Extended Abstract

Age and Neighborhood Change: Health Consequences of Neighborhood Decline for Older Adult Residents

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Introduction

Research on aging has long speculated that neighborhood social contexts are particularly important for older adults. Indeed, recent empirical research on the neighborhood context of aging has offered evidence of links between features of neighborhoods (e.g., economic disadvantage, the built environment, levels of social cohesion) and outcomes such as disability (Freedman et al. 2008), physical activity (Mendes de Leon 2009), self-rated health (Cagney et al. 2005) and cognitive status (Lang et al. 2008). The relevance of neighborhood environments for older adults has typically been attributed to the decreasing radius of routine activity that occurs with age. As individuals age, retire, and adjust to more limited mobility, the immediate residential environment may play an increasingly important role in shaping day-to-day experiences.

Using data from the National Social Life, Health, and Aging Project (NSHAP), we examine the extent to which changes in the physical conditions of immediate residential neighborhood environments influence changes in health-related outcomes. Recent dramatic declines in the US housing market have resulted in unprecedented levels of foreclosure in some geographic regions and corresponding declines in the physical condition of neighborhoods across the country. Wave 1 (W1) of NSHAP occurred in 2005-6 and Wave 2 (W2) has just come out of the field. Thus the timing of the waves corresponds to the peak of the housing market bubble (2005-6; W1) and the recent aftermath of the economic collapse of 2008 (2010-11; W2). Using interviewer reports of the condition of buildings near the respondent's residence at both waves, we consider the extent to which geographically variable, but potentially dramatic changes in the physical conditions of the immediate environment result in changes in older adults' health behaviors and health status. Changes in the physical conditions of neighborhoods due to the economic downturn offer a unique opportunity to examine the impact of relatively short-term changes in environmental conditions on older adult health and well-being.

Theoretical Background

The Foreclosure Crisis and Housing Decline
Recent evidence suggests that the foreclosure crisis, emerging in full force in 2007, has had devastating effects on the housing market and corresponding impact on the physical condition of housing units in neighborhoods characterized by high rates of foreclosure. Economic models point to significant neighborhood externalities associated with increases in foreclosure rates (Leonard and Murdoch 2009; Immergluck and Smith 2005). Foreclosure is the outcome of

failure to pay mortgage for more than 60 days, after which the holder of a mortgage may seek to foreclose on the property. States vary in the process by which a foreclosure unfolds, but the typical length of time between default and repurchase by a new homeowner may be considerable – a period in which properties are likely to experience significant decline. The duration of this period has, no doubt, increased in the most recent housing downturn due to the unprecedented glut of foreclosed properties on the market.

Drawing on physical and social disorder approaches, we hypothesize a number of mechanisms through which increased foreclosure rates and the corresponding decline in the condition of housing might affect health outcomes, described in more detail below. A key component of our model, however, is that housing decline, represented by declining property maintenance, the increased presence of vacant/abandoned buildings, and the associated potential for increased criminal activity (Immergluck and Smith 2006) may result in health behaviors and stress responses with significant consequences for health.

Neighborhood Disorder and Older Adult Health
The link between neighborhood social and physical disorder and health outcomes has been the subject of increasing interest in research on the social context of health. Building on a larger extant literature examining the influence of neighborhood social disorganization on health (Sampson 2003; Browning et al. 2003), research on the health consequences of disorder has emphasized visible cues of social and physical decline as the aspects of social disorganization with particular relevance for individual health status and health behaviors. Disorder in the vein of boarded-up buildings, graffiti, and physical signs of deterioration may combine with indicators of social decline (e.g., loitering and crime) to bring about fear and social withdrawal (Skogan 1990). Fear may discourage contact among residents (Krause 1993; Thompson & Krause 1998) and may lead to lower levels of street activity (Jacobs 1961) further discouraging older adults from venturing outside. Disorder's impact also may operate through fear responses that influence the stress process, with consequences for health (e.g., heightened C-reactive protein (CRP) as an indicator of inflammation (Browning, Cagney, & Iveniuk, 2011). For older adults, fear and social withdrawal may exacerbate the symptoms and conditions of an already-compromised health state.

Disordered social and physical spaces also may influence health behaviors. The literature suggests that increases in alcohol consumption and smoking take place in the context of declining physical surroundings (Stockdale et al. 2007 ;Miles 2006) and levels of obesity are markedly higher in communities where social and physical disorder are present (Boardman et al. 2005; Chang 2006). Women, in particular, may exercise less if the immediate physical environment seems uninviting for such activity (Wen et al. 2007). Less is known about the extent to which health behaviors may be differentially affected across stages of the life course but research does suggest that older adults who are less physically active are at heightened risk for disabling events such as falls (Gill et al. 2005).

The Current Study

Our plan is to exploit the fortuitous timing of the NSHAP study to investigate the link between changes in neighborhood conditions and changes in key health outcomes. As noted, an important advantage of the NSHAP study for the purposes of this paper is its measurement of

environmental conditions as well as health status – the latter with high quality biomeasures. Accordingly, our analytic strategy will examine changes in key outcomes (e.g., BMI, CRP, alcohol consumption, physical activity) over the two waves regressed on changes in neighborhood physical environments. Using the rich array of controls available in the NSHAP data, our approach offers an opportunity to more rigorously assess the impact of changing neighborhood conditions on health outcomes. As of this writing NSHAP W2 data have just been released. An analytic data set will be ready in mid-October of this year, allowing us to investigate changes between W1 and W2. We provide here an example of the analysis in the cross-section using W1 (an important first step in the analytic strategy). These results, described below, suggest that there is a relationship between physical disorder and health status (e.g., CRP and obesity). We believe this initial analysis provides preliminary evidence consistent with the hypothesis that disorder in the form of deteriorated local housing conditions influences health-related outcomes.

Data and Measures

We make use of National Social Life Health and Aging Project (NSHAP), which offers a unique combination of social and health measures for testing our hypotheses. NSHAP is a national probability sample of 1550 women and 1455 men, aged 57-85, with oversampling of blacks, Hispanics, men and adults aged 75 to 84 years old in order to make inferences about smaller populations of older adults. The NSHAP sample was generated from the household listings of the Health and Retirement Study, although the HRS target population and NSHAP do not overlap. NSHAP completed its first field period in 2006, collecting a large number of biomeasures, physical and mental health scales and social network variables. The survey also contains interviewer assessments of the respondent's neighborhood. In total, the sample is made up of 3005 older adults, with an overall response rate of 75.5%. Of these, 1939 subjects have data on CRP levels (64.5%), and 2790 have no missing data for height and weight (92.9%). Institutional review boards at the Division of the Social Sciences, University of Chicago and National Opinion Research Center approved data collection procedures (O'Muircheartaigh et al. 2009).

We focus on two health outcomes: obesity and C-Reactive Protein (CRP). Obesity is defined by body mass index over 30, which is the recommended cutoff provided by the CDC (2011). Weight and height were measured by the interviewer, not given by the respondent. We dichotomize CRP in order to account for the non-normal shape of its distribution in this sample (Skewness = 8.58). Typically, clinically elevated CRP is defined as 3.0 mg/liter or more in a blood sample. However, individuals with more than 10 mg/liter may be suffering from infections or serious metabolic issues which are not the result of more conventional stressors, and which do not forecast the same disease trajectories (McDade et al. 2006). There are 100 such persons in the NSHAP sample, and we recode them as missing data in all of the analyses below.

In our models, we also control for the respondent's difficulties with Activities of Daily Living (ADL; Katz 1963). These are: difficulty walking across a room, walking one block, dressing oneself, bathing, eating, getting in and out of bed, using the toilet, driving a car during daytime, and driving a car at night. If a respondent reported any difficulty with any of these activities, they were coded as having a '1' for that item, and their items were summed. In the NSHAP sample, 1913 respondents (63.70%) reported having no difficulties at all; 450 (14.99%)

reported having only one problem. The maximum value was 7 (1.30%). We control for this variable in order to assess the association between neighborhood conditions and both BMI and CRP net of potentially preexisting health conditions. The models may be considered conservative, however, to the extent that ADLs capture health effects of neighborhoods that mediate the relationship between neighborhood disorder and our outcomes.

We used two separate scales for mental health. The first is the Center for Epidemiologic Studies Depression Scale (CES-D). NSHAP uses the Iowa Short Form of the CES-D, with 11 questions in total. These include whether the respondent has had restless sleep, feels people were unfriendly, and feels unable to enjoy life (alpha = .80). The Iowa Short Form has a cutoff value of 9 or greater, which is sometimes used as a categorical marker of whether a person is depressed (Kohout et al. 1993). However, for the purposes of this study it is not important for us to determine absolutely who is and is not depressed in the NSHAP sample.

We also measured the respondent's self-reported loneliness, using a three-item modified version of the UCLA Loneliness Scale. The questions in this scale ask whether the respondent lacks companionship, feels left out, and feels isolated (alpha = .79). It has been shown to be highly correlated with the longer scale, previously used in the Health and Retirement Study (Hughes et al. 2004). Loneliness and depression are offered as possible proxies for the impact of increasing social isolation upon the respondent's psychology, leading to further disinvestment in themselves and their home environments.

Analytic Strategy

Ordinarily we would fit a fixed-effects model in order to control for interviewer-specific biases, however the logit link function, combined with some of the small number of respondents for some interviewers makes this problematic. More than sixty years of statistical literature testifies to what is called "the incidental parameter problem," which proves that for some set of groups T in sample of size N, as T goes to N the estimators in a fixed-effects model will be inconsistent, sometimes doubling in size (Neyman and Scott 1948; Andersen 1970; Chamberlain 1980; Lancaster 2000; Greene 2008). The only case where this is not a problem is if the outcome is continuous, and the link function is the identity; all other types of outcomes in multi-level models suffer from the incidental parameter problem (Hamerle and Ronning 1995). This makes a random-effects model preferable, alongside other methods which do not actually estimate fixed-effects parameters, including conditional logit models (Lancaster 2000). The results presented were verified using conditional logits, with virtually identical findings. The random effects model allows us to account for any non-independence of observations within interviewers (Hamerle and Ronning 1995; Lancaster 2000). Most statistical software packages are, however, unable to fit hierarchical models where the sampling weights vary within higher-order clusters, which is exactly what we would wish to do here. Our solution is to fit a GLLAMM (Generalized Latent Linear And Mixed Model), which allows us to differently weight all respondents seen by any particular interviewer (Hesketh, Pickles and Skrondal 2001). GLLAMMs with random intercepts were fit using Stata/SE 11.1 statistical software (StataCorp 2009).

Results

The models in Table 1 suggest that net of psychological health, functional health, as well as demographic variables (race, age, gender, marital status and education), and taking into account the potential dependence of observations within interviewer, the effect of neighborhood disorder on health remains significant for BMI and marginally so for CRP. One surprising result is that while ADL difficulty is a highly significant predictor of both obesity and elevated CRP, mental health shows no significant associations at all. Surprisingly, marital status also proves to be insignificant in the full models. Marriage has been well-documented as a source of social support and is associated with better health. These relatively conservative models offer evidence that neighborhood disorder affects health outcomes above and beyond the influence of important health-related predictors such as ADLs, loneliness, and depression.

We will extend this study to examine change in neighborhood physical conditions (namely decline) on changes in health and health behaviors. With NSHAP W2 we will be able to see whether levels of neighborhood disorder dramatically increased for already-disordered neighborhoods, following the housing crisis, and whether increases in levels of disorder interact with higher baseline disorder to produce worse health. That the housing crisis has, in various ways, contributed to the further impoverishment and worse health of already-poor Americans has been explored. However the question of whether the crisis' effects extend to 'broken windows' and other visible signs of disorder has not been studied.

Discussion and Next Steps

Our preliminary analyses indicate that the condition of proximal physical surroundings has implications for two key markers of physical health – CRP and BMI. Although these analyses rely on cross-sectional evaluations we believe they provide evidence that our planned analysis of neighborhood change has merit. The NSHAP data, to our knowledge, are the first of their kind to track changes in high quality biomeasures as they relate to changes in the immediate residential environments of respondents. Since NSHAP data provide interviewer assessments of the condition of surrounding buildings in both waves we are able to gain insight into the potential for these environmental inputs to alter health states. Apart from the data provided in NSHAP W2 we will have geocoded data that characterize the economic status and social structure of the surrounding area. We will also explore data sources on foreclosure rates at the neighborhood level. We will use these data to link changes in foreclosure rates across waves with changes in health outcomes and explore the potential mediating role of changes in disorder.

The population structure of the US is rapidly aging: older adults increasingly indicate that they wish to age in place but the extent to which neighborhoods can fully support a more vulnerable population is relatively unknown. So too are the health effects of a rapid negative change in the economy which further degrades the ability of communities to support and sustain healthful activities and interaction. Knowledge of the implications of neighborhood change can inform initiatives in health and healthcare.

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Table 1. Random-Effects Model Estimates of the Effect of Increases in Neighborhood Disorganization on Physical Health Outcomes (Odds Ratios)

	High C-Reactive Protein	Obesity
Variables		
Neighborhood Disorder	1.234 +	1.278 *
	(0.153)	(0.131)
Control Variables		
African-American	1.534 +	1.548 *
	(0.352)	(0.329)
Male	0.726 +	1.210
	(0.141)	(0.147)
Married	1.083	1.042
	(0.224)	(0.135)
Age	0.975 *	0.949 ***
	(0.011)	(0.008)
Education		
High School	0.572 *	1.057
	(0.133)	(0.171)
Col/Voc/As.	0.664 *	1.153
	(0.137)	(0.212)
BA or higher	0.380 **	0.821
	(0.126)	(0.157)
Health		
ADL Difficulties	1.293 ***	1.342 ***
	(0.080)	(0.071)
Depression	0.865	0.925
	(0.155)	(0.141)
Loneliness	0.906	0.959
	(0.195)	(0.130)
Constant	2.807	13.378 ***
	(2.516)	(9.723)
Interviewer Effects		
Variance	0.109	0.145
	(0.059)	(0.065)
Log-Likelihood	-793.984	-1379.650
n	1442	2148