

Mortgage Delinquency and Changes in Access to Health Resources and Depressive Symptoms in a Nationally Representative Cohort of Americans Older Than 50 Years

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Following the dramatic increase in subprime lending that began in 2003,¹ foreclosure rates increased rapidly through 2009, with 2.21% of all US homes—a total of more than 2.8 million properties—in some stage of foreclosure during that year.² The rise in mortgage default and foreclosure may threaten population health. Home ownership, a marker of wealth as well as a concrete material resource, is associated with better health,^{3–6} whereas financial strain is associated with worse health and higher mortality.^{7–9}

Like other sources of financial strain, mortgage delinquency likely affects health through multiple mechanisms, including psychological stress and disrupted access to essential material goods and services, such as food and health care.^{10,11} Mortgage foreclosure also carries disruption associated with moving such as dislocation from home and social ties. By forcing families to sever and reestablish attachments to their homes, communities, and social relationships, mortgage default and foreclosure may be particularly alienating and detrimental to psychosocial well-being.^{10,12} Therefore, the material, social, and symbolic upheaval of mortgage default and foreclosure may distinguish these experiences from other types of financial strain.^{4,13}

A recent cross-sectional study found that clients of a mortgage counseling agency in Philadelphia, Pennsylvania, who were undergoing mortgage foreclosure had higher rates of depression, hypertension, and heart disease, as well as a higher prevalence of cost-related health care and prescription nonadherence, than did the general population.¹⁴ The study also found that poor health and health-related debt were associated with being in foreclosure. A second cross-sectional study, conducted in 2008 in the 4 states with the highest foreclosure rates, also identified markedly poorer health status among homeowners in default or foreclosure than in all other housing groups (nondelinquent homeowners and renters).¹⁵ Longitudinal

Objectives. We evaluated associations between mortgage delinquency and changes in health and health-relevant resources over 2 years, with data from the Health and Retirement Study, a longitudinal survey representative of US adults older than 50 years.

Methods. In 2008, participants reported whether they had fallen behind on mortgage payments since 2006 (n=2474). We used logistic regression to compare changes in health (incidence of elevated depressive symptoms, major declines in self-rated health) and access to health-relevant resources (food, prescription medications) between participants who fell behind on their mortgage payments and those who did not.

Results. Compared with nondelinquent participants, the mortgage-delinquent group had worse health status and less access to health-relevant resources at baseline. They were also significantly more likely to develop incident depressive symptoms (odds ratio [OR]=8.60; 95% confidence interval [CI]=3.38, 21.85), food insecurity (OR=7.53; 95% CI=3.01, 18.84), and cost-related medication nonadherence (OR=8.66; 95% CI=3.72, 20.16) during follow-up.

Conclusions. Mortgage delinquency was associated with significant elevations in the incidence of mental health impairments and health-relevant material disadvantage. Widespread mortgage default may have important public health implications. (*Am J Public Health.* 2011;101:2293–2298. doi:10.2105/AJPH.2011.300245)

research is necessary to establish whether housing foreclosure simply occurs more frequently among people with poor health or whether foreclosure actually predicts health declines.¹⁶ We investigated whether mortgage delinquency was associated with decreases in health and access to health-relevant resources over a 2-year period in a nationally representative cohort of Americans older than 50 years.

METHODS

We examined data from the 2006 and 2008 waves of the Health and Retirement Study (HRS), a nationally representative panel study of Americans older than 50 years at baseline in 2004.^{17,18} Questions on mortgage delinquency were added during 2008 data collection, so that only 62% of the HRS sample were asked about their mortgage status (n=9470). Participants were eligible to be

interviewed about mortgage delinquency if they either had a current mortgage in 2008 or no longer owned a home that they had owned in 2006. The majority of HRS households (72%) did not have a mortgage, typically because they owned their homes free and clear or were renting, leaving 2474 participants eligible for mortgage-delinquency questions. These participants were asked, “Have you fallen more than 2 months behind on mortgage payments in the past 2 years?” We considered participants who answered yes to be mortgage delinquent; we considered participants who had an active mortgage and had not fallen behind on mortgage payments in the past 2 years to be nondelinquent.

Outcome Measures

We examined indicators of psychological impairment, general health status, and access to important health-relevant resources as

outcomes. A revised version of the Center for Epidemiological Studies Depression Scale measured depressive symptoms.¹⁹ For each of the 8 items, participants reported whether they had experienced the symptom “much of the time during the past week.” A summary score indicated the total number of symptoms experienced (0–8). We imputed total scores for participants who were missing up to 2 of the 8 items ($n=20$ in 2006; $n=21$ in 2008). A score greater than or equal to 6 indicated elevated depressive symptoms.¹⁹ A single validated question assessed self-rated health.²⁰ We defined a major decline in self-rated health as either a decline from excellent, very good, or good health in 2006 to fair or poor health in 2008 or as a decline from fair health in 2006 to poor health in 2008.²¹

The survey examined access to health-relevant resources in 2 ways. We considered participants to have experienced cost-related medication nonadherence if they reported taking less medication than was prescribed because of cost at any time in the past 2 years.²² We considered participants to have food insecurity²³ if they answered no to the question, “In the last two years, have you always had enough money to buy the food you need?” or if anyone in the household had received government food stamps at any time in the past 2 years.

Covariates

Participants reported their age, gender, race/ethnicity (Hispanic, Black, White, or other), marital status (married or unmarried), smoking status (current smoker or nonsmoker), sources of debt, and annual household income. The debt variable we chose reflected debt unrelated to housing such as credit card balances, medical debts, and loans from relatives. We log-transformed debt and annual household income in regression analyses.

Participants reported their history of diabetes, cancer, lung disease, heart disease, stroke, psychiatric problems, and arthritis, and we created a summary score to indicate the number of chronic conditions (0–7). We categorized self-reported physical activity as (1) vigorous activity at least once per week, (2) light or moderate activity at least once per week, or (3) sedentary. To capture changes in employment at the household level, we created a work

status variable for both the respondent and spouse (if present) in each year for each person: (1) employed full time, (2) employed part time, or (3) not currently employed. We categorized a participant as having a decline in the level of household employment if either spouse's employment changed from full-time to part-time or unemployed or from part-time to unemployed between 2006 and 2008. For unmarried participants, we derived employment decline solely from changes in employment of the respondent.

Analyses

We used the χ^2 test to examine differences in categorical variables across housing groups, and we used the t test to compare continuous variables. Among the 2474 HRS 2008 participants eligible to be asked mortgage-delinquency questions, 35 had missing covariates. To create a clearly defined comparison group of secure homeowners, we also excluded an additional 200 participants from the nondelinquent group who were renting or living in a nursing facility in 2008. This yielded an analytic sample of 2239, with 2171 participants classified as nondelinquent and 68 participants classified as mortgage delinquent. The number of participants with complete outcome data in 2006 and 2008 varied across outcome measures, yielding a sample of 2138 for the depression scale, 2236 for self-rated health, 2231 for food insecurity, and 2236 for cost-related medication nonadherence.

We used logistic regression to predict the odds of new onset of elevated depressive symptoms, decline in self-rated health, and new onset of unmet material resource needs (food insecurity and cost-related prescription nonadherence) by housing status, adjusted for covariates. By definition, a decline could not be observed in participants who in 2006 already reported significant depressive symptoms, poor health, or unmet needs. Thus, we excluded from analysis an additional 130 participants for depressive symptoms, 132 for poor self-rated health, 173 for food insecurity, and 229 for cost-related medication nonadherence.

For each outcome (elevated depressive symptoms, major decline in self-rated health, food insecurity, and cost-related medication nonadherence), we estimated 3 regression models. Model 1 controlled for age, gender,

marital status, race/ethnicity, and 2006 log income and debt unrelated to housing. Model 2 further controlled for number of chronic health conditions, smoking status, and physical activity level in 2006, to determine whether differences in baseline health status and health behaviors could account for differences in changes in health and access to resources by mortgage status. Model 3 included socioeconomic information from follow-up (2008) to determine whether changes in income, debt, and employment could account for differences in outcomes by mortgage status. We created model 3 to test whether mortgage delinquency independently contributed, beyond household socioeconomic status, to risk of poor health and unmet needs. We conducted all analyses in Stata 10 (StataCorp LP, College Station, TX) with sampling weights. We considered a P value of less than .05 to be significant.

RESULTS

Table 1 provides participant characteristics by mortgage status in 2008. Participants in the mortgage-delinquent group in 2008 were more likely than were nondelinquent participants to be female (63% vs 46%; $P=.025$), more likely to be non-White (44% vs 16%; $P<.001$), and less likely to be married (50% vs 65%; $P=.035$). Participants who were mortgage delinquent also had more chronic conditions at baseline than did nondelinquent homeowners, as well as lower incomes and higher levels of debt in both 2006 and 2008.

Table 2 provides both the baseline (2006) prevalence and the proportion of respondents with new onset of outcomes (between 2006 and 2008) by mortgage status. At baseline, participants in the mortgage-delinquent group had worse health status and higher levels of unmet need than did the control group. For example, 15% of participants who were mortgage delinquent and only 5% of participants who were nondelinquent during follow-up had elevated depressive symptoms in 2006 ($P=.004$). Nearly one third of participants who were mortgage delinquent had fair or poor self-rated health at baseline; 19% in the nondelinquent group reported suboptimal health ($P=.01$). Participants who were mortgage delinquent were also much more likely than nondelinquent respondents to be food insecure

TABLE 1—Participant Characteristics by Mortgage Delinquency Status: Health and Retirement Study, 2006 and 2008

	Nondelinquent (n = 2171)	Delinquent (n = 68)	P
Baseline, 2006			
Age, y, mean (SD)	62.4 (8.4)	61.6 (9.7)	.536
Women, %	46.1	62.6	.025
Race/ethnicity, %			<.001
White	83.9	56.5	
Black	7.6	25.9	
Hispanic	5.7	13.1	
Other	2.7	4.6	
Married, %	64.6	49.6	.035
Income, ^a median, \$ (IQR)	60 800 (72 976)	42 800 (49 840)	.016
Nonhousing debt, ^a median, \$ (IQR)	0 (4000)	4200 (18 000)	.001
Chronic health conditions, ^b mean (SD)	1.3 (1.2)	1.7 (1.4)	.023
Current smoker, %	13.8	19.0	.289
Weekly physical activity level, %			.447
None	6.8	10.5	
Light	54.8	58.6	
Vigorous	38.4	30.9	
Follow-up, 2008			
Income, ^a \$, median (IQR)	64 000 (78 676)	45 000 (53 852)	.001
Nonhousing debt, ^a \$, median (IQR)	0 (6000)	1500 (10 000)	.025
Decline in household employment, %	17.6	20.8	.575

Note. IQR=interquartile range. Means and proportions were weighted.

^aP value based on t test of difference in mean logged household income, which was used in regressions. Medians were provided for ease of interpretation.

^bScale 0–7.

(23% vs 6%; $P < .001$) and to experience cost-related medication nonadherence (28% vs 9%; $P < .001$) at baseline.

Table 2 also shows marked differences between the 2 groups from 2006 to 2008, with the mortgage-delinquent group experiencing a higher incidence of health declines and more pronounced declines in access to health-relevant resources. Among participants who were mortgage delinquent, 22% developed elevated depressive symptoms over the 2-year period; only 3% of nondelinquent respondents experienced such a change ($P < .001$). Mortgage-delinquent participants were far more likely than nondelinquent participants to develop food insecurity (28% vs 4%; $P < .001$) and cost-related medication nonadherence (32% vs 5%; $P < .001$), although we detected no differences in the likelihood of

experiencing major declines in self-rated health by mortgage status.

Table 3 shows the covariate-adjusted association between mortgage status and outcomes. After adjustment for demographic and economic covariates at baseline (model 1), participants who were mortgage delinquent were nearly 9 times as likely as nondelinquent participants to develop elevated depressive symptoms in 2008 (odds ratio [OR]=8.60; 95% confidence interval [CI]=3.38, 21.85). Participants who were mortgage delinquent had more than 7 times the odds of developing food insecurity (OR=7.53; 95% CI=3.01, 18.84) and nearly 9 times the odds of developing cost-related medication nonadherence between 2006 and 2008 (OR=8.66; 95% CI=3.72, 20.16) compared with nondelinquent participants. Controlling for chronic

health conditions and health behaviors (model 2) and 2008 household income, debt, and changes in employment status (model 3) did not substantially alter the magnitude of these associations. In all 3 models, mortgage delinquency was not significantly associated with major declines in self-rated health.

As a sensitivity analysis, we further examined the relation between mortgage default and depressive symptoms, testing a model that examined onset of food insecurity and cost-related prescription nonadherence as mediators of that relationship. Adding food insecurity and cost-related prescription nonadherence to the model predicting depression reduced the odds ratio for mortgage delinquency to 1.64 (95% CI=0.37, 7.17).

DISCUSSION

Our analysis took advantage of the HRS, a large, nationally representative study that followed a cohort of adults older than 50 years for 2 years at the beginning of the current housing crisis. We analyzed these data to determine whether mortgage delinquency increased the risk of declines in health and health-relevant resources. Homeowners who fell behind on their mortgages between 2006 and 2008 reported poorer health and more limited access to health-relevant resources at baseline for every metric studied: depressive symptoms, self-rated health, food insecurity, and cost-related medication nonadherence. Mortgage delinquency also strongly predicted incident depressive symptoms, food insecurity, and cost-related medication nonadherence over the 2-year follow-up period.

These outcomes are important both because of their effects on quality of life and because they are risk factors for further health declines in older adults. The markedly elevated depressive symptoms observed among mortgage-delinquent participants may be disabling, leading to impairments in physical functioning, social functioning, and employability, which are essential to coping with financial strain. In addition, depressive symptoms predict both incidence and survival rates for major illnesses such as myocardial infarction.^{24–26} Food insecurity, which was dramatically elevated among mortgage-delinquent HRS participants, is associated with poor self-rated health and mobility

TABLE 2—Baseline Health Status and Unmet Needs and Change at Follow-Up, by Mortgage Delinquency Status: Health and Retirement Study, 2006 and 2008

	No.	Nondelinquent, %	Delinquent, %	P
Baseline prevalence in 2006				
Elevated depressive symptoms	2183	5.2	14.7	.004
Fair or poor self-rated health	2238	18.8	33.2	.01
Food insecurity	2233	6.4	23.0	<.001
Cost-related medication nonadherence	2236	9.2	27.7	<.001
New onset between 2006 and 2008 ^a				
Elevated depressive symptoms	2008	3.1	21.6	<.001
Major decline in self-rated health	2104	11.7	15.8	.455
Food insecurity	2058	3.6	27.9	<.001
Cost-related medication nonadherence	2007	4.8	32.1	<.001

Note. Proportions were weighted.

^aOnly new-onset symptoms reported at follow-up among participants in both the 2006 and 2008 surveys; participants who at baseline had elevated depressive symptoms (n = 130), poor health (n = 132), food insecurity (n = 173), or cost-related medication nonadherence (n = 229) were excluded.

disability in older adults.²⁷ Nonadherence to prescription medications, which was also far more common in the mortgage-delinquent group, can have powerful short- and long-term

effects on older adults' health.^{22,28} Previous research on HRS data has found that the effects of food insecurity and cost-related medication nonadherence on subsequent health outcomes

were similar in magnitude to those of diabetes and pulmonary disease.²⁹ Thus, the rise in mortgage defaults may have important public health implications that could ultimately prove costly to affected individuals, employers, the health care system, and society.^{28,30}

Previous cross-sectional studies have shown that foreclosure is associated with poor health.^{14,15,31} In some cases, mortgage foreclosure may occur as a result of poor health, an observation corroborated by our finding that participants who fell behind in their mortgages between 2006 and 2008 had worse health at baseline. One previous longitudinal study found that well-being declined in British households that experienced mortgage delinquency during the 1990s.¹⁶ Our analyses extend previous research by incorporating a range of health indicators and longitudinal data that captured health changes during the current US housing crisis. Among participants without depression at baseline, those who entered into mortgage delinquency during the follow-up period were far more likely than were their nondelinquent peers to experience new onset of elevated depressive symptoms at follow-up. We observed the same pattern for new onset of food insecurity and cost-related medication nonadherence. These data suggest that mortgage delinquency predicts declines in health and reduced access to health-relevant material resources. Health-relevant material resources appear critical to preserving health and may mediate the association between mortgage default and depression.

Our results also suggest that the housing crisis may be exacerbating health disparities, because lower-income and minority homeowners were at higher risk than other homeowners for mortgage default. These groups had a higher level of material disadvantage²⁹ and worse health status^{32,33} even before the current mortgage crisis. Research suggests that it will take decades for African American and Hispanic communities to recover the wealth lost during the housing crisis and that minority communities are disproportionately affected by the community-level effects of the mortgage crisis such as declining home values and lost tax revenue.³⁴

The population older than 50 years represents a large and important subgroup of homeowners experiencing mortgage delinquency. Although risk of mortgage default tends to be lower in this age group than among

TABLE 3—Relative Odds of Incident Depressive Symptoms, Health Declines, Food Insecurity, and Cost-Related Medication Nonadherence at Follow-Up, by Mortgage Delinquency Status: Health and Retirement Study, 2006 and 2008

	Model 1, ^a OR (95% CI)	Model 2, ^b OR (95% CI)	Model 3, ^c OR (95% CI)
New onset of elevated depressive symptoms	8.60 (3.38, 21.85)	8.08 (3.11, 21.04)	7.86 (3.13, 19.77)
Major decline in self-rated health	1.39 (0.52, 3.72)	1.19 (0.42, 3.43)	1.17 (0.41, 3.32)
New onset of food insecurity	7.53 (3.01, 18.84)	7.27 (2.74, 19.29)	7.58 (2.80, 20.54)
New onset of cost-related medication nonadherence	8.66 (3.72, 20.16)	8.67 (3.67, 20.52)	8.64 (3.63, 20.56)

Note. CI = confidence interval; OR = odds ratio.

^aControlled for age, gender, marital status, race/ethnicity, 2006 log income, and 2006 log debt unrelated to housing.

^bControlled for model 1 variables plus number of chronic health conditions, smoking status, and physical activity level.

^cControlled for model 1 and 2 variables plus 2008 log income, log debt unrelated to housing, and declines in household employment.

younger homeowners, 28% of homeowners facing foreclosure are older than 50 years.^{35,36} Recent cohorts of older adults are less likely to own their homes outright and are carrying high levels of housing debt into old age, typically through refinancing: in 2000, 60% of homeowners aged 55 to 64 years and 37% of homeowners aged 65 to 74 years had housing debt.³⁷ Older adults also have fewer working years remaining during which lost wealth can be recouped. Furthermore, because older adults are more likely to have chronic health conditions, behaviors such as compromising diet quality or incomplete adherence to prescription medications may have particularly detrimental consequences.

Although foreclosure prevention has been considered primarily in economic terms, policies that prevent mortgage delinquency and foreclosure could also have positive effects on health outcomes. Alternatively, foreclosure policies that lengthen the foreclosure process without permanent resolution of loan terms may extend periods of stress and financial strain. Although US housing policy has long advocated efforts to advance home ownership per se, policy analysts are now shifting toward advocating sustainable home ownership, defined as home ownership that

confers social and economic benefits on the owner at a cost that does not impose unreasonable financial stress and where the risk of an involuntary end to the home ownership spell has been significantly reduced.^{38(pp.19-20)}

When sustainable home ownership is not feasible, then affordable, safe rental housing may be the best alternative.

Homeowners in default represent an identifiable high-risk group that may need and benefit from coordinated, affordable health services, including mental health services. For example, behavioral and mental health screening, referral, and counseling could be bundled with financial and mortgage assistance counseling services to support homeowners at risk for default and foreclosure. In Philadelphia, which requires mediation between lenders and distressed homeowners in a foreclosure diversion program, courts have acted as a portal into necessary health and social services, beyond housing itself (Judge A. Rizzo, Philadelphia Court of Common Pleas, oral communication, March 3, 2011). By recognizing the population

health implications of mortgage default, policymakers may be better able to craft initiatives to address the multiple health-relevant needs of families facing foreclosure.

Strengths and Limitations

We used a nationally representative sample and longitudinal data that allowed us to examine health status and unmet needs before and after mortgage delinquency. The availability of socioeconomic data both before and after mortgage delinquency allowed us to examine the independent effects of foreclosure, accounting for changes in income and employment. Although the sample of participants who experienced mortgage default was small, the relationship between mortgage delinquency and health outcomes was strong and robust to several important controls.

However, several limitations are relevant to our findings. The HRS asked about mortgage delinquency for the first time in 2008, so mortgage status in 2006 is unknown. Therefore, it is possible that participants were already experiencing difficulties making mortgage payments before 2006, and people who experienced mortgage delinquency might have been more likely to drop out of the survey. In addition, this was an observational study, and it is possible that unmeasured confounding influenced the relationships we observed. Although we used longitudinal analysis and controlled for baseline income and health behaviors, we cannot rule out the possibility that unmeasured factors might have predisposed individuals to both financial strain and poor health.

Because the sample of participants who were mortgage delinquent was small, we were unable to examine the association between mortgage status and health in subgroups, such as those in poor health at baseline. Because few participants actually lost their homes to foreclosure, we were not able to examine differences between the effects of mortgage delinquency and foreclosure. Nonetheless, the HRS data were consistent with population exposure to mortgage delinquency: the majority of people who fall behind on mortgage payments do not lose their homes.

Conclusions

Our analysis showed that homeowners in a nationally representative sample who fell

behind on their mortgages were more likely than were nondelinquent homeowners to develop elevated depressive symptoms, food insecurity, and cost-related prescription nonadherence. Our results highlight the implications of increasing mortgage default and foreclosure on both population health and health disparities. ■

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Contributors

D. E. Alley designed the study and drafted the article. All authors interpreted results and revised the article. J. Lloyd and M. Shardell assisted with data coding and analysis.

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Human Participant Protection

The University of Maryland institutional review board determined that no protocol approval was required because no human participants were involved in the study.

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