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Original Contribution

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

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Homeownership is consistently associated with better mental health, but whether becoming a homeowner in later in life has positive psychological benefits has not, to our knowledge, been examined. We assessed whether acquiring a home after age 50 years was associated with depression in a representative sample of older US adults. We used individual fixed-effects models based on data from 20,524 respondents aged ≥50 years from the Health and Retirement Study, who were interviewed biennially during 1993–2010. Depressive symptoms were measured using the 8-item Center 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% confidence interval (CI): −0.152, −0.007). The association remained significant after 2 years (β = −0.0556, 95% CI: −0.134, −0.001) but weakened afterward. 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 neighborhood, 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.

aging; depression; fixed-effects models; homeownership; housing

Abbreviations: CES-D, Center for Epidemiologic Studies Depression Scale; CI, confidence interval; HRS, Health and Retirement Study.

The association between housing and health is well-established (1). Previous studies suggest that housing might 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 benefits to mental health 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% of US adults aged 50 years or older 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 2000s, encouraged by active policies favoring homeownership (25). In the United States, most access the housing ladder in their 30s (26), but the dynamics of homeownership attainment are changing. There was, for example, a 16-point difference between the homeownership rate of those aged 40–44 years 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 black persons aged 55–64

years were homeowners, as opposed to 82% of white persons of the same ages. In 2015, one-third of black persons in the United States were not homeowners (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 might lead to improvements in mental health and wellbeing.

Acquiring a home in later life might 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 greater positive affect (30, 31). Housing conditions are an important determinant of mental health in old age: Compared with their younger counterparts, older people spend more time in their homes 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 might also increase self-esteem, control, and autonomy, which are associated with better mental health (8, 36, 37).

This study aimed 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 adults 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 used data from the Health and Retirement Study (HRS), a longitudinal study that has followed older US adults since 1992. Our paper builds on earlier work (16, 17, 23) by using panel data and individual fixed-effects models that leverage individual-level changes in homeownership. Our estimates provide new evidence for the potential mental health benefits of acquiring a home in later life.

METHODS

Study population

HRS is a nationally representative study of US adults aged ≥50 years, started in 1992. The HRS sample is selected based on a multistage 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 years. HRS included respondents from several birth cohorts: Asset and Health Dynamics Among the Oldest Old cohort (born 1923 or earlier), children of the Depression (1924–1930), the initial HRS cohort (1931–1941), War babies (1942–1947), and early (1948–1953) and middle Baby Boomers (1954–1959). Biennial interviews were conducted through 2010, and wave-to-wave retention rates were approximately 90%. Our data set comprised 11 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 in which 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 8-item version of the Center for Epidemiologic Studies Depression Scale (CES-D) 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 range is 0–8, with higher scores indicating higher levels of depressive symptoms. A cutoff point of 3 is often used to define elevated levels of depressive symptoms (45, 46).

Moving to an owner-occupied home after age 50 years

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 $t + 2$ years, 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 about the reasons for this change. Web Table 1 (available at https://academic.oup.com/aje) provides examples of stated reasons for moving house. In total, there were 47 broad reasons respondents provided for a move. Based on previous literature (47, 48), we classified these reasons into 6 broad categories that cover individual- as well as neighborhood-level drivers for the move: 1) pull factors (e.g., more appealing neighborhood with better access to transportation and services); 2) push factors (e.g., poor neighborhood conditions or economic insecurity); 3) the desire to be closer to family or friends; 4) downsizing (moving to a smaller and/or less expensive house); 5) upsizing (moving to a larger home); and 6) 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 starting only in 1996 ($n = 4,195$, which corresponds to 38% of those who moved).

Covariates

Respondent's time-invariant characteristics included sex, race/ethnicity (white, black, or Hispanic), and highest educational level attained (less than high-school graduation, General Education Development certificate, 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), natural logarithms of household income, and nonhousing 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; currently smoking vs. no), heavy alcohol drinking (based on self-report of consuming more than 2 drinks per day over 5–7 days a week), and physical functioning (measured by the number of difficulties with activities of daily living (range, 0–5) and instrumental activities of daily living (range, 0–3)).

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 implemented individual fixed-effects models, which use 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 compared the depressive symptom levels of a respondent before buying a home with that same respondent's depression score when he/she became a 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 nonhousing wealth, self-reported health, health behaviors (smoking and drinking), and number of limitations with activities of daily living and instrumental activities of daily living. To minimize the potential impact of reverse causality, we also controlled for the lagged value of depressive symptoms in the previous wave. Our approach satisfied the 2 conditions of fixed-effects models: The outcome variable should be measured for each respondent in a similar fashion for at least 2 time points, and the exposure variable should vary over time for at least part of the respondents (54).

Our linear model was as follows:

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

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 if 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 (2 years before); and ε_{it} is the error term. μ_t is 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 6 reasons stated for acquiring a house and mental health and introduced a term for interaction 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 a 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 sex. We estimated individual clustered robust standard errors for all estimates. All analyses were conducted using Stata, version 14.0 (StataCorp LP, College Station, Texas).

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 points, and 15.98% of respondents had a score of ≥3 on the CES-D, corresponding to the cutoff 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%). Compared with homeowners, renters were also more likely to be female (56.76%), black (37.23%), or Hispanic (12.49%) and to have a level of education less than high-school graduation (30.90%). Renters at baseline were also more likely to be separated or divorced (30.90%) and had less financial wealth and lower incomes.

During the entire study period, a total of 2,462 respondents became homeowners. The majority (64.44%) became homeowners between the ages of 50 and 65 years. Results from a random-effects model (Web Table 3) showed that being a female, black, or Hispanic as well as having divorced, being widowed, or being never married at the previous wave were key predictors of acquiring an owner-occupied home in our sample. Results from fixed-effects models are presented in Table 2. Losing a spouse (β = 0.650, 95% confidence interval (CI): 0.577, 0.723) and declining self-reported health (β = 0.521, 95% CI: 0.479, 0.562 respectively) were the strongest predictors of increases in depressive symptoms. Becoming a homeowner predicted a decline in depressive symptoms in the same year (β = −0.077, 95% CI: −0.152, −0.007), which corresponded to a 6.8% decline relative to the mean CES-D score for homeowners at baseline in our sample.

Figure 1 displays 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 2 years after homeownership (β = −0.056, 95% CI: −0.134, −0.020). Estimates were similar in magnitude but no longer significant after 4 years (β = −0.06, 95% CI: −0.143, 0.023).

Respondent's self-reported reasons for moving are summarized in Web Figure 1, focusing only on respondents who

Table 1. Baseline Characteristics of Selected Participants Among Respondents Aged 50 Years or Older, According to Homeownership Status, Health and Retirement Study, United States, 1993–2010

Characteristic	Homeowner (n = 18,652)		Renter (n = 5,812)	
	No. of Participants	%	No. of Participants	%
Depressive symptoms score or health characteristic				
CES-D score[a]	1.356 (1.87)		2.257 (2.37)	
CES-D score of ≥3	2,976	15.98	2,004	34.49
Self-reported bad or 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
No. of limitations with ADL[a]	0.17 (0.637)		0.42 (0.99)	
No. of limitations with IADL[a]	0.059 (0.297)		0.17 (0.49)	
Demographic characteristic				
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
No. of children[a]	3.242 (2.12)		3.301 (2.50)	
No. of household members[a]	2.560 (1.188)		2.332 (1.430)	
Educational level				
Less than high-school graduation	3,255	17.46	1,979	34.06
GED certificate	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 or above	4,602	24.68	711	12.24
Socioeconomic characteristic				
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
Nonhousing wealth, $[b]	63,000 (689,644)		3,700 (206,629)	
Household total income, $[b]	50,300 (97,994)		16,800 (40,502)	

Abbreviations: ADL, activities of daily living; CES-D, Center for Epidemiologic Studies Depression Scale; GED, General Education Development; IADL, instrumental activities of daily living.

[a] Expressed as mean values (standard deviations).

[b] Expressed as median values (standard deviations).

moved to owner-occupied housing. Estimates for this figure were based on 1,204 respondents who provided information on the reason for moving (48.9% of all new homeowners). About one-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 neighborhood 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

Table 2. Contemporaneous Associations Between Changes in Homeownership and Changes in Depressive Symptoms Score Among Respondents Aged 50 Years or Older ($n = 20,524$), Health and Retirement Study, United States, 1993–2010

Characteristic	Model 1[a]		Model 2[a]	
	β	95% CI	β	95% CI
Exposure of interest				
Homeownership	−0.107	−0.179, −0.035	−0.077	−0.152, −0.007
Demographic characteristic				
Age	−0.120	−0.156, −0.082	−0.0471	−0.084, −0.009
Age squared	0.001	0.001, 0.001	0.001	0.0004, 0.001
Separated or divorced[b]			0.279	0.171, 0.386
Widowed			0.650	0.577, 0.723
Never married			0.474	0.117, 0.830
No. of children			−0.002	−0.024, 0.021
Household size			0.0210	0.002, 0.039
Health status				
Poor self-reported health[c]			0.521	0.479, 0.562
Currently smoking[d]			−0.127	−0.198, −0.055
Currently drinking[e]			−0.042	−0.78, −0.005
No. of limitations with ADL			0.267	0.237, 0.297
No. of limitations with IADL			0.203	0.147, 0.258
Depressive symptoms score at previous wave			−0.008	−0.019, 0.003
Socioeconomic characteristic				
Unemployed[f]			0.273	0.168, 0.376
Retired			0.009	−0.025, 0.044
Disabled			0.348	0.196, 0.498
Not in the labor force			0.075	0.009, 0.140
Log of household nonhousing wealth			−0.011	−0.021, 0.001
Log of household total income			−0.018	−0.034, −0.002

Abbreviations: ADL, activities of daily living; CI, confidence interval; IADL, instrumental activities of daily living.
[a] Models included survey-year fixed effects.
[b] Reference category: married.
[c] Reference category: excellent/good self-rated health.
[d] Reference category: not currently smoking.
[e] Reference category: not currently drinking.
[f] Reference category: employed.

of their last residence), 14% due to downsizing, and 13.6% due to upsizing. The desire to become a homeowner was mentioned as the reason to move by 13.3% of those who became homeowners.

Figure 2 explores the association between becoming a homeowner and depressive symptoms separately according to the reasons for moving, in fixed-effects models. In these models, we used a term for interaction between homeownership and the categorical variable indicating the reason for the 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 ($\beta = -0.426$, 95% CI: −0.786, −0.066). By contrast, transitions to homeownership for other reasons were not associated with depressive symptoms.

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 2 years after the acquisition, late access to homeownership might convey mental health benefits.

Our results support findings from previous studies showing 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

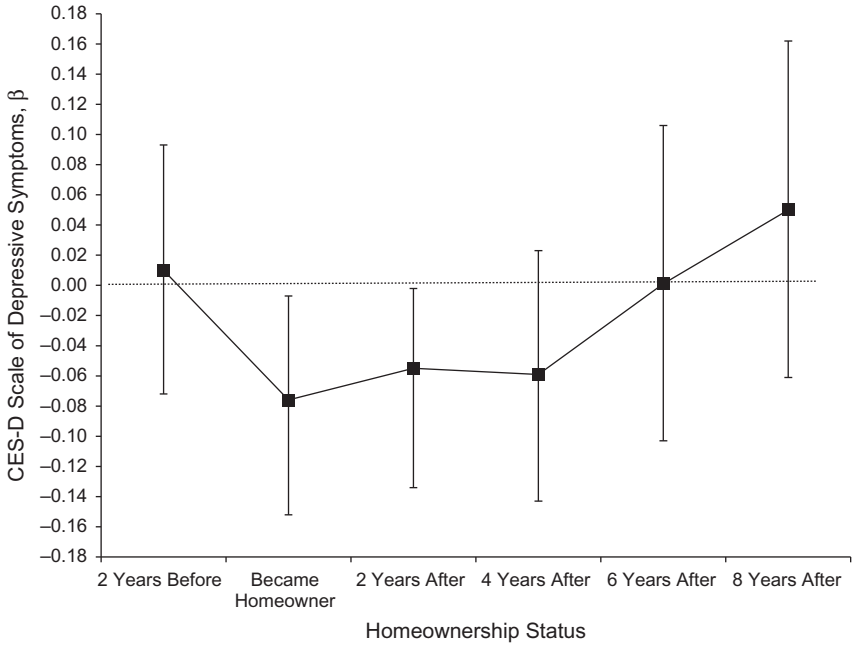

Figure 1. Contemporaneous and lagged associations (β with robust 95% confidence interval) between changes in homeownership and changes in depressive symptoms score among participants aged 50 years or older (n = 20,524), Health and Retirement Study, United States, 1993–2010.

and mental health. To our knowledge, only 3 studies have addressed this issue using fixed-effects models and propensity score–matching techniques (16, 17, 23). Our study builds on this work by implementing a fixed-effects approach and focusing on transitions in homeownership status among adults aged 50 years or older.

To provide a sense of the size of the association, we estimated that the benefit of becoming a homeowner in later life with

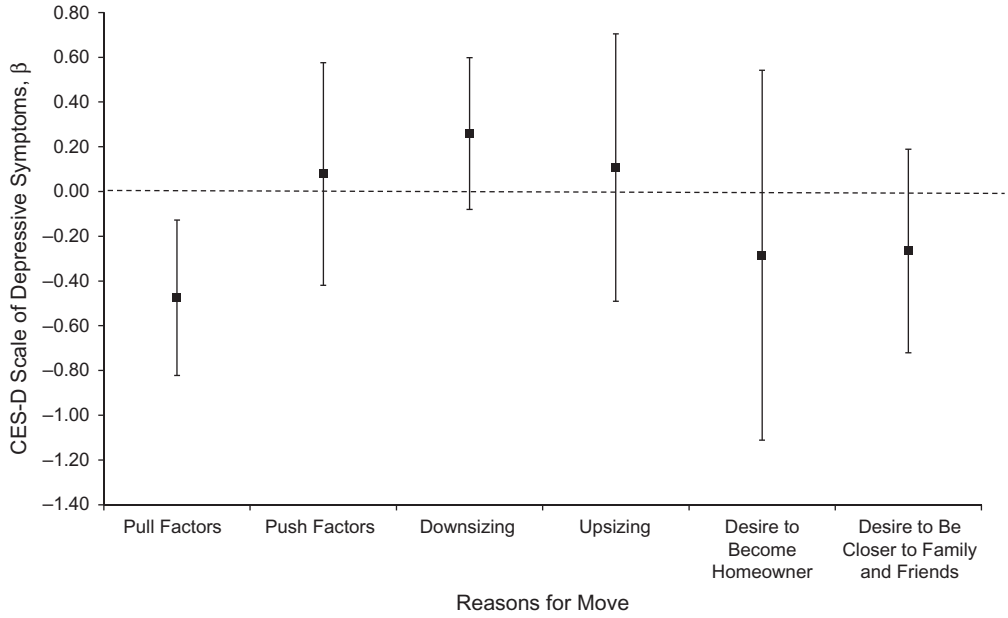

Figure 2. Contemporaneous associations (β with robust 95% confidence interval) between a move for a given reason and the change in depressive symptoms score among participants aged 50 years or older (n = 4,195), Health and Retirement Study, United States, 1996–2010. Fixed-effects coefficients with robust 95% confidence intervals; lower values indicate lower levels of depressive symptoms. Models included survey-year fixed effects and controlled for sociodemographic characteristics, wealth, income, health status, and depressive symptoms scores from the previous wave.

respect to depressive symptoms corresponded to a Cohen's *d* effect of 0.12 (56). This effect is small but significant, contrary to studies of adult populations in the United States, Australia, and New Zealand that have found no association of homeownership with mental health measures using a similar fixed-effects design or propensity score matching (16, 17, 23).

The benefits of accessing homeownership later in life might 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 2 years for renters and 8 years for homeowners (57). Second, improved social contacts and investment in the community and home are likely to be key elements that reduce depressive symptoms among new homeowners. For example, homeowners are likely to be more active to introduce housing improvements and adaptations, which might 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 neighborhood are associated with an improvement in depressive symptoms. These moves might improve residential satisfaction, an important predictor of psychological well-being 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 in life. Evidence suggests that homeowners interact more with their neighbors and trust their community more (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 might 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 years 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 United States (65). These results confirm previous reports that high rates of homeownership in the United States mask persistent inequalities by race/ethnicity. For example, at the peak of homeownership rates in 2004, less than half of black and Hispanic households owned a home, compared with more than 70% of white households (28, 66). In 2015, the median age of first access to homeownership was 31 years, but the median age for black first-time buyers was 37 years, and only approximately half of black Americans owned a home when they reached the age of 50 years (27). We did not have the statistical power to examine the benefits of homeownership separately by race/ethnicity. Yet our results suggest that policies that support older people in accessing homeownership in later life might particularly benefit racial and ethnic minorities, who tend to access home ownership at older ages (67, 68).

This study has several strengths. We used a large, representative, longitudinal sample of older US adults. Using fixed-effects models, we controlled for time-invariant characteristics that might confound the relationship between homeownership and mental health. However, some limitations should also be considered. Because our modeling strategy explores transitions into homeownership, we cannot disentangle the effect of acquiring a new home from a neighborhood effect. Results could also reflect the effect of "snowbird migration" toward 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 United States at 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 —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 the move for only 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 approximately 85% in the HRS, and evidence suggests that attrition is not linked to health outcomes (72). In our sample, 10% of respondents had data missing for the homeownership variable, and 14% had data missing for 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 of the imputed data set led to essentially the same results (Web Table 5).

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

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