Changes in City-Level Foreclosure Rates and Home Prices through the Great Recession and Depressive Symptoms among Older Americans

Abstract

Scholarship shows that the changing economic fortunes of cities influence mental health. However, the mechanisms through which this occurs are underexplored. I address this gap by investigating the Great Recession of 2007-2009. Using the National Social Life, Health, and Aging Project survey (N = 1,341), I study whether increases in cities' home foreclosure rates and declines in their median home prices through the Great Recession cause increases in older persons' depressive symptoms. I also study whether these effects are mediated by one's household assets declines. I find that increases in cities' home foreclosure rates and declines in their median home prices potently increase depressive symptoms, and that these effects are not mediated by personal financial losses. Supplementary analyses reveal that changes in city-level unemployment rates and median household incomes are less directly linked with changes in depressive symptoms than changes in city-level home foreclosure rates and median home prices.

Keywords: depression, the Great Recession, economic declines, foreclosure rates, home prices, household assets, aging

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American cities vary substantially in the typical levels of mental health of their residents. In 2005, while the average citizen in Ames, IA had 2.1 days of depression per month, the corresponding amount was 3.6 in Little Rock-North Little Rock, AR, and 5.1 in Amarillo, TX (Sperling and Sander 2007). Why then do different people and contexts show varying levels of depression? The reasons are multiple and varied, spanning from individual dispositions to contextual characteristics of neighborhoods, cities, states, and nations. Some micro-level causes are biological in nature, relating to temperament, personality, and intelligence. Other causes are meso-level; the demographic, economic, and housing characteristics of neighborhoods and cities are consequential for health and well-being (Chernick, Langley, and Reschovsky 2011; Hollander 2011; Peck 2012). Still other causes exist at the macro level of the cultural, economic, and political features of nations. I focus on causes of depression at the city level.

City effects upon well-being have long garnered sociological interest. Marans and Stimson (2011) emphasize the impacts of city-level employment conditions, levels of education and income, extents of crime and severe illnesses, climatic conditions, quality of transportation infrastructure, provision of affordable and nutritious foods, etc. Galea, Freudenberg, and Vlahov (2005) argue that all residents are affected by the physical, social, economic, and political features of their cities. Momentous economic shocks, such as the Great Recession of 2007-2009, can alter the demographic, economic, and housing characteristics of cities, thereby affecting residents' well-being (e.g., Chernick et al. 2011; Hollander 2011; Peck 2012). In studying these impacts, it is important to investigate the indirect pathways from city-level change to changes in

individual-level resources, as well as to distinguish between stable levels of resources and changes in resources. Through fixed-effects modelling, I focus on changes in resources.

Population aging and urbanization motivate the study of how cities affect older persons. Population aging, due to lower rates of fertility and higher life expectancies, is an increasingly important demographic trend throughout the industrialized world (Brown 2011; Cooke 2006; McDaniel and Rozanova 2011; McDonald and Donahue 2011; Turcotte and Schellenberg 2007). As populations have aged, they have more and more come to live in cities; aging is increasingly becoming an urban experience. This requires that we study the health of American cities.

I focus on older adults, among whom the Great Recession was a challenging experience (Boen and Yang 2016; Cagney et al. 2014). Over 1.5 million older Americans lost their homes to foreclosure between 2007 and 2011 (Trawinski 2012). Heads of households between 55 and 64 years of age experienced a decline of almost one third in their median family net worth between 2007 and 2010; for heads of household between 65 and 74 years of age, this amount was about 18 percent (Bricker et al. 2012). This recession put many older Americans' retirement security at risk, forcing many to delay their retirement within a labor market not conducive to their continued employment (Munnell and Rutledge 2013). Additionally, the physical and cognitive vulnerabilities that come with aging might increase older persons' susceptibility to contextual stressors (Lawton and Nahemow 1973). Older persons' dependency on the assets accumulated over their lives might also increase this vulnerability (Boen and Yang 2016; Cagney et al. 2014).

THEORETICAL PERSPECTIVES

The ecological stress process orients my inquiry into whether and how stressors linked with changing city-level economic conditions affect depressive symptoms. This model is an extension of Pearlin et al.'s (1981) original stress process model, which emphasized how life

events and circumstances, and strains within one's roles, can be sources of stress that cause negative psychological outcomes, such as depression. Stressors can proliferate across institutional boundaries and role domains since the multiple sectors of a person's life intersect (Pearlin, Aneshensel, and LeBlanc 1997). Stressors associated with personal financial difficulties cause feelings of hopelessness, anxiety, and frustration (Drentea and Reynolds 2015). If these financial difficulties persist, they become chronic stressors (Burgard, Brand, and House 2007).

The ecological stress process model also adapts insights from Bronfenbrenner's (1979) ecological theory by incorporating multiple, overlapping layers of the physical and social environment as sources of stressors that can proliferate across different levels of context. Bronfenbrenner (1979:13) emphasized how larger overarching forces, including economic influences, that emanate "from more remote regions in the larger physical and social milieu" impact what occurs in people's immediate environments. Accordingly, the ecological stress process model suggests that "the factors that contribute to environmental exposures, especially among urban populations, are complex and linked to larger social and political processes that affect access to economic, political, and social resources" (Parker et al. 2004:505).

Consistent with this model, research suggests that city-level stressors proliferate to the individual level. For example, cities' housing market problems can erode residents' personal wealth and create financial strain (Boen and Yang 2016; Meltzer, Steven, and Langley 2013), which negatively impacts health (Boen and Yang 2016; Hajat et al. 2010, 2011; Pool et al. 2017; Robert and House 1996). In this study, I am testing this pathway between city-level declines and health. However, there are additional pathways of stress proliferation suggested by the ecological stress process model that I do not directly test. City-level economic declines lead to higher foreclosure rates, producing neighborhood-level externalities that reduce home values and

neighborhoods' quality (Leonard and Murdoch 2009). Socioeconomically disadvantaged and declining urban neighborhoods are marked by vandalism, delinquent activity, and uncontrolled young persons, all of which are contextual stressors. These stressors proliferate to the individual level as they lead residents to stay within their homes, to limit their social interactions to close friends and family members, and to avoid community involvements (Aneshensel 2010; Aneshensel et al. 2011), all of which negatively affect mental health (Aneshensel 2010).

The present study focuses on depression; the stress process model states that depression is a central psychological outcomes of stressful conditions, as well as an overall barometer of stress (Pearlin 1989; Pearlin et al. 1997; Pearlin et al. 1981). Among older adults, depression is possibly the most common form of emotional suffering (Blazer 2003) and is a powerful predictor of suicide (Blazer 2003; Fiske, Wetherell, and Gatz 2009; Vanderhorst and McLaren 2005). Furthermore, depressed older persons suffer higher rates of morbidity, suffer from detriments to physical, cognitive, and social functioning, and show lower levels of selfcare, all of which increase risk of mortality (Blazer 2003; Fiske et al. 2009).

CONTEXT: THE GREAT RECESSION OF 2007-2009

I use the ecological stress process model to generate hypotheses about the mental health effects of the Great Recession, which was the most severe global economic crisis since the Great Depression of the 1930s (Meltzer et al. 2013). During this crisis, the property market collapsed, causing great losses within the financial sector and triggering an intense recession in which the median American family lost 40% of its net worth. Furthermore, from 2007 to 2009, America saw its unemployment rate increase from 4.6% to 9.3%, its real GDP drop by 3.1%, and its real personal income per capita decrease by 8.3% (Meltzer et al. 2013). Increased home foreclosures through this recession were linked with lower well-being (Cagney et al. 2014; Houle 2014) and

higher suicide rates (Houle and Light 2014). Likewise, rising unemployment rates (Phillips and Nugent 2014) and income problems (Burgard, Seefeldt, and Johnson 2011) through this recession were linked with detriments to physical and mental health.

Although the recession was widespread, American cities varied considerably in how they fared. Some cities recovered rapidly and successfully (e.g., Boston and Seattle), while others continue to experience difficulties (e.g., Detroit and Miami) (Arias, Gascon, and Rapach 2016; Davidson 2014; Dill 2014; Gray and Scardamalia 2014). Cities that fared better typically had larger and more educated populations (Arias et al. 2016; Florida 2016; Gray and Scardamalia 2014). Additionally, smaller shares of their economies were based on the housing industry (Arias et al. 2016; Florida 2016; Gray and Scardamalia 2014).

Hard-hit cities underwent high rates of foreclosed homes (Chatterjee and Eyigungor 2015; NBC News 2012; Wang and Immergluck 2018) and substantial decreases in real estate prices (Arias et al. 2016; Chatterjee and Eyigungor 2015; Gray and Scardamalia 2014). The latter was primarily responsible for American families' declines in median net worth (Bucks et al. 2009). While most past research on economic recessions and mental health focused on unemployment rates (Dooley, Fielding, and Levi 1996; Tefft 2011), the centrality of the housing market to the Great Recession suggests that foreclosure rates and home prices might be more relevant pathways for studying this economic downturn, particularly for older adults. Accordingly, these are the primary independent variables for the present study.

Numerous mechanisms link changes in city-level home prices and foreclosure rates to health and well-being. Decreases in city-level home prices reduce a city's economic strength, and just like increased foreclosure rates, reduce the quality of city neighborhoods. Weakened property values reduce cities' revenue bases for public goods and services, including for

schooling (Lerman and Zhang 2012), foreclosure prevention, the upkeep and repurchasing of vacated buildings (Baumer, Wolff, and Arnio 2012), and street maintenance (Allen 2013). They also lead to decreased consumption as residents save as protection against economic uncertainty and to rebuild their lost wealth, including that embedded in their homes (Huo and Ríos-Rull 2015; Ríos-Rull and Huo 2016; Lerman and Zhang 2012; Petev, Pistaferri, and Saporta 2012). Cities with highly reduced consumption faced a worsened and prolonged economic shock (Petev et al. 2012), affecting their neighborhoods' quality and extents of crime and disorder (Leonard and Murdoch 2009; Lerman and Zhang 2012). Among older Americans, decreased home values implied less money accessible for spending while retired, which impacted their quality of life (Munnell and Rutledge 2013). More generally, those who lost much of their housing wealth through the recession experienced heightened levels of stress (Yilmazer, Babiarz, and Liu 2015), corresponding with broader claims concerning the mental health effects of personal financial difficulties (Drentea and Reynolds 2015). Additionally, buildings abandoned through foreclosures accumulate insects and other carriers of disease (Burgard and Kalousova 2015). Even when any individual person faces a relatively low absolute risk of home foreclosure, a higher risk of foreclosure within his or her neighborhood can cause stress (Cagney et al. 2014).

For numerous reasons, I focus on city-level (specifically, metropolitan statistical areas (MSAs)) declines. The recession affected urban and rural areas differently (Thiede and Monnat 2016), complicating any study addressing both. Because MSAs approximate housing markets (Houle and Light 2017; Iceland, Weinberg, and Steinmetz 2002), they are effective for analyzing the recesion (Houle and Light 2017). Additionally, their economic and social integration (United States Census Bureau 2016) makes them accurate approximations of labor markets.

RESEARCH QUESTIONS AND HYPOTHESES

My central research questions are whether city-level economic declines through the Great Recession caused depressive symptoms among older residents, and to what extent these effects were mediated by their own asset losses. The ecological stress process model suggests that city-level economic shocks might cause depressive symptoms through personal financial losses as well as other pathways. Accordingly, I hypothesize that while significant proportions of the effects of changes in city-level foreclosure rates and median home prices through the recession upon depressive symptoms are mediated by changes in total household assets, these effects will remain significant after accounting for possible mediation.

DATA AND METHODS

Dataset and Sample

I use individual-level variables within the National Social Life, Health, and Aging Project (NSHAP), which is a longitudinal study of a representative sample of older Americans focused on health, well-being, and social relationships. 3,005 respondents from 57 to 85 years of age were interviewed at wave 1 (2005-2006). The NSHAP is based on a complex multi-stage area probability sample that includes 58 MSAs that varied substantially in their fortunes through the Great Recession. More information concerning the NSHAP's sampling design is provided in Suzman (2009) and O'Muircheartaigh, Eckman, and Smith (2009). The response rate at wave 1 was 75.5%, and 75.2% of respondents from wave 1 took part in wave 2 (2010-2011). I linked respondents with their MSAs using protected geodata obtained from the National Opinion Research Center through special contractual arrangements. Respondent retention between the first and second waves was similar for those initially residing within MSAs (76.0%). This dataset is especially effective since the first two waves bracket the peak of the Great Recession.

Because I am interested in how older residents are affected by changes within their cities over time, I study only respondents who did not change MSAs between the two waves. Of the 3,005 wave 1 NSHAP respondents, 2,073 resided within MSAs. A total of 731 either did not take part in wave 2 or relocated to a new MSA (the latter includes 16.1% of relevant NSHAP respondents). My analytical sample is 1,342 respondents. The range of number of respondents per MSA is 1 to 61, with an average of 23.14.

Respondents initially living within MSAs did not differ statistically from the rest according to gender, depression, smoking behavior, and social support from family and friends. However, at baseline, they were generally younger, more racially/ethnically diverse, wealthier, healthier, more educated, and more likely to be in a serious relationship and working for pay.

Wave 1 respondents successfully followed up at wave 2 did not differ statistically from the rest according to gender, race/ethnicity, total household assets, smoking behavior, and social support from family and friends. On the other hand, they were overall younger, more educated, healthier, less depressed, and more likely to be in a serious relationship and employed for pay. Retained respondents tended to live in MSAs with higher initial median household incomes and home prices, as well as lower initial rates of home foreclosures and unemployment.

Central Dependent Variable

My central outcome is depressive symptoms, studied through an index of eleven symptoms of depression and a rating of general happiness. The former were an eleven-item short form version of the twenty-item Center for Epidemiologic Studies Depression (CES-D) Scale. Items include the extent to which respondents did not feel like eating, felt everything was an effort, felt happy, felt sad, etc., over the previous week. Answers were on an ordinal scale from (1) rarely or none of the time to (4) most of the time. Two of these measures were reverse coded

to be in the direction of more depression. Respondents stated their general happiness on an ordinal scale from (1) unhappy usually to (5) extremely happy (reverse coded).

According to an exploratory factor analysis, these twelve measures were best combined into one factor at both waves (based on the Kaiser criterion). I created this factor by averaging standardized scores on these twelve measures, separately for each wave. Using the NSHAP, Payne et al. (2014) found that among older adults, these twelve measures form a single cluster of mental health and might be part of the same aspect of mental health. At both waves, this index's Cronbach alpha is greater than 0.70. Results were substantively identical when using an index based only on the eleven CES-D scale depressive symptoms.

Independent Variables

I obtained foreclosure information pertaining to 57 of the 58 MSAs from ATTOM Data Solutions; I was unable to obtain foreclosure information for the remaining MSA. Therefore, all models employing foreclosure rates have 19 fewer respondents. I studied percentage of homes in any stages of the foreclosure process: pre-foreclosure, auction, and bank owned (REO).

I obtained MSA-level median home prices from the U.S. Census Bureau – American FactFinder (2017). Wave 1 amounts were adjusted for inflation; following the U.S. Bureau of Labor Statistics – CPI Inflation Calculator (Consumer Price Index Inflation Calculator) (2017), they were multiplied by 1.11652. Because it is right skewed, I computed its natural logarithm at both waves. While normalizing the distribution, this transformation also allows the study of non-linear relationships between median home prices and other variables; the natural logarithm of a continuous variable allows it to be studied as ratios rather than absolute differences.

Mediating Variable

My putative mediating variable is total household assets, which are a more effective measure of NSHAP respondents' economic circumstances than income since a substantial proportion are retired. Prior research indicates that assets eclipse yearly income in importance for well-being in later life (Willson, Shuey, and Elder 2007; Robert and House 1996). Moreover, because the largest component of the typical American household's financial portfolio is the value of the primary residence (U.S. Census Bureau Support, personal communication, January 17, 2017), total household assets are more responsive to housing market conditions

Respondents stated in dollars the total assets of their households, including all sources of wealth subtracted by all forms of debt. Those who were uncertain or who declined to answer were provided a series of categories (e.g. between $10,000 and $50,000) from which to select. I assigned to these respondents the mid-point value of the selected range. Amounts from wave 1 were multiplied by 1.11652 to adjust for inflation (U.S. Bureau of Labor Statistics – CPI Inflation Calculator 2017). I computed its natural logarithm to correct the right skew. Since total household assets are assessed as a single overall measure, they include potential measurement error, which might inflate standard errors when assessing how they affect depressive symptoms.

Control Variables

Because I employ fixed-effects regression models, all time-invariant features of MSAs and respondents are controlled. I further include several time-varying individual-level control variables that are possible confounders of the relationship between total household assets and depressive symptoms. This helps rule out spuriousness and supports causal interpretations of my results by specifically targeting potential mediator-outcome confounding.

I control whether a respondent was married/cohabiting (reference: not married/cohabiting) and whether a respondent was working for pay (reference: not working for pay). I also control for residential relocation between the two waves (reference: did not relocate).

Four control variables pertain to respondents' physical health. I include self-rated physical health, ranging from (1) poor to (5) excellent (reference: poor health). I developed an index of functional difficulty based on mean scores pertaining to daily living activities (walking across a room, walking one block, bathing, dressing, getting in or out of bed, eating, and using toilet). Answers ranged from (0) no difficulty to (3) unable to do. At both waves, this index's Cronbach alpha is over 0.80. I employ a count of six possible chronic illnesses: stroke, cancer (excluding skin cancer), diabetes, heart disease, dementia, and arthritis. Respondents also reported whether they had ever been smokers (reference: was never a smoker).

Two control variables are based on social support. Support from family is assessed with two questions: "How often can you open up to members of your family if you need to talk about your worries?" and "How often can you rely on family for help if you have a problem?". Possible responses were (1) hardly ever, rarely, or never, (2) some of the time, and (3) often. Answers to these two questions were averaged. At both waves, this index's Cronbach alpha is over 0.62. A measure of support from friends was developed through answers to these two questions based instead on friends. At both waves, this index's Cronbach alpha is over 0.64.

Analysis

I employ fixed-effects linear regression models to estimate how changes in MSA-level foreclosure rates and median home prices through the Great Recession cause changes in depressive symptoms net of all time-invariant MSA- and individual-level variables and net of the control variables, as well as the extent to which total household assets mediate these

relationships. Because my analytical sample did not change MSAs, the individual-level fixed effects include the time-invariant characteristics of MSAs (including climatic characteristics, healthcare and educational infrastructure, general culture, and population composition). This is required since cities' differing population compositions could influence their susceptibility to the Great Recession (Arias et al. 2016; Florida 2016; Gray and Scardamalia 2014).

The first two models assess how changes in MSA-level total foreclosure rates (%) were associated with changes in logged total household assets. While the first model assesses this bivariate relationship, the second model adds the complete set of control variables. The third and fourth models repeat these analyses with logged MSA-level median home prices as the central independent variable. These four models are necessary preliminary steps for my mediation analyses; only if changes in MSA-level foreclosure rates and median home prices cause changes in total household assets can the latter be a mediator of the central relationships I study. These models also test the proliferation of economic stressors from the MSA to the individual level.

The central mediation analyses are based on the fifth to twelfth models. Models 5 through 8 assess how changes in MSA-level total foreclosure rates (%) are associated with changes in depressive symptoms. Model 5 assesses this bivariate relationship. Model 6 adds logged total household assets. While model 7 includes the complete set of control variables, model 8 further includes logged total household assets. Models 9 through 12 repeat these analyses with logged MSA-level median home prices as the central independent variable. In assessing the possible mediating role of total household assets, I focused on changes in the coefficients for the MSA-level measures when total household assets were added into the models.

Supporting causal interpretations of my mediation analyses requires that I control for confounders between changes in MSA-level foreclosure rates/median home prices and changes

in depressive symptoms, between changes in total household assets and changes in depressive symptoms, and between changes in MSA-level foreclosure rates/median home prices and changes in total household assets (see VanderWeele 2015). My fixed-effects modelling strategy and control variables address these requirements. For example, controlling for all stable individual-level traits nets out features of respondents, such as levels of education and race/ethnicity, that might affect placement into declining cities and susceptibility to asset losses and depressive symptoms. My set of control variables further net out individual-level changes over the two waves that might affect both asset losses and increases in depressive symptoms.

To prevent bias based on which types of respondents were more likely to have remained within the sample, I adopted the inverse probability weighting technique recommended by Hawkley et al. (2014). Causes for attrition include death, institutionalization, inability to locate a respondent, as well as relocation to a new MSA. An array of health and demographic variables from wave 1 were used to predict inclusion in wave 2. Inverse predicted probability scores from this logistic regression model were multiplied by the NSHAP's standard weights before being applied within the regression models. Those least likely to have been included in the analytical sample were thereby weighted more heavily. Still, sample attrition could result in underestimation of how city-level economic declines impact depressive symptoms, especially if those most susceptible to depressive symptoms were the least likely to remain within the sample.

Standard errors were adjusted for MSA-level clustering. Missing data were dealt with through multiple imputation using chained equations. Only total household assets had ten percent or more of the sample missing. Ten imputed data sets were created. My central dependent variable, depressive symptoms, was used in the imputation process. However, cases originally

missing on depressive symptoms were not included in the final analyses (von Hippel 2007), removing one respondent from the final sample. I used the Stata 15 statistical software package.

RESULTS

Table 1 presents the descriptive statistics. As my index of depressive symptoms is based on items standardized within each wave, it holds a mean of zero at both waves 1 and 2. MSA-level foreclosure rates show an increase over time, while logged MSA-level median home prices show a decrease over time. Logged individual-level total household assets substantially decline between the two waves. At wave 2, fewer respondents are married/cohabiting and working for pay. There are overall declines in physical health and increases in functional difficulties over time. Less than one fifth of respondents changed residences between the two waves.

- insert Table 1 about here-

I studied three correlations between logged total household assets and depressive symptoms, one at each wave, and one based on changes over time. At both waves, logged total household assets are significantly negatively correlated with depressive symptoms (wave 1: corr.: -0.205, $p < 0.001$; wave 2: corr.: -0.173, $p < 0.001$). The correlation between changes in logged total household assets and changes in depressive symptoms is statistically insignificant.

Table 2 shows that with and without the control variables included in the models, both changes in MSA-level total foreclosure rates (%) (model 1, without control variables: coeff.: -2.195, $p < 0.001$; model 2, with control variables: coeff.: -1.214, $p < 0.05$) and changes in logged MSA-level median home prices (model 3, without control variables: coeff.: 2.332, $p < 0.001$; model 4, with control variables: coeff.: 1.400, $p < 0.05$) are significantly associated with changes in logged total household assets, in the expected directions. The substantial decreases in the magnitudes of these coefficients when the control variables are included suggest that the effects

of the MSA-level economic measures upon total household assets are partly, but not fully, mediated through these individual-level changes.

The MSA-level coefficient from model 2 implies that a 0.5% increase in MSA-level foreclosure rate is associated with a drop of 45.5% in total household assets. The MSA-level coefficient from model 4 implies that a 40% reduction in MSA-level median home price is associated with a 51% decrease in total household assets.[1] Both are strong effects that show economic stressors proliferating from cities to people. Table 2 also shows that household assets rise among those transitioning into paid work, while declining among those changing residences.

-insert Table 2 about here-

Table 3 is based on the mediation analysis pertaining to MSA-level total foreclosure rates (%). All models show that MSA-level foreclosure rates are significantly associated with depressive symptoms. The coefficients substantially drop between the first two (model 5: coeff.: 0.366, $p < 0.001$; model 6: coeff.: 0.359, $p < 0.001$) and latter two (model 7: coeff.: 0.272, $p < 0.01$; model 8: coeff.: 0.271, $p < 0.01$) models, suggesting that the individual-level changes represented by the control variables partly mediate the central relationship. However, in neither model 6 nor 8 does the inclusion of logged total household assets substantially change the coefficients for MSA-level total foreclosure rates from models 5 and 7, respectively. Table 4, which is based on the mediation analysis pertaining to logged MSA-level median home prices, reveals similar patterns. Coefficients for logged MSA-level median home prices substantially differ only between the former two (model 9: coeff.: -0.405, $p < 0.01$; model 10: coeff.: -0.392, $p < 0.01$) and latter two (model 11: coeff.: -0.278, $p < 0.05$; model 12: coeff.: -0.276, $p < 0.05$) models. Tables 3 and 4 also show that changes in logged total household assets are not

significantly associated with changes in depressive symptoms, while higher physical and functional health are associated with less depressive symptoms.

-insert Tables 3 and 4 about here-

Since the standard deviation for depressive symptoms is 0.56 at wave 1 and 0.57 at wave 2, the MSA-level coefficient from model 8 implies that 0.5% increases in foreclosure rates are associated with just under a quarter of a standard deviation increases in depressive symptoms. The MSA-level coefficient from model 12 suggests that drops of 40% in MSA-level median home prices are associated with a quarter of a standard deviation rises in depressive symptoms.

Additional Analyses

In additional to foreclosure rates and home prices, prior scholars investigating the effects of the Great Recession have also focused on unemployment rates and household incomes (e.g., Chatterjee and Eyigungor 2015; Katz, Wallace, and Hedberg 2013; Zivin, Paczkowski, and Galea 2011). Because these are two additional central dimensions of economic decline through this recession, they are included in this study within supplementary analyses. While MSA-level unemployment rates (%) were obtained from the U.S. Bureau of Labor Statistics – Local Area Unemployment Statistics (2017), MSA-level median household incomes were obtained from the U.S. Census Bureau – American Factfinder (2017). For the same reasons as with median home prices and total household assets, I computed the natural logarithm of the latter variable. The results for these additional analyses can be viewed within the online supplementary appendix.

With and without the control variables included in the models, logged MSA-level median household incomes were not significantly associated with logged total household assets. Both with and without the control variables included, higher MSA-level unemployment rates (%) were significantly associated with lower logged total household assets.

Both supplementary MSA-level economic variables were significantly associated with depressive symptoms only when the set of control variables were not included in the models. In no case did the addition of logged total household assets substantially change any of the coefficients for the supplementary MSA-level economic measures.

DISCUSSION

I found that increases in MSA-level foreclosure rates and declines in MSA-level home prices through the Great Recession significantly affect older residents' depressive symptoms through pathways other than their own asset losses. While my hypothesis concerning mediated effects of MSA-level economic declines is not supported, my hypothesis that these effects significantly occur through other pathways is supported. Most studies of how economic shocks affect well-being focus on personal financial losses. Within the context of the Great Recession, my results suggest that this focus is limited. Features of declining cities, including compromised institutions, infrastructure (Kazembe and Nickanor 2017; Leventhal and Brooks-Gunn 2003; Tendler 1982), and societal cohesion and collective efficacy (McDaniel, Gazso, and Um 2013; Weffer et al. 2014), might more potently affect older adults than their own asset losses.

This study thus contributes to scholarship on how cities impact residents. It concurs with scholars emphasizing how the physical, demographic, housing, social, economic, and political features of cities hold consequences for residents' quality of life (Chernick et al. 2011; Galea et al. 2005; Hollander 2011; Peck 2012). This study also supports the ecological stress process model's claim that contextual stressors significantly impact mental health (Aneshensel 2010; Gilster 2014, 2016; Howze, Baldwin, and Kegler 2004; Mohammad et al. 2015; Parker et al. 2004), as well as its tenet that stressors can proliferate from more macro to more micro levels.

My analyses reveal that the two measures of MSA-level economic decline most closely associated with the housing market (rates of home foreclosures and median home prices) were the two significantly associated with both personal financial losses and depressive symptoms. This is not surprising, given the centrality of the housing market to the Great Recession. The other two MSA-level economic measures (considered in supplementary analyses), unemployment rates and median household incomes, were only significantly associated with depressive symptoms when the control variables were not included in the models. This suggests that these two MSA-level economic measures impact older residents mainly through the types of individual-level changes that are operationalized by this study's control variables. MSA-level foreclosure rates and home prices, on the other hand, might significanlty impact older residents' depressive symptoms through changes to features of contexts that are not captured by this study's individual-level control variables. This corresponds with the studies cited above that link rising foreclosure rates and decreasing median home prices with negative externalities at the level of the urban neighborhood that can be damaging to physical and mental health (Leonard and Murdoch 2009; Lerman and Zhang 2012).

The impacts of changes in MSA-level foreclosure rates and median home prices upon depressive symptoms are modest in magnitude. This is not unexpected, given that I am assessing the effects of macro-contextual economic changes over a relatively small interval of time while keeping constant all time-invariant city- and individual-level characteristics. I have uncovered some small, yet significant, contextual effects upon depressive symptoms.

My results show no evidence that asset declines cause depressive symptoms. McInerney, Mellor, and Nicholas (2013) also found that household asset losses through the Great Recession were not associated with rises in depression. Nonetheless, they found that those who underwent

large losses in wealth showed a 35% higher chance of taking antidepressant medication (McInerney et al. 2013). They suggest that this increased use of antidepressants might have prevented major depressive episodes. One's own financial losses might be more salient than gradual declines within one's city, and thus more likely to result in antidepressant use.

My results suggest that to help older persons cultivate the resources and protections that make them resilient through economic declines, we should focus on cities' institutions, infrastructure, services, amenities, and collective efficacy, all of which are compromised within declining cities (Kazembe and Nickanor 2017; Leventhal and Brooks-Gunn 2003; McDaniel et al. 2013; Tendler 1982; Weffer et al. 2014). Maintaining cities' and city neighborhoods' quality is perhaps even more important than helping older persons safeguard their personal wealth.

Limitations and Paths for Future Research

The present study is focused on depressive symptoms which can change in the short-term in response to changed life circumstances (Burgard and Kalousova 2015). The appropriate span of time for studying the health impacts of economic shocks varies according to the measure of health (Burgard and Kalousova 2015). For contextual economic declines to 'get under the skin' and impact physical health might require a longer time span. Accordingly, the present study should be replicated using a longer span of time to assess impacts on physical health.

This study should be repeated with younger adults. Younger adults experiencing the Great Recession might have been more concerned with difficulties buying a home, detriments to their paid work trajectories, as well as their families' economic futures. The relevant topics of study might differ when analyzing a younger sample.

My focus on MSAs is effective for numerous reasons. MSAs' social and economic integration (United States Census Bureau 2016) makes them effective approximations of labor

markets. They furthermore approximate housing markets (Houle and Light 2017; Iceland et al. 2002). Still, an MSA can encompass both urban and suburban areas that are likely to substantially differ socially and economically. Future research might focus on counties or census tracts as more fine-grained levels of analysis. In fact, numerous theories of contextual effects, including social capital (e.g., Putnam 2001) and social disorganization perspectives (e.g., Bursik 1988; Sampson and Groves 1989), suggest that neighborhood-level economic and social changes have strong effects upon well-being. Future research might also study how features of neighborhoods mediate and/or moderate the effects of city-level declines.

NOTES

1. Changes in MSA-level foreclosure rates range from -0.065% to +0.665%. The strongest drop in MSA-level median home prices is a 42% decrease, while the strongest rise is a gain of 45.5%.

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TABLES

Table 1. Descriptive Statistics (Number of Respondents = 1,342)

Variables	Wave 1		Wave 2	
Dependent Variable	**Mean/Proportion (%)**	**Standard Deviation**	**Mean/Proportion (%)**	**Standard Deviation**
Index of Depressive Mood	0.00	0.56	0.00	0.57
MSA-Level Independent Variables				
MSA-Level Total Foreclosure Rate (%)	0.07	0.05	0.24	0.18
MSA-Level Logged Median Home Price[a]	12.24	0.52	12.18	0.42
Mediating Variable				
Logged Total Household Assets[a]	11.97	2.30	11.38	3.63
Control Variables				
Is Married or Cohabiting	66.02%		60.51%	
Is not Married or Cohabiting	33.98%		39.49%	
Is Working for Pay	38.23%		22.40%	
Is not Working for Pay	61.77%		77.60%	
Poor Physical Health	4.40%		4.84%	
Fair	18.88%		21.83%	
Good	30.45%		33.38%	
Very Good	33.28%		28.17%	
Excellent	12.99%		11.77%	
Functional Health Problems	0.131	0.294	0.179	0.361
Chronic Diseases	1.032	0.956	1.085	1.019
Has Smoked	57.57%		59.69%	
Has Never Smoked	42.43%		40.31%	
Support from Family	2.445	0.595	2.413	0.625
Support from Friends	2.155	0.616	2.039	0.687
Did not Move between the Two Waves			80.69%	
Moved between the Two Waves			19.31%	

[a] Note: Values at wave 1 were adjusted for inflation between waves 1 and 2 by multiplying them by 1.11652 before they were logged.

Table 2. Fixed-Effects Linear Regression Analysis of Logged Total Household Assets

VARIABLES	Model 1	Model 2	Model 3	Model 4
Total Foreclosure Rate (%)	-2.195***	-1.214*		
	(0.456)	(0.498)		
Logged Median Home Price			2.332***	1.400*
			(0.576)	(0.531)
Married or Cohabiting		0.123		0.142
		(0.327)		(0.322)
Working		0.532*		0.586*
		(0.216)		(0.221)
Physical Health (ref. poor)				
Fair		0.076		0.068
		(0.497)		(0.479)
Good		-0.006		-0.015
		(0.477)		(0.457)
Very Good		-0.050		-0.054
		(0.530)		(0.515)
Excellent		0.248		0.231
		(0.566)		(0.555)
Functional Health Problems		-0.225		-0.196
		(0.478)		(0.470)
Chronic Diseases		-0.133		-0.131
		(0.141)		(0.137)
Smoking		-0.460		-0.519
		(0.325)		(0.337)
Social Support from Family		-0.121		-0.104
		(0.142)		(0.143)
Social Support from Friends		0.028		0.067
		(0.165)		(0.166)
Changed Residences		-0.767*		-0.945**
		(0.296)		(0.292)
Constant	12.262***	12.585***	-16.531*	-4.782
	(0.073)	(0.691)	(7.028)	(6.349)
Observations	2,644	2,644	2,680	2,679
Number of Respondents	1,322	1,322	1,341	1,341

Robust standard errors in parentheses

Two-tailed tests *** p<0.001, ** p<0.01, * p<0.05, † p<0.10

Table 3. Fixed-Effects Linear Regression Analyses of how Total Foreclosure Rates Affect Depressive Symptoms

VARIABLES	Model 5	Model 6	Model 7	Model 8
Total Foreclosure Rate (%)	0.366***	0.359***	0.272**	0.271**
	(0.085)	(0.085)	(0.091)	(0.091)
Logged Total Household Assets		-0.004		-0.001
		(0.007)		(0.007)
Married or Cohabiting			-0.100	-0.100
			(0.068)	(0.068)
Working			-0.048	-0.047
			(0.039)	(0.039)
Physical Health (ref. poor)				
Fair			-0.173*	-0.174*
			(0.068)	(0.068)
Good			-0.311***	-0.312***
			(0.071)	(0.071)
Very Good			-0.336***	-0.336***
			(0.077)	(0.077)
Excellent			-0.421***	-0.421***
			(0.079)	(0.079)
Functional Health Problems			0.233**	0.233**
			(0.070)	(0.070)
Chronic Diseases			-0.013	-0.013
			(0.017)	(0.017)
Smoking			0.019	0.018
			(0.072)	(0.072)
Social Support from Family			-0.040	-0.040
			(0.024)	(0.025)
Social Support from Friends			0.008	0.008
			(0.021)	(0.021)
Changed Residences			-0.004	-0.005
			(0.034)	(0.035)
Constant	-0.068***	-0.024	0.365**	0.384*
	(0.013)	(0.081)	(0.127)	(0.162)
Observations	2,644	2,644	2,644	2,644
Number of Respondents	1,322	1,322	1,322	1,322

Robust standard errors in parentheses

Two-tailed tests *** p<0.001, ** p<0.01, * p<0.05, † p<0.10

Table 4. Fixed-Effects Linear Regression Analyses of how Median Home Prices Affect Depressive Symptoms

VARIABLES	Model 9	Model 10	Model 11	Model 12
Logged Median Home Price	-0.405**	-0.392**	-0.278*	-0.276*
	(0.141)	(0.140)	(0.127)	(0.127)
Logged Total Household Assets		-0.005		-0.002
		(0.006)		(0.007)
Married or Cohabiting			-0.122†	-0.120†
			(0.067)	(0.067)
Working			-0.071†	-0.070†
			(0.038)	(0.038)
Physical Health (ref. poor)				
Fair			-0.135†	-0.136†
			(0.072)	(0.072)
Good			-0.268***	-0.268***
			(0.076)	(0.076)
Very Good			-0.294***	-0.294***
			(0.082)	(0.082)
Excellent			-0.378***	-0.379***
			(0.084)	(0.084)
Functional Health Problems			0.254***	0.253***
			(0.066)	(0.066)
Chronic Diseases			-0.011	-0.012
			(0.017)	(0.018)
Smoking			0.035	0.034
			(0.077)	(0.077)
Social Support from Family			-0.041†	-0.043†
			(0.024)	(0.024)
Social Support from Friends			0.007	0.008
			(0.021)	(0.021)
Changed Residences			0.027	0.025
			(0.032)	(0.033)
Constant	4.934**	4.843**	3.765*	3.766*
	(1.721)	(1.711)	(1.528)	(1.525)
Observations	2,682	2,680	2,681	2,679
Number of Respondents	1,341	1,341	1,341	1,341

Robust standard errors in parentheses

Two-tailed tests *** p<0.001, ** p<0.01, * p<0.05, † p<0.10

ONLINE SUPPLEMENTARY APPENDIX

Table A-1. Fixed-Effects Linear Regression Analysis of Logged Total Household Assets

VARIABLES	Model 1	Model 2	Model 3	Model 4
Unemployment Rate (%)	-0.122***	-0.071*		
	(0.025)	(0.029)		
Logged Median Household Income			3.082	0.903
			(2.891)	(2.083)
Married or Cohabiting		0.053		0.181
		(0.331)		(0.328)
Working		0.460*		0.640**
		(0.216)		(0.222)
Physical Health (ref. poor)				
Fair		0.136		0.0294
		(0.485)		(0.482)
Good		0.042		-0.057
		(0.461)		(0.463)
Very Good		-0.010		-0.080
		(0.517)		(0.526)
Excellent		0.317		0.246
		(0.551)		(0.565)
Functional Health Problems		-0.137		-0.208
		(0.460)		(0.464)
Chronic Diseases		-0.117		-0.145
		(0.142)		(0.138)
Smoking		-0.477		-0.554†
		(0.327)		(0.328)
Social Support from Family		-0.129		-0.107
		(0.139)		(0.145)
Social Support from Friends		0.036		0.059
		(0.166)		(0.167)
Changed Residences		-0.743*		-1.013***
		(0.310)		(0.291)
Constant	12.819***	12.922***	-21.505	2.553
	(0.183)	(0.727)	(31.353)	(22.448)
Observations	2,680	2,679	2,680	2,679
Number of Respondents	1,341	1,341	1,341	1,341

Robust standard errors in parentheses

Two-tailed tests *** p<0.001, ** p<0.01, * p<0.05, † p<0.10

Table A-2. Fixed-Effects Linear Regression Analyses of how Unemployment Rates Affect Depressive Symptoms

VARIABLES	Model 5	Model 6	Model 7	Model 8
Unemployment Rate (%)	0.014**	0.014**	0.006	0.006
	(0.005)	(0.005)	(0.005)	(0.005)
Logged Total Household Assets		-0.004		-0.002
		(0.007)		(0.007)
Married or Cohabiting			-0.120†	-0.118†
			(0.067)	(0.068)
Working			-0.067†	-0.067†
			(0.039)	(0.039)
Physical Health (ref. poor)				
Fair			-0.138†	-0.139†
			(0.072)	(0.072)
Good			-0.270***	-0.270***
			(0.076)	(0.076)
Very Good			-0.297***	-0.297***
			(0.082)	(0.082)
Excellent			-0.390***	-0.391***
			(0.084)	(0.084)
Functional Health Problems			0.253***	0.252***
			(0.070)	(0.070)
Chronic Diseases			-0.010	-0.011
			(0.017)	(0.018)
Smoking			0.037	0.035
			(0.080)	(0.080)
Social Support from Family			-0.038	-0.040
			(0.024)	(0.024)
Social Support from Friends			0.011	0.012
			(0.020)	(0.020)
Changed Residences			0.019	0.017
			(0.035)	(0.036)
Constant	-0.112**	-0.060	0.317*	0.345*
	(0.034)	(0.090)	(0.136)	(0.167)
Observations	2,682	2,680	2,681	2,679
Number of Respondents	1,341	1,341	1,341	1,341

Robust standard errors in parentheses

Two-tailed tests *** p<0.001, ** p<0.01, * p<0.05, † p<0.10

Table A-3. Fixed-Effects Linear Regression Analyses of how Median Household Incomes Affect Depressive Symptoms

VARIABLES	Model 9	Model 10	Model 11	Model 12
Logged Median Household Income	-0.895**	-0.873**	-0.499	-0.498
	(0.314)	(0.318)	(0.329)	(0.330)
Logged Total Household Assets		-0.007		-0.003
		(0.006)		(0.007)
Married or Cohabiting			-0.125†	-0.122†
			(0.067)	(0.067)
Working			-0.077*	-0.075*
			(0.037)	(0.037)
Physical Health (ref. poor)				
Fair			-0.124†	-0.125†
			(0.073)	(0.073)
Good			-0.255**	-0.256**
			(0.076)	(0.076)
Very Good			-0.282**	-0.283**
			(0.082)	(0.082)
Excellent			-0.370***	-0.371***
			(0.082)	(0.082)
Functional Health Problems			0.250***	0.248***
			(0.067)	(0.067)
Chronic Diseases			-0.009	-0.011
			(0.018)	(0.018)
Smoking			0.038	0.036
			(0.080)	(0.080)
Social Support from Family			-0.043†	-0.045†
			(0.023)	(0.023)
Social Support from Friends			0.008	0.008
			(0.021)	(0.021)
Changed Residences			0.032	0.030
			(0.033)	(0.034)
Constant	9.696**	9.538**	5.786	5.805
	(3.404)	(3.445)	(3.568)	(3.580)
Observations	2,682	2,680	2,681	2,679
Number of Respondents	1,341	1,341	1,341	1,341

Robust standard errors in parentheses

Two-tailed tests *** p<0.001, ** p<0.01, * p<0.05, † p<0.10