The Mental Health Benefits of Acquiring a Home in Older Age: A Fixed-Effects Analysis of Older Americans

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Running head: Homeownership and Mental Health in Old Age

Abstract

Homeownership is consistently associated with better mental health, but whether becoming a homeowner in later in life has positive psychological benefits has not been examined. We assessed whether acquiring a home after 50 is associated with depression in a representative sample of older Americans. We used individual fixed-effects models based on data from 20,524 respondents aged ≥50 from the Health and Retirement Study and interviewed biannually between 1993 and 2010. Depressive symptoms were measured using the 8-item Centre for Epidemiologic Studies Depression scale. Controlling for confounders, becoming a homeowner in later life predicted a decline in depressive symptoms in the same year (β=-0.0768, 95% CI [confidence interval]: -0.152, -0.007). The association remained significant after two years (β=-0.0556, 95% CI: -0.134 to -0.001) but weakened afterwards. Buying a home for reasons associated with positive characteristics of the new house or neighborhood drove this association (β=-0.426, 95% CI: -0.786, -0.066), while acquiring a home for reasons associated with characteristics of the previous home or neighbourhood, the desire to be closer to relatives, downsizing or upsizing did not predict mental health improvements. Findings suggest that there are small but significant benefits for mental health associated with acquiring a home in older age.

Keywords: depression, housing, homeownership, ageing, fixed-effects models

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Introduction

The association between housing and health is well-established (1). Previous studies suggest that housing may influence health through three main pathways: neighborhood characteristics, housing conditions and housing tenure (2, 3). Extensive research has focused on establishing the impact of neighborhood characteristics and housing quality on health, while less is known about the benefits or harms of housing tenure type (3). A number of studies have found an association between homeownership and better physical health (4-15), mental health (16, 17) and longevity (15, 18). However, whether this relationship is causal has been debated (2). Indeed, an important limitation of these studies is the strong selection associated with homeownership (19). Individual characteristics from childhood to adulthood are likely to be associated with both homeownership and health in later life (20). In addition, healthier individuals enjoy longer and more stable careers (21), increasing their ability to accumulate wealth (22) and consequently access mortgage loans. These concerns have led to a reassessment of the potential mental health benefits of homeownership in early adulthood (23). Less is known, however, about the causal association between acquiring a home and mental health in older age.

Today, over 70% Americans aged 50 and over own a home (24). The number of Americans who are homeowners increased steadily during the second half of the 20th Century and until the early 2000's, encouraged by active pro-homeownership policies (25). Most Americans access the housing ladder in their thirties (26) but the dynamics of homeownership attainment are changing. There was, for example, a 16-point difference between the homeownership rate of those aged 40 to 44 in 2005 (70%) and 2015 (54%) (27). Aggregate homeownership rates also mask important disparities (28). Homeownership access has historically been low for Black households: in 2015, 56% of

Blacks aged 55-64 were homeowners, as opposed to 82% of Whites at the same age. In 2015, a third of Black Americans was not a homeowner (27). Whether delayed access to homeownership has implications for mental health in later life is not clear. An important, yet untested, hypothesis is that acquiring a home later in life may lead to improvements in mental health and wellbeing.

Acquiring a home in later life may influence mental health through several mechanisms. Studies suggest that homeownership is associated with better quality of housing (29), which is in turn associated with lower levels of mental distress and better positive affect (30, 31). Housing conditions are an important determinant of mental health in old age: Compared to their younger counterparts, older people spend more time in their home due to reduced functioning, access to transportation and social networks (30, 32). They also invest more in local services because they are less mobile and are more likely to benefit themselves from these investments than renters (33-35). Acquiring a home later in life may also increase self-esteem, control and autonomy, which are associated with better mental health (8, 36, 37).

This study aims to estimate the impact of acquiring a home on depressive symptoms in older age. Depression in older age is a significant problem in the United States: Approximately 7% of Americans above the age of 74 suffer from major depression and 17% from elevated depressive symptoms (38, 39). Major depression is the leading cause of years lived with disability worldwide and the fifth leading cause of disability-adjusted life years in North America (40, 41). We use data from the Health and Retirement Study, a longitudinal study that follows older Americans since 1992. Our paper builds up on earlier work (16, 17, 23) by using panel data and individual fixed-effects models that exploit

individual-level changes in homeownership. Our estimates provide new evidence on the potential mental health benefits of acquiring a home in later life.

Methods

Study population

The Health and Retirement Study (HRS) is a nationally representative study of Americans aged ≥50 started in 1992. The HRS sample is selected based on a multi-stage area probability sample. Details of the study are provided elsewhere (42). Enrollment occurred in 4 waves (1992, 1993, 1998 and 2004), depending on respondents' birth year. HRS included respondents from several birth cohorts: The Asset and Health Dynamics Among the Oldest Old cohort (born 1923 or earlier), the children of the depression (1924-1930), the initial HRS cohort (1931-1941), War babies (1942-1947), early (1948-1953) and mid baby boomers (1954-1959). Biennial interviews were conducted through 2010, and wave-to-wave retention rates were around 90%. Our dataset comprised eleven HRS waves starting in 1993, the first year that depressive symptoms were measured, and ending in 2010. We excluded 441 respondents living in nursing homes at the first wave they were observed in our data. Respondents were right censored upon entry into a nursing home or loss to follow up (N=680). The final sample comprised 20,524 individuals living in the community.

Assessment of depressive symptoms

An eight-item version of the Centre for Epidemiologic Studies Depression (CES-D) scale was used to measure depressive symptoms (43). CES-D is a valid and reliable scale, widely used to measure depression in older age (40, 44). The score ranges from zero to eight, with higher scores indicating higher levels of depressive symptoms. A cut-off point of three is often used to define high levels of depressive symptoms (45, 46).

Moving to an owner-occupied home after age 50

HRS respondents provided information on their tenure status at each wave of the survey. Individuals who reported living in rented housing at time *t*, but who reported living in an owner-occupied home at time *t*+2, were considered new homeowners. We did not consider as new homeowners those who bought a second residence or a residence to which they did not move. HRS does not include information on residential histories so this study is exclusive to transitions from renting to owning a home after 50, regardless of respondents' homeownership status before entering the survey.

HRS also asked respondents who moved to a new residence the reasons for this change. **Web Table 1** provides examples of stated reasons for moving houses. In total, there were 47 broad reasons respondents provided for a move. Based on previous literature (47, 48), we reclassified these reasons into six broad categories which cover individual- as well as neighborhood-level drivers for the move: (a) pull factors (e.g. more appealing neighborhood with better access to transportation and services); (b) push factors (e.g. poor neighborhood conditions or economic insecurity); (c) the desire to be closer to family or friends; (d) downsizing (moving to a smaller and/or less expensive house); (e) upsizing (moving to a larger home), and (f) the expressed desire to be a homeowner. Each category was coded as mutually exclusive. Reasons for moving were coded as a categorical variable; with push factors as the reference category. The 'reason-for-move' subsample is smaller than the main analytic sample because HRS collected this information only starting in 1996 (N=4,195, which corresponds to 38% of those who moved).

Covariates

Respondent's time-invariant characteristics included gender, race (White, Black or Hispanic), and highest educational level attained (lower than high school, General Education Development, high-school graduate, some college, college or above).

Time-varying demographic confounders, measured at each wave, included age (included as a linear term and squared), marital status (married or in partnership, separated or divorced, widowed, never married), size of the household and number of children. Time-varying socioeconomic characteristics, measured at each wave, included labor force participation (employed, unemployed, retired, disabled, not in the labor force), log natural logarithms of household income and non-housing wealth. Time-varying measures of physical health and behavior assessed at each wave comprised self-reported health (dichotomized into fair/poor vs. excellent/very good/good), tobacco smoking (ever smoked vs. no; and currently smoking vs. no), heavy alcohol drinking (based on self-report of consuming more than two drinks per day over five to seven days a week), and physical functioning (measured by the number of difficulties with activities of daily living [ranging from zero to five] and instrumental activities of daily living [ranging from zero to three]).

Data analysis

Hausman specification tests (49) suggested that the assumption of no correlation between explanatory variables and individual characteristics was violated in the random-effects models (results presented in **Web Table 2**). We therefore used individual fixed-effects models, which exploit within-individual changes in homeownership, consequently controlling for time-invariant confounders that differ across individuals such as unobserved family background characteristics or preexisting levels of physical and mental health (50-52). Fixed-effects models compare the depressive symptom levels of a respondent before buying a home to that same respondent's depression score when he/she becomes homeowner, net of the effect of time invariant characteristics and time-variant

control variables (53). We adjusted for all time-varying factors described above: age, marital status, size of the household, number of children, labor force participation, natural logarithms of total household income and of non-housing wealth, self-reported health, health behaviors (smoking and drinking) and number of limitations with ADLs and IADLs. To minimize the potential impact of reverse causality, we also controlled for the lagged value of depressive symptoms in the previous wave. Our approach satisfies the two conditions of fixed-effects models: the outcome variable should be measured for each respondent in a similar fashion for at least two time points; and the exposure variable should vary over time for at least part of the respondents (54).

Our linear model was as follows:

$$Dep_{it} = \mu_t^1 + \beta^2 homeownership_{it} + \beta^3 X_{it} + \beta^4 Dep_{i,t-1} + \alpha_i^5 + \varepsilon_{it} \quad (1)$$

Where Dep_{it} indicates the depressive symptoms score for individual *i* at time *t;* $homeownership_{it}$ is the homeownership indicator that takes the value 1 of the individual is a homeowner and 0 otherwise; X_{it} a vector of supplementary time-varying controls; $Dep_{i,t-1}$ is a control for the depressive symptoms score at the previous wave (two years before); and ε_{it} is the error term. μ_t if a fixed effect for time that accounts for time trends that are constant across individuals; and α_i controls for time-invariant individual characteristics. We used the same model specification to examine the relationship between the six reasons stated for acquiring a house and mental health and introduced an interaction term between acquiring a new home and the reason for the move. The estimate of interest (the interaction term) captures the change in depressive symptoms for a renter after becoming homeowner due to a specific reason, relative to the change in depressive symptoms for respondents moving for the same reason but remaining homeowners or renters. In all models, homeownership status was coded as an absorbing state, whereby individuals who

became homeowners at some point in the observation period remained homeowners for the rest of follow-up. This specification allowed us to examine both contemporaneous as well as lagged effects of acquiring a home in older age (55).

We followed a stepwise approach to build the fixed-effects models, starting with a model that controlled for age, age-squared and survey year only (model 1). We then incorporated additional controls for time-varying variables (model 2). Data were initially analyzed separately for men and women but estimates were subsequently pooled because results did not differ by gender. We estimated individual clustered robust standard errors for all estimates. All analyses were conducted in Stata version 14.0.

Results

Sample baseline characteristics are summarized in **Table 1,** separately for homeowners and renters. The vast majority of respondents (76.2%) were already homeowners at the time they enrolled in the study. The average depressive symptoms score was 1.356 point and 15.98% of respondents had a score superior or equal to three on the CES-D score, corresponding to the cut-off indicating clinical depression symptomatology. Those who were renters at baseline (23.8%) differed from homeowners along several important dimensions. They had higher levels of depressive symptoms (mean CES-D score: 2.257), and they were more likely to report being in poor physical health (41.50%). They were also more likely to be female (56.76%), Black or Hispanic (37.23% and 12.49% respectively), and to have a level of education lower than high school (30.90%) compared to homeowners. Renters at baseline were also more likely to be separated or divorced (30.90%), and had less financial wealth and lower incomes.

<Insert Table 1 here>

During the entire study period, a total of 2,462 respondents became homeowners. The majority (64.44%) became homeowners between the age of 50 and 65. Results from a random-effects model (**Web Table 3**) show that being a female, Black or Hispanic, and having divorced, being widowed or never married at the previous wave were key predictors of acquiring an owner-occupier home in our sample. Results from fixed-effects models are displayed in **Table 2**. Losing a spouse and declining self-reported health were the strongest predictors of increases in depression (β=0.650, 95% CI: 0.577 to 0.723 and β=0.521, 95% CI: 0.479 to 0.562 respectively). Becoming a homeowner predicted a decline in depressive symptoms in the same year (β=-0.0768, 95% CI: -0.152, -0.007), which corresponds to a 6.8% decline relative to the mean CES-D score for homeowners at baseline in our sample.

<Insert Table 2 here>

Figure 1 presents the results of lagged models to examine to what extent this association was sustained over time. Becoming a homeowner was associated with a reduction in depressive symptoms two years after homeownership (β=-0.0556, 95% CI: -0.134, -0.020). Estimates were similar in magnitude but no longer significant after four years (β=-0.06, 95% CI: -0.143, 0.023).

<Insert Figure 1 here>

Respondent's self-reported reasons for moving are summarised in **Web Figure 1**, focusing only on respondents who moved to owner-occupied housing. Estimates for this figure are based on 1,204 respondents who provided information on the reason for moving (48.9%

of all new homeowners). About a third of those who moved to an owner-occupied home (30%) reported pull factors as the main reason to move, *i.e.* positive features of the new neighbourhood or the new home. Only 16.4% reported moving to be closer to family and friends; 13.7% due to push factors - *i.e.* negative factors of their last residence; 14% due to downsizing and 13.6% to upsize. The desire to become homeowner was mentioned as the reason to move by 13.3% of those who became homeowners.

Figure 2 explores the association between becoming homeowner and depressive symptoms separately by the reason behind the move in fixed-effects models. In these models, the homeownership variable is interacted with a categorical variable indicating the reason to move. Full results are presented in **Web Table 4**. A transition to homeownership motivated by pull factors was associated with a significant decline in depressive symptoms scores (β=-0.426, 95% CI: -0.786, -0.066). By contrast, transitions to homeownership for other reasons were not associated with depressive symptoms.

<Insert Figure 2 here>

Discussion

In this paper, we investigated the mental health benefits of accessing homeownership later in life. Using fixed-effects models, we found that acquiring a home after age 50 is associated with a reduction in depressive symptoms. These findings indicate that, for up to two years after the acquisition, late access to homeownership may convey mental health benefits.

Our results support findings from previous studies which have shown that homeownership is beneficial for health (7, 51) and longevity (15, 18). A key challenge in

this literature is selection: it is difficult to establish whether an association exists because homeownership influences mental health, or because of unobserved characteristics that confound the relationship between homeownership and mental health. To our knowledge, only three studies have addressed this issue using fixed-effects models and Propensity Score Matching (PSM) techniques (16, 17, 23). Our study builds up on this work by implementing a fixed-effects approach and focusing on transitions in homeownership status among adults aged 50 and over.

To provide a sense of the size of the association, we estimated that the benefit of becoming a homeowner in later life on depressive symptoms corresponds to a Cohen's *d* effect of 0.12 (56). This effect is small but significant, contrary to studies in the American or Australian adult population which have found no association of homeownership with mental health measures using a similar fixed-effects design or PSM (16, 17, 23). The benefits of accessing homeownership later in life may be conferred through a complex array of mechanisms. First, becoming a homeowner is likely to improve residential stability. Indeed, the median length of time an American household spends in the same house is two years for renters and eight years for homeowners (57). Second, improved social contacts and investment in the community and home are likely to be key elements to reduce depressive symptoms among new homeowners. For example, homeowners are likely to be more active to introduce housing improvements and adaptations, which may help them to live independently for longer and maintain social contacts, benefiting their mental health (58). The importance of the community and neighborhood in the decision to move is illustrated by our finding that moves motivated by positive factors ("pull" factors) linked to the new house and neighbourhood are associated with an improvement in depressive symptoms. These moves might improve residential satisfaction, an important predictor of psychological wellbeing in old age (47, 59). Homeowners also tend to have

better quality housing, which in turn influences depression (60). Homeownership might also influence mental health in later life by providing a sense of trust and control on life. Evidence suggests that homeowners interact more with their neighbors and trust more their community (61, 62); they also have higher levels of self-efficacy and perceived control over their life (8, 37), which have been hypothesized to act as buffers and coping resources for stressful events (36, 63). Homeownership is often considered as a proxy for socioeconomic status alongside income, education and employment, but its direct health effects have been less researched. Our findings indicate that homeownership may be an important measure of changing socioeconomic circumstances in later life, at an age when occupation or income might be less adequate measures of socioeconomic status (64).

We found that those who accessed homeownership after age 50 had a specific demographic and socioeconomic profile: they were more likely to be female, Black or Hispanic, less educated and poor. Households headed by women and minorities have persistently lower rates of homeownership in the US (65). These results confirm previous reports that high rates of homeownership in the US mask persistent inequalities by race. For example, at the peak of homeownership rates in 2004, less than half of Black and Hispanic households owned a home, compared to more than 70 per cent of white households (28, 66). In 2015, the median age of first access to homeownership was 31, but the median age for Black first-time buyers was 37 and only around half of Black Americans owned a home when they reached the age of 50 (27). We did not have enough statistical power to examine the benefits of homeownership separately by race. Yet, our results suggest that policies that support older people in accessing homeownership in later life may particularly benefit racial and ethnic minorities that tend to access homeownership later in life (67, 68).

This study has several strengths. We used a large, representative and longitudinal sample of older Americans. Using fixed-effects models, we controlled for time-invariant characteristics that may confound the relationship between homeownership and mental health. However, some limitations should also be considered. As our modelling strategy explores transitions into homeownership, we cannot disentangle the effect of acquiring a new home from a neighbourhood effect. Results could also reflect the effect of 'snowbird migration' towards sunnier US states (69). Yet, in supplementary analyses presented in **Web Table 3**, we found that new homeowners in our sample were very different from those who migrated to the south of the US in older ages: they were more likely to be Black or Hispanic, female or to have divorced, be widowed or never married at the previous wave. Most importantly, studies indicate that snowbird migration occurs primarily among individuals who already owned a home in their state of origin (70, 71). Second, although we controlled for depressive symptoms score at the previous wave, we cannot completely rule out the possibility of reverse causation. Our lagged models, however, are less vulnerable to reverse causality as they show the association between current changes in housing tenure and later changes in depressive symptoms. Third, while our fixed-effects models controlled for a large number of time-varying confounders, unmeasured time-varying confounding remains a potential source of bias. Fourth, we had information on the reason-for-move only for a subset of our sample, which resulted in large standard errors (53). Finally, attrition is a potential concern in longitudinal studies. However, retention rates are around 85% in HRS and evidence suggests that attrition is not linked to health outcomes (72). In our sample, 10% of respondents had data missing on the homeownership variable and 14% had data missing on the depressive symptoms score. In sensitivity analyses, we also used Multiple Imputation methods to explore the potential impact of selection associated with missing values. Analyses on the imputed dataset led to essentially the same results (**Web Table 5**).

Conclusion

Our findings suggest that accessing homeownership after age 50 reduces depressive symptoms in older age. At baseline, non-homeowners had a range of health and socioeconomic disadvantages compared to homeowners. We found that the well-documented benefits of homeownership for mental health extend to those who acquired a home later in life. These results add to the growing recognition that homeownership may have public health implications for current and future generations of older Americans. Further research is needed to disentangle potential mechanisms. Our results suggest that policies that enable disadvantaged older Americans to access homeownership by providing them access to affordable housing may reduce depressive symptoms in older age.

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TABLES

Table 1. Baseline Characteristics of Selected Participants Among HRS Respondents Aged 50 Years and Older by Homeownership Status, 1993-2010

	Homeowner (*n*= 18,652)		Renter (*n*=5,812)	
	No.	%	No.	%
Depressive symptoms and health characteristics				
CES-D score [a]	1.356	1.87	2.257	2.37
CES-D≥3	2,976	15.98	2,004	34.49
Self-reported bad and poor health	3,787	20.30	2,412	41.50
Ever smoked	10,809	58.23	3,863	66.64
Currently smoking	3,737	20.07	2,080	35.81
Ever drinks any alcohol	11,991	64.29	3,280	56.44
Number of limitations with ADLs [a]	0.17	0.637	0.42	0.99
Number of limitations with IADLs [a]	0.059	0.297	0.17	0.49
Demographic characteristics				
Age, years [a]	56.84	6.73	56.22	6.11
Female	9,927	53.22	3,299	56.76
Male	8,725	46.78	2,513	43.24
Married	15,358	82.66	2,750	47.25
Separated or divorced	1,744	9.35	1,794	30.90
Widowed	973	5.22	574	9.89
Never married	577	2.77	694	11.96
White	14,684	78.68	2,934	50.28
Black	2,877	15.46	2,155	37.23
Hispanic	1,091	5.86	723	12.49
Number of children [a]	3.242	2.12	3.301	2.50
Number of household members [a]	2.560	1.188	2.332	1.430
Education				
Lower than high school	3,255	17.46	1,979	34.06
GED	864	4.63	360	6.20
High-school graduate	5,456	29.27	1,458	25.09
Some college	4,466	23.96	1,302	22.41
College and above	4,602	24.68	711	12.24
Socio-economic characteristics				
Employed	11,503	61.67	2,909	50.05
Unemployed	587	3.15	456	7.85
Retired	4,540	24.34	1,407	24.21
Disabled	457	2.45	541	9.31
Out of the labor force	1,565	8.39	499	8.59
Non-housing wealth, dollars [b]	63,000	689,644	3,700	206,629
Household total income, dollars [b]	50,300	97,994	16,800	40,502

Abbreviations: CES-D, Centre for Epidemiologic Studies Depression scale; ADLs, Activities of Daily Living; IADLs, Instrumental Activities of Daily Living; GED, General Education Development.

[a] expressed as mean (standard deviation)

[b] expressed as median (standard deviation)

Table 2. Contemporaneous Associations between Changes in Homeownership and Changes in Depressive Symptoms Score Among Respondents Aged 50 Years and Older in HRS (N=20,524), 1993-2010

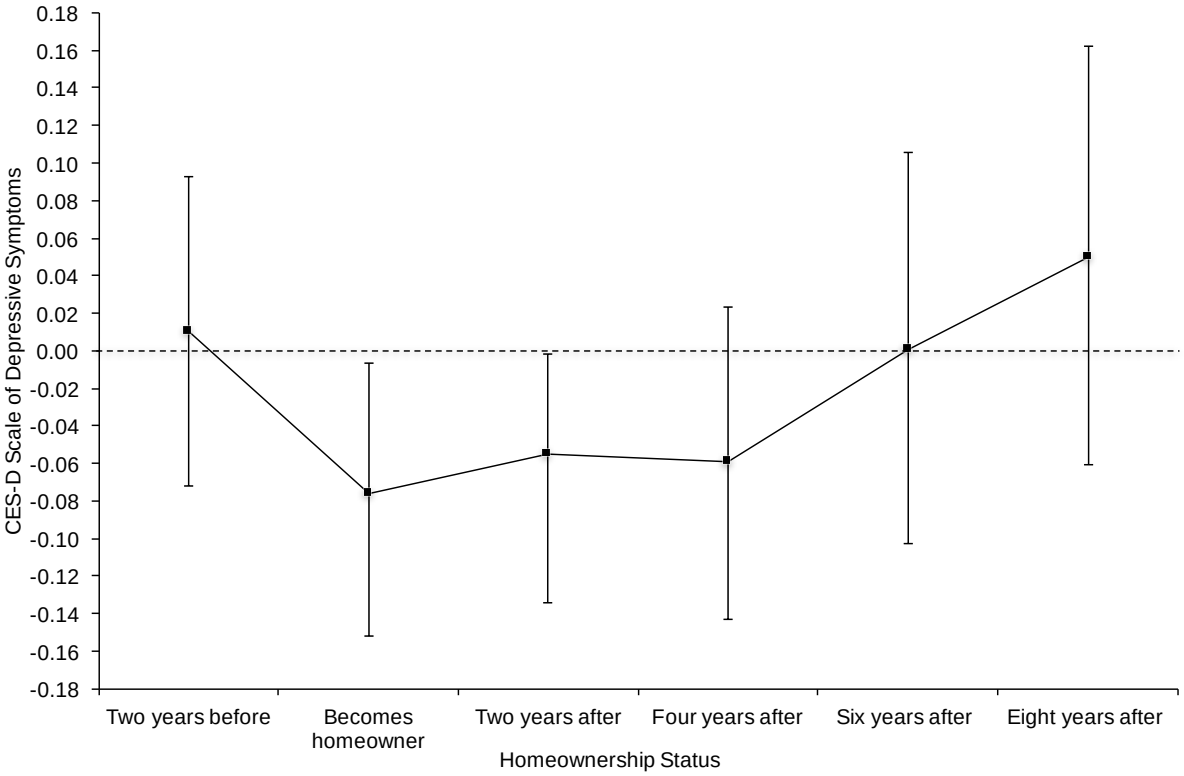
	Model 1		Model 2	
	β	95% CI	β	95% CI
Exposure of interest				
Homeownership	-0.107	-0.179, -0.035	-0.0768	-0.152, -0.007
Demographic characteristics				
Age	-0.120	-0.156, -0.082	-0.0471	-0.084, -0.009
Age squared	0.00123	0.001, 0.001	0.000648	0.0004, 0.0008
Separated or divorced [a]			0.279	0.171, 0.386
Widowed			0.650	0.577, 0.723
Never married			0.474	0.117, 0.830
Number of children			-0.00154	-0.024, 0.021
Household size			0.0210	0.002, 0.039
Health status				
Poor self-reported health [b]			0.521	0.479, 0.562
Currently smoking [c]			-0.127	-0.198, -0.055
Currently drinking [d]			-0.0419	-0.78, -0.005
Number of limitations with ADLs			0.267	0.237, 0.297
Number of limitations with IADLs			0.203	0.147, 0.258
Depressive symptoms score at previous wave			-0.00802	-0.019, 0.003
Socioeconomic characteristics				
Unemployed [e]			0.273	0.168, 0.376
Retired			0.00908	-0.025, 0.044
Disabled			0.348	0.196, 0.498
Not in the labor force			0.0749	0.009, 0.140
Log of household non-housing wealth			-0.0105	-0.021, 0.0009
Log of household total income			-0.0184	-0.034, -0.002

Abbreviations: CI, confidence intervals; ADLs, Activities of Daily Living; IADLs, Instrumental Activities of Daily Living.

Models include survey year fixed effects.

[a] reference category: married; [b] reference category: excellent/good self-rated health; [c] reference category: not currently smoking; [d] reference category: not currently drinking; [e] reference category: employed.

Figure 1. Contemporaneous and lagged associations (b with robust 95% confidence interval) between changes in homeownership and changes in depressive symptoms score among participants aged 50 years and older in HRS (N=20,524), 1993-2010.



Notes: Fixed-effects coefficients , with robust 95% confidence intervals. Lower values indicate lower levels of depressive symptoms; models include survey year fixed effects and control for socio-demographic characteristics, wealth, income, health status and depressive symptoms at previous wave.

Figure 2. Contemporaneous associations (b with robust 95% confidence interval) between reasons-for-move and changes in depressive symptoms score among participants aged 50 years and older in HRS (N=4,195), 1996-2010.