, only a handful of researchers have considered how debt might add to our understanding of the range of socioeconomic resources and obligations that could affect health and health care seeking. They have argued that debt could be added to a broader conceptualization of the fundamental causes of health because it can constrain ability to maintain health (Drentea and Reynolds 2012). It is also important to consider that debt is socially stratified differently than other social determinants, like income: people with the same level of income could carry very different levels of debt, and debt may not increase linearly with income. Moreover, different kinds of debt could be associated with health care access in a variety of distinctive ways.

It seems reasonable to expect that debt could lead some individuals to forego medical care, but there are two related caveats to consider. First, simply having debt does not indicate that finances are limited—debt becomes problematic when it exceeds the holder's ability to service it and causes difficult spending choices. Second, different types of debt are likely to influence the decision to forego care to different degrees. For example, credit card debt could signal financial troubles and could harm health because of the stress of holding the debt and the demands of creditors. Paying off that debt may pose substantial constraints on spending, and it may represent unplanned and unwanted debt for some. However, individuals from across the income spectrum use credit cards,

and higher-income individuals may not often have to choose between needed medical care and making monthly payments. By contrast, secured debts, like home mortgage loans, have traditionally indicated credit worthiness. When an individual's income or assets make this normative form of debt affordable, it should not be associated with foregone care or could even have an independent and negative association if it acts as an asset that can be drawn upon, such as with a home equity loan. Planned debts like these may not weigh on individuals as heavily when they are considering what expenses they can afford, such as a visit to the doctor when they are feeling ill or desire preventive care.

Finally, medical debt may represent a special type when considering the links between debt and health care utilization. Medical debt, more than other kinds of debt, is likely to be related to health problems in the household and a greater need for medical care. It could constrain spending when it exceeds a holder's ability to repay, as do other kinds of debt, but may be particularly unplanned, unwanted debt that accumulates quickly because of the high costs of health care in the United States, particularly for those who are uninsured or underinsured. On the other hand, people could incur medical debt voluntarily to access medical care, particularly, elective medical or dental care. New "medical credit cards" have appeared on the credit card market and are intended specifically for medical expenses but in many cases are subject to the same fees and penalties as conventional credit cards (Zeldin and Rukavina 2007). Some recent studies have focused on the correlates and consequences of medical debt and medical debt-related bankruptcy and how these may shape health-relevant behaviors. Their results typically suggest that having medical debt is correlated with foregoing physician visits, putting off needed care, and not filling prescription medications (Doty, Edwards, and Holmgren 2005; Tu 2004).

### *The Current Study*

Because of differences in individuals' ability to afford the debt they take on, and because of the different meanings and underlying factors associated with different kinds of debt, there is likely to be heterogeneity in whether debt will restrict health care access. However, measurement of debt in prior studies of health has often been limited, in some cases to measures of credit card debt only (Drentea 2000; Nelson et al. 2008) or to a dichotomous indicator of debtor status (Drentea and Reynolds 2012), although there are examples of studies using debt to predict other health and nonhealth outcomes that use more comprehensive debt indicators (Brown, Taylor, and Wheatley Price 2005; Dwyer, McCloud, and Hodson 2011). No other studies have to our knowledge examined varying types of debts and health care seeking. In addition, failure to control for wealth or net worth (assets minus debts) in most prior studies may have disguised heterogeneity in ability to service these different types of debt.

In the present study, we address these limitations. We expect that incorporating adjustment for income, net worth, health, and health insurance coverage will condition the association with foregone care and may do so differently for different types of debt. We focus on foregone medical care occurring in the past 12 months to reduce the possibility that reverse causation explains associations we find with debt, and we assume that most debts were incurred and began to accumulate more than a year before the interview. We examine two research questions. First, is the total amount of debt, the ratio of debt to income, or the ratio of debt to assets associated with foregoing medical care? Do these associations change after adjustment for income and net worth? And second, are there specific types of debt that put people at greater risk of foregoing medical care than others? Do these associations with different types of debt change after we adjust for income and net worth?

## DATA AND METHOD

### *Data*

We use data from the MRRS. The MRRS was designed to follow a stratified random sample of English-speaking adults ages 19 to 64 who lived in southeastern Michigan (Macomb, Oakland, and Wayne counties) at the time of the initial data collection in late 2009 and early 2010. Data were collected by in-person survey interviews.

Administration of the survey interview took approximately 60 minutes, and respondents were paid between $50 and $120 for their participation. A total of 914 respondents were interviewed, with a survey response rate of 82.8 percent. The MRRS data collection was based on complex stratified sampling, during which African Americans were intentionally oversampled. It includes mainly African American and non-Hispanic white respondents, reflecting the residential composition of the area. Survey weights were applied during analysis to account for oversampling. These weights were designed to adjust the value of each observation to reflect the age, educational, and racial composition of residents of the three-county area based on the 2009 American Community Survey data. More information on the study design is available elsewhere (Burgard, Seefeldt, and Zelner 2012).

## Measures

*Foregone medical care.* We assessed whether respondents had not seen a health care provider because of cost in the past 12 months (22.6 percent) with an item that asked, "Was there any time in the past 12 months that you needed to see a doctor or dentist but could not afford to go?" This is a combination of two questions that are regularly used in the National Health Interview Survey: "During the last 12 months, was there any time when you/anyone in the family needed medical care, but did not get it because you/the family couldn't afford it?" and "In the past 12 months, was there time when you/anyone in the family needed dental care (including check-ups), but did not get it because you/the family couldn't afford it?"

*Debt, asset, net worth, and income measures.* All respondents were asked about multiple specific types of debt—a mortgage or home equity line of credit (here referred to collectively as housing debt), student loans, car loans, outstanding credit card balances, medical debt, and other debt—and how much of each type was held. Respondents were told to consider themselves and anyone for whom they were financially responsible at the outset of this section of the survey, and the question was phrased for each type of debt as, for example, "Do you have any student loans?" If they answered in the affirmative, we inquired about the specific dollar amount by following up with, "About how much do you still owe on your student loans?" In the sample overall, 47.8 percent of respondents reported having any housing debt (conditional mean [the mean among those who reported any of this type of debt] = $141,349), 18.9 percent reported student loans (conditional mean = $24,535), 46.7 percent had car loans (conditional mean = $12,285), 61.2 percent were carrying a credit card balance (conditional mean = $8,541), 28.6 percent reported medical debt (conditional mean = $5,572), and 19.8 percent had some other type of debt (conditional mean = $13,376). While we cannot be completely certain what "other type of debt" meant for every respondent, the survey advised them that other debt could include legal bills or unpaid taxes.

We collected information about respondents' assets in the same manner as for debt. We included as assets primary residence, any cars, and checking, savings, and/or individual retirement accounts (IRA and 401K).[1] We asked respondents to estimate their total household income in 2008, the last full year before the interview for most respondents, from all sources before taxes. We used this information to construct the debt-to-asset ratio (DTA; described below). We also constructed a net worth variable by subtracting respondents' debts from their assets and used the net worth value as an independent variable (divided into quartiles and omitting the second and third quartiles as the reference category).[2] We adjust for household income as an independent predictor of forgone care (divided into quartiles and omitting the second and third quartiles as the reference category) and use income in the construction of a debt-to-income ratio (DTI; described below).

Using these data, we constructed two types of debt measures. First, we considered debt amounts, including debt overall, calculated as the sum of housing debts, student loans, car loans, credit card balance, medical debt, and other loans. We also considered most of these separately as amounts of specific types of debt. To mitigate the influence of outlier debt values, as is typically done for financial measures, like income and wealth, because they are highly skewed, we transform these debt amounts by taking their natural log. Because the natural log function is defined only for values

greater than zero, we add .001 to all values before log transformation to include also original zero values in our analysis.[3] We also present untransformed values in Table 1 for comparison. We present conditional means in Table 1 but retain all individuals in all multiple regression analysis, even those who reported a value of zero on a particular type of debt. The conditional mean of overall debt was $95,340. Second, we constructed ratio measures to account for availability of resources to service debts. We created the DTA (mean = 4.05, that is, approximately $4 of debt for every $1 in assets) and DTI (mean = 3.1, approximately $3 of debt for every $1 of household income) for all respondents by dividing total debt by the total value of income or assets. To construct these ratio measures for all respondents, including those who did not report any assets or income, we added a constant of $100 to the total value of every respondent's assets and household income in 2008 (the denominators of the ratios).[4] Like many financial measures, the distributions of these ratio measures are highly skewed. We used them after a natural log transformation.

*Health and health insurance measures.* In our analyses, we also examine health status because of its association with the need for medical care. For some individuals whose resources have been insufficient in the past, poor health could also have led to the accumulation of medical debt. To assess the association between health status and debt, we include an indicator of self-reported health, assessed with the typical item, "Would you say that your health in general is excellent, very good, good, fair, or poor?" We used this variable in its continuous form with *excellent* = 5 and *poor* = 1. Additionally, we include health insurance status of the respondents, considering every respondent who reports having no type of health insurance at the time of their interview to be uninsured (19.2 percent were uninsured). We address other possible categorizations of health insurance in the Sensitivity Analysis section.

*Other measures.* On the basis of prior evidence about the socially patterned nature of foregone care, we also adjust for the respondent's age in years, gender (male or not), race (African American or not African American), marital status (married or not), and educational attainment (bachelor's degree or more vs. less than bachelor's degree).

### Analytic Strategy

We first examined bivariate associations between foregone care and debt and all predictors. We also considered the bivariate associations between different measures of debt and household income. Then we estimated logistic regression models to examine associations between foregone care and overall debt measures, the presence of specific types of debt, or the amounts of specific types of debt, net of other predictors.

We performed all analyses reported here using multiply imputed data with survey weights and applied Stata/SE 12 -mi- estimation techniques that applied Rubin's combination rules to conduct analysis across the five imputed datasets (StataCorp 2011). We applied a sequential regression multiple imputation methodology as a solution to missingness in an entire data set. The technique is aimed at using all available information, and therefore preserving the covariance structure, to impute in a data file for any analysis rather than for a specific analysis (Raghunathan et al. 2001). With 10 percent of respondents failing to report values, checking-account value had the most missing data, and 8 percent of respondents did not know or refused to report their 2008 household income. Other specific asset and debt measures had lower levels of missing values.[5] The smallest number of observations in any model using the unimputed data set was 817. We found little discernible difference when we used the original data and deleted cases with missing values, so we present the results using imputed data here (analytic $N = 914$). The unimputed results are available from the authors.

## RESULTS

### Descriptive Results

Table 1 compares the characteristics of MRRS respondents who did not forego care with those who said they had foregone care in the past 12 months (22.6 percent). We present weighted

**Table 1**. Debt Characteristics of Michigan Recession and Recovery Study Respondents, Presented as Conditional Means and 95% Confidence Intervals (CI) or Percentages.

| Variable | Did Not Forego Care Past 12 Months | 95% CI | Foregone Care Past 12 Months | 95% CI | *p* |
|---|---|---|---|---|---|
| Any type of debt | 89.40% | | 94.21% | | |
| Mean of total debt | $106,666 | [85,602, 127,730] | $59,093 | [41,080, 77,106] | ** |
| Mean of ln total debt | 10.44 | [10.18, 10.70] | 9.37 | [8.81, 9.94] | ** |
| Any housing debt | 53.45% | | 28.35% | | *** |
| Mean of housing debt | $143,289 | [112,274, 174,304] | $128,818 | [94,803, 162,833] | |
| Mean ln of housing debt | 11.57 | [11.39, 11.76] | 11.53 | [11.25, 11.82] | |
| Any student loans | 22.48% | | 17.97% | | |
| Mean of student loans | $26,380 | [15,031, 37,730] | $19,482 | [13,858, 25,106] | |
| Mean ln of student loans | 9.35 | [9.06, 9.65] | 9.37 | [9.13, 9.61] | |
| Any car loans | 52.20% | | 27.80% | | *** |
| Mean of car loans | $12,276 | [10,824, 13,727] | $12,349 | [8,442, 16,255] | |
| Mean ln of car loans | 9.09 | [8.94, 9.23] | 9.09 | [8.69, 9.48] | |
| Any credit balance | 60.33% | | 64.11% | | |
| Mean of credit card balance | $8,604 | [5,855,11,353] | $8,418 | [6,468, 10,369] | |
| Mean ln of credit card balance | 8.01 | [7.73, 8.29] | 7.85 | [7.60, 8.10] | |
| Any medical debt | 20.06% | | 57.75% | | *** |
| Mean of medical debt | $2,783 | [1,803, 3,763] | $8,889 | [6,033, 11,745] | * |
| Mean ln of medical debt | 6.72 | [6.41, 7.04] | 7.95 | [7.57, 8.32] | *** |
| Any other debt | 16.92% | | 29.63% | | ** |
| Mean of other debt | $16,397 | [4,963, 27,830] | $7,470 | [4,593, 10,346] | |
| Mean ln of other debt | 8.47 | [7.96, 8.99] | 8.08 | [7.65, 8.52] | |
| Mean debt-to-asset ratio | 2.66 | [1.16, 4.05] | 8.81 | [4.46, 12.68] | |
| Mean ln debt-to-asset ratio | −1.44 | [−1.78, −1.22] | −.21 | [−.68, −.01] | *** |
| Mean debt-to-income ratio | 1.97 | [1.55, 2.39] | 7.04 | [.80, 13.27] | |
| Mean ln debt-to-income ratio | −.95 | [−1.32, −.58] | −.58 | [−.86, −.30] | |
| *n* | 651 | | 263 | | |

*Note:* Figures are all weighted and based on estimates obtained from five imputed data sets, $N = 914$ in each. *P* values obtained from logistic regression models for foregone care with each variable the sole predictor.
*$p < .05$. **$p < .01$. ***$p < .001$.

conditional means and 95 percent confidence intervals or percentages as appropriate.[5] We examined bivariate associations using logistic regression models with the outcome variable as foregoing care and each independent variable as the sole predictor and report *p* values for differences.

Table 1 shows that nearly all respondents reported some type of debt, but the two groups of respondents differ substantially in the amount of debt they hold and the components that make up their total debt. Those foregoing care appear to have less debt overall than their counterparts who have not foregone care ($59,093 vs. $106,666), and those foregoing care are less likely to have housing debt (28 vs. 53 percent). However, among those who do have housing debt, the average amounts do not vary. There are no differences in student loan prevalence or magnitude, but those foregoing care are less likely to have any car loans (28 vs. 52 percent). Among those who report auto loans, however, there are no significant differences in average amounts. We find little difference in the likelihood of carrying a credit card balance or the amount carried, but those forgoing care were much more likely to have medical debt (58 vs. 20 percent) and had carried more of it ($8,889 vs.

$2,783). Finally, those foregoing care were more likely to report other types of debts (30 vs. 17 percent), but among those with any other debts, the amounts did not vary.

Table 2 presents similar comparisons for financial resources and sociodemographic characteristics of respondents by foregone care status. Respondents foregoing care in the past 12 months had substantially lower average total net worth ($5,746 vs. $137,884) and household income ($29,407 vs. $71,046). We also find significant income differences when we compare respondents in the top and bottom income quartiles—even within these quartiles of the total distribution, those foregoing care tend to have lower values. We find a marginally statistically significant difference in net worth in the top quartile of the distribution but none in the bottom quartile. Combining measures of debt with income and net worth, we find that those foregoing care carry more debt in relation to their assets (Ln DTA = –.21 vs. –1.44) and their income (Ln DTI = –.58 vs. –.95), although the latter difference is only marginally significant (see Table 1). In addition to their relatively disadvantaged financial portfolios, Table 2 shows that respondents foregoing care recently also reported poorer self-rated health (2.9 vs. 3.7) and were more likely to be uninsured (37 percent vs. 14 percent). Those foregoing care were also more likely to be women and African American and less likely to be married or to have a bachelor's degree or more. They are slightly younger than their counterparts who have not foregone care (40 vs. 42), but this difference is only marginally significant.

## *Multiple Regression Results*

Table 3 presents logistic regression models predicting foregone care in the past 12 months on the basis of three measures of overall debt at the time of interview in 2009-2010: natural log of total debt (Models 1 and 2), natural log of DTA (Models 3 and 4), and natural log of DTI (Models 5 and 6). We adjust for age, marital status, gender, race, education, insurance, and self-reported health in the first of each pair of models and add household income and net worth in the second. Model fit statistics are reported at the bottom of each column. The results for Models 1 through 6 suggest that debt is positively associated with foregoing needed medical or dental visits for all three measures of overall debt. Table 3 also shows that being in the top quartile of income or net worth is associated with a lower likelihood of foregoing care, compared to being in the middle two quartiles. Being married and reporting better self-reported health are associated with significantly lower likelihood of foregoing care, while being uninsured is associated with higher likelihood and women are marginally more likely to have foregone care.

In Table 4, we decompose total debt into specific types and examine how associations with foregone care may vary. For Models 7 through 16 in Table 4, we show odds ratios (OR) with two levels of adjustment: first for sociodemographic characteristics in the top panel A and then additionally for income and net worth in the bottom panel B. The adjusted models include all covariates presented in Table 3, but since OR values for these predictors change so little from those presented in Table 3, we do not present them to conserve space. Table 4 demonstrates the sharp difference between credit card debt and medical debt when contrasted with mortgage debt, student loans, and car loans. In panels A and B, those with any unpaid credit card balance (OR = 1.83 and 1.89, respectively) and greater credit card debt in natural log values (OR = 1.04 and 1.05, respectively) are significantly more likely to have recently foregone care. Respondents with any medical debt have odds of foregoing care 3.3 times as great as those of respondents with no medical debt after all adjustments, and the odds also rise as the magnitude of medical debt rises (OR = 1.10 in panels A and B). Because housing debt, student loans, and car loans did not have any association with foregone care in multiple models, the results support our hypothesis that these types of debts are more likely to signal solvency and access to credit than to act as constraints on spending for medical care.

Because Table 4 showed much stronger associations between foregone care and credit card and medical debt than associations with other types that could compose total debt, we explored some additional analyses (not shown). We considered the overall DTA and DTI results from Table 3 again, this time first considering only housing, auto loan, and student loan debts when constructing the

**Table 2**. Sociodemographic and Financial Characteristics of Michigan Recession and Recovery Study Respondents, Presented as Means and 95% Confidence Intervals (CI) or Percentages.

| Variable | Did Not Forego Care Past 12 Months | 95% CI | Foregone Care Past 12 Months | 95% CI | *p* |
|---|---|---|---|---|---|
| Mean of net worth | $137,884 | [99,924, 175,845] | $5,746 | [–8,369, 19,861] | *** |
| Mean of net worth in the lowest quartile | –$59,749 | [–77,985, –41,512] | –$47,829 | [–62,892, –32,766] | |
| Mean of net worth in the top quartile | $328,554 | [110,961, 237,859] | $174,410 | [257,727, 399,381] | |
| Mean of household income 2008 | $71,046 | [62,948, 85,657] | $29,407 | [26,864, 41,176] | *** |
| Mean of household income 2008 in lowest quartile | $10,179 | [5,093, 15,266] | $8,170 | [6,662, 9,678] | *** |
| Mean of household income 2008 in the top quartile | $121,099 | [99,222, 142,977] | $92,084 | [62,609, 121,560] | *** |
| Age in years | 42.34 | [40.64, 44.04] | 39.86 | [37.72, 41.20] | |
| Married | 60.40% | | 28.76% | | *** |
| Female | 47.66% | | 63.44% | | * |
| African American | 22.00% | | 37.58% | | ** |
| Bachelor's degree or more | 31.11% | | 12.27% | | *** |
| Self-rated health (1 = *poor*; 5 = *excellent*) | 3.68 | [3.54, 3.82] | 2.93 | [2.72, 3.14] | *** |
| Uninsured (no health insurance) | 14.09% | | 36.77% | | *** |
| *n* | 651 | | 263 | | |

*Note:* Figures are all weighted and based on estimates obtained from five imputed data sets, $N = 914$ in each. *P* values obtained from logistic regression models for foregone care with each variable the sole predictor.
*$p < .05$. **$p < .01$. ***$p < .001$.

ratios and then considering only credit card and medical debt in separate DTA and DTI results. Findings were again clear: credit card and medical debt drive the associations between overall debt and overall debt ratios and foregone care. We found no associations when we included only car loans, housing debt, and student loans in the constructed ratios. These results are robust regardless of which set of debt ratios included "other" debts.

### *Sensitivity Analysis*

We examined how sensitive our models were to changes in measurement or model specification in several ways. We reestimated Models 1 through 6 using overall debt and debt relative to assets or income in their nonlogged form after removing a handful of extreme outliers. Extremely large values could be erroneous and in any case may exert disproportionately strong influence on the estimates (Anguelov and Tamborini 2009), especially in a relatively small sample, like the MRRS. We found that the positive associations reported between foregone care and total debt or DTI were still significant, while the DTA was no longer a statistically significant predictor. Furthermore, when we reestimated Models 7 through 16 using the total amounts of specific types of debt instead of logged values, our findings were unchanged from those presented: both credit card debt and medical debt remained significant predictors of foregone medical care, while other types were not significant predictors. We also reestimated all of our models using continuous versions of both net worth and income. We found that the coefficients for these measures were not significant in this form, pointing to nonlinear effects or to significant effect of the outliers, but the coefficients for the

**Table 3**. Odds Ratios and 95% Confidence Intervals from Logistic Regression Models of Foregone Medical Care, Using Various Measures of Overall Debt (see column heading).

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|---|---|---|---|---|---|---|
| Variable | Ln Total Debt | Ln Total Debt | Ln Debt-to-Asset Ratio | Ln Debt-to-Asset Ratio | Ln Debt-to-Income Ratio | Ln Debt-to-Income Ratio |
| Focal debt measure (see column heading) | 1.08** [1.02, 1.13] | 1.09** [1.03, 1.14] | 1.23*** [1.11, 1.36] | 1.20** [1.06, 1.35] | 1.17** [1.08, 1.28] | 1.22** [1.09, 1.36] |
| 2008 household income quartile[a] | | | | | | |
| Bottom Quartile | — | .99 [.66, 1.48] | — | .85 [.56, 1.30] | — | .74 [.44, 1.25] |
| Top Quartile | — | .38*** [.25, .58] | — | .40*** [.27, .59] | — | .32* [.14, .74] |
| Household net worth quartile[a] | | | | | | |
| Bottom Quartile | — | .93 [.55, 1.59] | — | .82 [.46, 1.47] | — | 1.55 [.90, 2.66] |
| Top Quartile | — | .21 [.10, 0.43] | — | .27** [.13, 0.56] | — | .38** [.21, .68] |
| Age (years) | .99† [.97, 1.00] | 1.00 [.98, 1.01] | .99 [.98, 1.01] | 1.00 [.99, 1.02] | .99† [.97, 1.00] | 1.00 [.99, 1.02] |
| Married | .32*** [.21, .47] | .40** [.24, .66] | .34*** [.22, .51] | .44** [.26, .72] | .32*** [.21, .48] | .40*** [.26, .64] |
| Female | 2.03* [1.03, 4.01] | 1.87† [.98, 3.55] | 1.92† [.94, 3.96] | 1.86† [.96, 3.63] | 2.02* [1.03, 3.97] | 1.76† [.90, 3.43] |
| African American | 1.21 [.76, 1.91] | .93 [.59, 1.49] | .93 [.58, 1.51] | .79 [.49, 1.27] | 1.14 [.71, 1.84] | .80 [.49, 1.31] |
| BA or higher degree | .53† [.25, 1.12] | .92 [.46, 1.82] | .58 [.28, 1.22] | .96 [.49, 1.88] | .53† [.25, 1.11] | .85 [.42, 1.74] |
| Uninsured | 2.55*** [1.62, 4.03] | 2.20** [1.43, 3.39] | 2.42*** [1.59, 3.67] | 2.12** [1.41, 3.19] | 2.45*** [1.58, 3.79] | 2.20** [1.40, 3.48] |
| Self-rated health | .55** [.40, .75] | .61** [.46, .81] | .58** [.43, .78] | .64** [.49, .84] | .56** [.41, .75] | .62** [.47, .82] |
| *F* | 29.24 | 20.51 | 47.66 | 27.19 | 36.35 | 48.96 |
| *df* | (8, 23.2) | (12, 23.2) | (8, 23.2) | (12, 23.2) | (8, 23.2) | (12, 23.2) |
| Prob > *F* | <.001 | <.001 | <.001 | <.001 | < .001 | <.001 |

*Note:* Estimates obtained using five imputed data sets, $N = 914$ in each. Prob > *F* is the *p* value associated with the *F* statistic, which tests the null hypothesis that all coefficients in the model are zero.
[a]Middle two quartiles omitted.
*$p < .05$. **$p < .01$. ***$p < .001$. †$p < 0.1$.

focal debt measures were similar to those presented.

We also conducted sensitivity analysis with different specifications of the health insurance variable. We created a categorical version that separated respondents by type of insurance they reported: private only (65.81 percent), public only (11.44 percent), military (.69 percent), private and public (2.03 percent), other (.76 percent), or uninsured (19.27 percent). We found that the only significant difference in foregone care across the types of insurance coverage occurred among people who reported currently having no insurance at all and other groups. We then collapsed this version into three categories (private = private, private and public option, or other; public = public or military;

**Table 4**. Odds Ratios and 95% Confidence Intervals for Focal Debt Measure (see column heading) from Logistic Regression Models of Foregone Medical Care, Using Measures of Specific Types of Debt, Considering Presence and Amount.

| | Model 7 | Model 8 | Model 9 | Model 10 | Model 11 | Model 12 | Model 13 | Model 14 | Model 15 | Model 16 |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Any Housing Debt | Ln Housing Debt Amount | Any Student Loans | Ln Student Loan Amount | Any Car Loans | Ln Car Loan Amount | Any Credit Card Debt | Ln Credit Card Debt Amount | Any Medical Debt | Ln Medical Debt Amount |
| Model A. Adjusted for age, marital status, gender, race, education, insurance status, self-rated health | .73 [.44, 1.21] | .98 [.96, 1.01] | 1.27 [.80, 2.04] | 1.02 [.99, 1.05] | .64 [.36, 1.13] | .97 [.94, 1.01] | 1.83** [1.27, 2.65] | 1.04** [1.02, 1.07] | 3.62*** [2.42, 5.40] | 1.10*** [1.07, 1.13] |
| *F*(12, 23.2) | 33.30 | 32.83 | 30.17 | 28.92 | 27.75 | 27.94 | 25.29 | 25.62 | 35.5 | 36.03 |
| Prob > *F* | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| Model B. Model A + household income and net worth | .81 [.48, 1.36] | .99 [.96, 1.02] | 1.11 [.64, 1.93] | 1.01 [.97, 1.04] | .60 [.32, 1.12] | .97 [.93, 1.01] | 1.89** [1.28, 2.79] | 1.05** [1.02, 1.08] | 3.32*** [2.09, 5.27] | 1.10*** [1.06, 1.13] |
| *F*(12, 23.2) | 32.97 | 32.60 | 24.45 | 24.96 | 22.48 | 22.66 | 26.47 | 24.33 | 25.33 | 25.45 |
| Prob > *F* | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |

*Note:* Estimates obtained using five imputed data sets, $N = 914$ in each. Prob > *F* is the *p* value associated with the *F* statistic, which tests the null hypothesis that all coefficients in the model are zero.
*$p < .05$. **$p < .01$. ***$p < .001$.

uninsured = no insurance of any kind). We observed no difference in the association between foregone care and private or public insurance, while the uninsured remained significantly more likely to forego medical care. We estimated additional models that replaced self-reported health with adjustment for depressive symptoms, the number of chronic conditions the respondent has ever been diagnosed with, or the number of chronic conditions diagnosed in the past two years. In separate models focusing on each in turn, all three of these were powerful predictors of having foregone care in the past 12 months, but the focal coefficients remained substantially unchanged, suggesting that our findings are robust to these alternative specifications. However, the variable capturing the number of chronic conditions diagnosed in the past is likely to be dependent on whether someone has been foregoing care, and including it in the models could bias our results. Thus, we opted for self-reported health as an indicator of overall well-being because prior literature has shown that the measure captures both mental and physical health (Schnittker 2005). We did not include depressive symptoms in our models with self-reported health to avoid introducing collinearity.

All of our models, including those reported here as sensitivity analyses, were estimated using both imputed and unimputed data sets. We found no meaningful differences, but the unimputed results, as well as all other sensitivity analyses, are available on request.

## DISCUSSION

Scholars interested in the social causation of health and social disparities in health have called for more accurate assessments of individuals' resource profiles in recent years (Braveman et al. 2005; Duncan et al. 2002; Herd, Goesling, and House 2007; Schnittker 2004). We build on a small body of research that has pointed out the potential health relevance of debt, an understudied aspect of total resource portfolios (Drentea 2000; Drentea and Reynolds 2012; Ross and Huber 1985). Far from merely being the opposite of wealth, debt is socially stratified in its own unique ways. While the wealthy hold greater amounts of debt overall, the types of debt they tend to acquire are less harmful and do not represent immediate risk to their well-being. The less advantaged, on the other hand, have a more difficult time gaining access to credit, and even once they have acquired it, falling behind on payments can quickly escalate into catastrophic financial consequences (Sullivan, Warren, and Westbrook 1989). Our study therefore makes an important contribution not only by paying careful attention to the absolute magnitude of debt in relation to other resources but also by drawing distinction between "good" and "bad" debts.

Extant studies have shown associations between debt and poorer mental health, but we made novel contributions to this nascent literature by assessing whether debt has an association with lack of access to needed medical care. Foregone medical care is an important outcome in its own right and one that may also have implications for subsequent health and social disparities in health. Debt could constrain access to health care if individuals need to make trade-offs between servicing debt and going to the doctor, but the need to make trade-offs depends on the resources they have to service their debt. Moreover, some kinds of debt may be more likely than others to change individuals' assessments of what they can afford, including health care.

We found that respondents foregoing care in our sample of Michigan residents surveyed in the wake of the late 2000s recession were socioeconomically disadvantaged and had poorer health than their counterparts who did not forego needed care for cost reasons, similar to findings of previous studies of the predictors of foregone care (May and Cunningham 2004; Mielck et al. 2009; Wallace and MacEntee 2012). It was thus important to consider whether debt was still associated with foregone care even after we accounted for these disadvantages. We provided a more comprehensive assessment of the "affordability" of an individual's total debt burdens than some prior studies by considering how they aligned with available income and assets. Our first research question asked whether the total amount of debt, DTA, or DTI were associated with foregone medical care and whether any associations we found changed after we adjusted for income and asset levels. We found positive associations with foregone care that persisted even when we adjusted for commonly

studied predictors, including health insurance status, self-rated health, and marital status. Associations were also robust to adjustment for quartiles of respondents' household income and net worth, suggesting that debt does not simply signal a lack of material resources. To better understand the remaining association between overall debt and foregone care even after we addressed income and asset differences between debt holders, our second research question asked whether there were specific types of debt that drove the association. Some debts colloquially thought of as good, such as housing debt, signal credit worthiness and probably do not influence decisions to seek medical care if they are affordable. Other debts generally thought of as bad, such as credit card debt, may for some individuals have been unplanned and may accumulate beyond their ability to repay. Holders of such debts may feel more pressure to repay them to avoid interest and stress. Finally, we considered the special case of medical debt, which could behave like other types of bad debt but may also signal health issues that could both necessitate more care and lead to broader debt problems and inability to make debt payments. The results were very clear: net of income and assets, credit card debt and medical debt were strongly and positively associated with having foregone care in the past 12 months.

Our findings thus support and bridge two relatively unrelated sets of studies, some focused on credit card debt and its association with risky health behaviors and mental health (Drentea 2000; Nelson et al. 2008) and others focused on the particularities of medical debt and medical bankruptcy and how they constrain health care consumption (Doty, Edwards, and Holmgren 2005; Herman, Rissi, and Walsh 2011). Using population-representative data, strong controls for income and assets, and a much fuller range of types of debt than these previous studies, we show support for credit card debt and medical debt as particularly potent predictors of foregone medical care.

Nonetheless, while it presents novel findings, this study has several limitations that point to the need for future research. First, our measure of foregone care is limited because it conflates foregone care for both medical and dental care. Compared to the 2010 CDC estimates of foregone medical care based on the National Health Interview Survey, the rate of foregone care was approximately twice as high in our sample. Some of this high prevalence can be accounted for by the generally poorer economic climate in southeast Michigan, but a non-negligible part could be due to the combination of medical and dental care in one measure. According to the 2010 CDC estimates, approximately 16 percent of working-age adults decided to forego dental care because of cost, making it a more prevalent behavior than foregone medical care, estimated to characterize about 11 percent of U.S. adults. Unfortunately, we are not aware of studies that explicitly test the association between foregone dental and medical care. It is likely that debt influences decisions about both medical and dental care via similar pathways, and we could speculate that dental need may seem less pressing, although future research would benefit from looking at these and other types of health care separately.

Second, we rely on cross-sectional data, and it is challenging to disentangle the temporal ordering of the accumulation of debt, health problems, and foregoing needed care. We assume that by asking about foregone care within the past year, it is plausible that debt was accumulated prior to the foregone care incident, but we cannot rule out the possibility of reverse causality. Moreover, it is also possible that poor health, poor health insurance quality or coverage history, and foregone care in the past have led to the accumulation of medical debt measured in our study (Herman, Rissi, and Walsh 2011). We adjust for health status and health insurance coverage to the extent possible with our relatively small sample and cross-sectional data and, even with limited measures, find significant associations with foregone care. Future studies using longitudinal data and larger samples could better untangle this process and assess the role of health insurance quality and coverage. They could also explore whether health problems that drive the accumulation of medical debt could also catalyze other debts, such as growing credit card balances when individuals are too sick to work or do not have the income or assets to pay their medical bills on time.

Our sample is composed of working-age residents of southeastern Michigan, which limits our

ability to generalize to the U.S. population. Because our data are not nationally representative but drawn from a relatively specific population, it is possible that unmeasured community-level factors could influence both taking on debt and foregone care, and the possibility could be better investigated in studies using national data that cover a broader range of communities and contexts. A relatively small sample also limits the power of our statistical analysis, but there are few sources of data on the working-age population of the United States that contain detailed information about debt, assets, and foregone medical care. Another important limitation is that the data we use are self-reported, and economists have shown that the actual magnitude of household debt and reported household debt vary considerably (Keese 2012). While it is plausible that the perception of indebtedness or of the stigma associated with certain kinds of debt link objective debt burdens to the decision to forego needed medical care, more data collection and mixed-methods research are clearly needed.

Finally, we are facing a data limitation that could influence the validity of our conceptual framework. Even though we have a good sense of the overall debt burden of the respondents, and our measures allow us to draw conclusions about the overall burdens and foregone care, we did not collect information about how high monthly debt payments or interest rates on these debts may be. For this reason, we cannot construct the serviceable debt ratio, a measure of how much debt a household has to pay each month that is used by the Federal Reserve Board. Such a measure would allow us to more carefully consider the true impact of competing obligations on households' budgets and to determine whether the association between foregone care and debt is similar to the association with any other type of expenditure.

Despite these limitations, we find novel associations between credit card and medical debt and unmet medical need. These suggest the value of further research for researchers, providers, and policy makers focused on disparities in health behaviors and health outcomes. For example, understanding the complex links between debt and foregoing care for cost reasons will be important for evaluating the implications of major policy changes, like the Patient Protection and Affordable Care Act. Will reductions in the number of uninsured and underinsured Americans mitigate the restrictions posed by total debt burdens and different kinds of debt? Will it help prevent accumulations of large medical debts? Additionally, our results suggest that social policy interventions, such as debt relief programs, could remove an important barrier to care. For example, the Medical Debt Responsibility Act (H.R. 2086) introduced in June 2011 would allow people to erase medical debt bills from their credit reports once their debt has been paid back. This could improve credit scores for many and give former medical debtors access to the forms of debt that our study identified as less threatening to access to medical care use, like secured auto or mortgage debt. Debt is a fact of life for most Americans, so further research is warranted to understand how enabling access to "healthier" forms of debt while minimizing the restrictions imposed on some by credit card and medical debt could potentially improve access to health care and population health.

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## NOTES

1. Two respondents reported their housing values to be improbably high. We set those values to missing and imputed them along with the rest of the missing values.
2. We assessed other ways of including measures of household income and net worth, both highly skewed measures that could have nonlinear associations with foregone care. Other specifications yielded substantively similar findings, leading us to settle on this one as it combined parsimony with the ability to see whether a nonlinear association existed.
3. We conducted additional analyses to assess the impact of the magnitude of the added constant on the results, replicating all models when using constants .01, .1, and 1.0. We found that the value chosen for the constant did not influence our results.
4. Additional sensitivity analyses using alternate constants ranging from $1 to $1,000 showed that results did not vary on the basis of the constant chosen.
5. Considering debt reports, 2 percent of respondents did not report the value of their car loans, .3 percent did not report amount owed on student loans, 2 percent did not report the amount of their housing debt, 2 percent did not report the amount of their credit card balance, and .7 percent did not report how much they owed on "other loans." Considering asset reports, 7 percent of respondents did not report a value for their IRA, 2 percent did not report the value of government-secured savings, 4 percent did not report the value of their car, and 4 percent did not report the value of their house.

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## AUTHOR BIOGRAPHIES

**Lucie Kalousova** is a doctoral student in sociology and health policy at the University of Michigan. Her research focuses on social stratification and mobility, health disparities, and comparative social policy.

**Sarah A. Burgard** is an associate professor of sociology and epidemiology and a research associate professor at the Population Studies Center at the University of Michigan. Her research focuses on the ways that stratification by race-ethnicity, gender, and socioeconomic position influence people's opportunities in life and how this influences their health. She uses surveys and other data to examine a variety of health outcomes from sleep to mortality. She is currently engaged in several data collection projects aimed at understanding links between the Great Recession and population health.