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Title

Housing cost burden and material hardship among older adults: how do they influence mental health?

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Abstract

Objectives: Despite a growing body of evidence for the association between housing cost burden and psychological health, few studies have focused on the potential mediators of this association and the extent to which housing cost burden poses a threat to older adults' psychological health. This study aims to assess (a) the link between housing cost burden and psychological health among older adults and (b) how the association is mediated by material hardship.

Methods: Using thirteen waves of a nationally representative longitudinal study in Korea, this study assessed the association between housing cost burden and depressive symptoms among older adults aged 65 or over. Mediation tests were conducted to identify whether material hardship explains the link between housing cost burden and depressive symptoms. We used fixed-effects models to account for individual-level heterogeneity.

Results: Housing cost burden was significantly associated with depressive symptoms among older adults, regardless of their housing tenure status. Different types of material hardship partially mediated the association between housing cost burden and depressive symptoms in older adults. Older adults with severe housing cost burden are more susceptible to all types of material hardship compared to those with a moderate burden.

Conclusions: To contribute further to the social causation discussions, future studies should seek to identify protective factors of depressive symptoms among older adults and other potential mechanisms of the association between older adults' socioeconomic conditions and their psychological health.

Keywords: Housing cost burden, material hardship, depressive symptoms

Key points

- Few studies examined what mechanisms housing cost burden affects psychological health in later life.
- Housing cost burden is associated with depressive symptoms among older adults.
- Housing cost burden is likely to cause depressive symptoms partially through material hardship, such as being unable to eat adequate food or use heating.

1 Introduction

2 The social causation theory suggests that socioeconomic conditions influence psychological
3 health as people continuously interact with the social environment.^{1,2} Its core hypothesis is that people
4 with lower socioeconomic status are more likely exposed to psychological health risks than those with
5 higher socioeconomic status are.³ It contends that economically stressful events, such as income poverty²
6 and job loss,⁴ produce higher risks of psychological health problems since people under such
7 circumstances tend to have difficulties maintaining adequate living standards and thus gain a feeling of
8 fear and uncertainty about the future.⁵ Therefore, alleviating individuals' socioeconomic difficulties can
9 be seen as a form of intervention to promote their psychological health.

10 Prior studies have documented that housing comprises an essential part of one's socioeconomic
11 status linked to psychological health.⁶⁻⁸ It has been shown that housing cost-burdened households tend to
12 feel worried since they might not be able to control their life independently. Housing cost burden also
13 causes depression among households living in the substandard dwelling because poor housing conditions
14 cannot be repaired in a timely manner due to financial constraints.⁹ Moreover, people who cannot afford
15 housing expenses are likely to have a weak sense of social trust, particularly when they cannot obtain
16 social support from other people.¹⁰ Families with housing payment problems tend to be dissatisfied with
17 their community¹¹ and have a weak sense of belongingness in the neighborhood.¹²

18 Despite the established association between housing cost burden and psychological health in the
19 literature, there is insufficient research on through what mechanisms housing cost burden has effects on
20 health. While people might feel stressed about the constrained income after paying for housing, income
21 poverty does not necessarily indicate whether or not a household has sufficient financial resources to meet
22 its basic needs because people with limited income would not encounter financial difficulties if they could
23 find necessary support from other sources (e.g., neighbors, in-kind welfare benefits).¹³⁻¹⁵ Therefore,
24 limited after-housing income alone does not suffice to explain the linkage between housing cost burden
25 and psychological health from the social causation perspective.

26 To address this gap in the literature, our study postulates that material hardship can be one of the
27 potential mechanisms linking housing cost burden and psychological health. Material hardship, the
28 concept originated in the 1989 survey that investigated the economic well-being of Chicago residents,¹⁶ is
29 considered a more accurate instrument, compared to income, to measure the effect of financial constraints
30 on mental health.¹⁷ Given that housing expenses account for a considerable proportion of household
31 expenditure, housing cost burden may lead income-constrained households to reduce other household
32 expenditures (e.g., food purchase, access to health care). People with higher housing expenses relative to
33 income are more likely to seek loans to pay for utilities and fall into the risk of eviction or foreclosure.¹⁸
34 Poor families with a decline in post-shelter household income were also found to have inadequate diet
35 quality, such as skipping meals or eating fast food.¹⁹⁻²¹ Furthermore, those who cannot afford housing
36 expenses tend to delay regular medical check-ups, which may have adverse effects on health.^{22,23}

37 Meanwhile, many studies have demonstrated that material hardship influences mental health
38 outcomes. A decline in physical health caused by material hardship can increase the likelihood of
39 depression. For example, those who cannot take in enough vitamins and minerals are not able to easily
40 control their emotional conditions due to nutrient deficiency.^{16,24} In addition, people are likely to be
41 overwhelmed by feelings of frustration, hopelessness, and depression when unable to make their ends
42 meet persistently.²⁵ Living in material hardship makes people feel shameful and experience humiliation,
43 stigmatization, and discrimination when they need to seek help or claim welfare payments.¹⁶ Yet, whether
44 and the extent to which housing cost burden is associated with psychological health through material
45 hardship has been understudied due to the limited availability of the relevant data.¹⁰

46 There is a strong likelihood that housing cost burden affects older adults' psychological health in
47 Korea. Korea is facing a rapidly ageing society with the population aged 65 or above accounting for

1 14.3% in 2018 (7.2% in 2000).²⁸ Similar to other western countries, the Korean government has
2 encouraged households to purchase a house for individual economic security under the asset-based
3 welfare policy.^{29,30} This has helped to achieve a high rate of owner-occupiers among older adults (78.8%).
4 Unfortunately, however, housing seems to impose a great financial burden on older persons in Korea.³¹
5 For example, older Koreans spend about 36% of their monthly household income on housing,³² which is
6 much higher than the average housing cost burden in Korea (14.7%),³³ arguably due to older Koreans'
7 generally low income. In addition, the erosion of the traditional familism accompanied by the expansion
8 of nuclear family in recent decades has rendered older adults increasingly reluctant to seek support from
9 their adult children.³⁴ Therefore, many older adults in Korea are likely to experience financial difficulties.
10 These challenges seem inconsistent with the notion that older adults benefit from economic resources they
11 have accumulated over their lifetime, which has been well established in the literature.³⁵ Nevertheless,
12 older population with housing cost burden has not been well targeted in Korea's housing policy
13 framework. There has been an insufficient supply of senior housing, and older persons have not been
14 much prioritized in allocating the limited public rental housing. Furthermore, it was not until 2017 that
15 the government committed to providing public rental housing units accommodating low-income people
16 aged 65 or above. Therefore, housing cost burden is likely to affect older Koreans' material hardship and
17 psychological health significantly, but to the authors' knowledge, this association has not yet been
18 studied.

19 Using the data from thirteen waves of the nationally representative longitudinal study in Korea,
20 we examine the association between housing cost burden, material hardship and psychological health
21 among people aged 65 or over in Korea. While the majority of the existing studies on housing cost and
22 psychological health look into the working-age population.^{8,25,26} their findings are not necessarily
23 generalizable to older persons. From the social causation perspective, we hypothesize that housing cost
24 burden exacerbates material hardship and further affects the psychological health of older adults
25 adversely.²⁷

26 In this study, we employ three methodological strategies distinctive from the previous research.
27 First, we use fixed effects models to disentangle the effects of housing cost burden on psychological
28 health by taking into account individual heterogeneity that influences focal independent and dependent
29 variables.³⁶ Second, we consider different types of material hardship to discern the mediation effects of
30 specific types of material hardship on the association between housing cost burden and psychological
31 health. Lastly, we break down the proportion of housing expenses to income into different ranges to see
32 whether the severity of housing cost burden makes the associations different. These strategies can yield
33 more refined implications for policies and practices to promote older adults' psychological health.

34 **Data and method**

35 ***Dataset***

36 The data for analysis was obtained from the Korean Welfare Panel Study (hereafter *KoWEPS*), a
37 nationally representative longitudinal survey of Korean households. Since it was launched by the Korea
38 Institute for Health and Social Affairs and Seoul National University in 2006, it has collected information
39 from 7,072 households and 14,463 individuals at the baseline and further supplemented the sample size in
40 order to compensate for sample attrition. It provides detailed information on the respondents'
41 socioeconomic status, such as income, working status, and material hardship. In line with the research
42 questions, the analyses restricted the study participants to households of at least one older adult aged 65 or
43 above from the data from 3rd (2007) to 15th (2019) waves where the information for housing expenses is
44 available. After deleting missing variables (4,015 observations), the primary analytical sample in the
45 present study contained 3,430 individuals in the baseline (wave 3).

1 **Depressive symptoms**

2 We used the data about depressive symptoms to measure the study participants' psychological
3 health. In the *KoWEPS*, depressive symptoms were measured using the Center for Epidemiological
4 Studies-Depression (CES-D) instrument, which included 11 items. Each person was required to respond
5 to how often they experienced specific symptoms of depression in the past week, such as feeling lonely
6 and losing appetite. After summing all responses ranging from 0 (rarely or never) to 3 (most or all the
7 time), we calculated the total score of CES-D ranging from 0 to 33, with a higher score indicating more
8 severe depressive symptoms. Prior literature has evaluated the reliability and validity of the CES-D for
9 older adults.³⁷

10 **Housing cost burden**

11 Housing cost burden was measured based on the data about household income and housing
12 expenses. We used equivalized annual income, including earnings, capital gains and cash transfers. The
13 sum of housing costs was extracted from the housing expenditure data, including mortgage principal and
14 interest repayment, property-related tax (for owner-occupiers), monthly rent (for renters), maintenance
15 costs, and utility costs (e.g., water, utility, fuel, electricity, etc.). In the housing literature, 30% of the
16 household income is the widely used threshold for housing cost burden³⁸. However, we further
17 categorized the sample into groups with no housing cost burden (<30%), moderate housing cost burden
18 (30-50%), and severe housing cost burden (≥ 50%).

19 **Material hardship**

20 We measured four types of material hardship. The study participants were required to answer the
21 following questions. During the last year, (a) "have you ever been unable to use the heating system
22 because of financial difficulties?", (b) "have you ever been unable to pay taxes?", (c) "have you ever
23 been unable to (1) buy food or (2) eat balanced meals because of financial difficulties?" and (d) "have you
24 or your family member ever been unable to go to hospitals for treatment?". We constructed a binary
25 indicator of material hardship (1: yes vs 0: No) for each item. As the third item, (c) food insecurity,
26 includes two questions asking the study participants to choose from very often (1) to very rare (3), we
27 made a binary indicator (1: very often and often vs 0: very rare) and regarded those who answered 'very
28 often' or 'often' to either of the two items food insecure.

29 **Covariates**

30 For control variables, we included age (as a continuous variable), marital status (single, married,
31 and divorced/widowed/separated), household size (1, 2, and 3 or above), housing tenure (owner-
32 occupiers, private renters, and others), household income level (quintile), and presence of chronic
33 diseases.

34 **Analytical approach**

35 First, the frequency and distribution of the study population at the baseline are presented to
36 explore the general characteristics of the sample. For the main analysis, we conducted fixed effects (FE)
37 logistic regression models to estimate the association between housing cost burden and depressive
38 symptoms. The following equation represents the FE model:

39
$$Y_{it} = \alpha_t + \beta_1(\text{moderate housing cost burden})_{it} + \beta_2(\text{severe housing cost burden})_{it} + \mathbf{Z}_{it}\delta$$

40
$$+ v_i + \varepsilon_{it} \dots (1)$$

41 where Y_{it} is the dependent variable, depressive symptoms of individual i at time t . The reference
42 category is no housing cost burden (<30% of income). The variables with β_1 coefficients indicate
43 moderate housing cost burden (30-50% of income) and the variables with β_2 coefficients indicate
44 moderate housing cost burden (≥50% of income). The vector \mathbf{Z}_{it} includes a set of control variables (age,
45 marital status, a number of household members, household income, and presence of chronic diseases). v_i
46 is the individual-specific time-invariant error term that takes into account unobserved individual fixed

1 effects. ε_{it} is the idiosyncratic error term. Compared to conventional ordinary least square models, FE
2 models can reduce potential bias driven by time-invariant unmeasured and measured confounders. For
3 example, FE models can control for time-constant confounding variables that vary across individuals
4 (e.g., gender, ethnicity, and personality). Since all models in our study were conducted with a fixed-
5 effects estimator, the coefficient indicates within-individual average difference in depressive symptoms
6 between waves where older adults report no housing cost burden and waves in which older adults report
7 housing cost burden. In other words, this model estimates only for variables that change across the
8 observation period. Next, we examined whether housing cost burden is associated with different types of
9 material hardship. We included a set of material hardships in regression models of housing cost burden
10 and depressive symptoms to examine its mediating effects. The statistical analyses were implemented
11 using STATA/SE version 15.0 (StataCorp, College Station, TX).

12 Results

13 The distribution of the study population is presented in Table 1. Those who experienced housing
14 cost burden was 21%, and 9% spent more than 50% of their income on housing. The mean of depressive
15 symptoms was 7.054, which is relatively higher than that of adults aged 25 to 64 (mean: 4.518). Overall,
16 older adults reported experiencing material hardship at the baseline: being unable to use a heating system
17 (4.2%), being unable to pay taxes (3.5%), being unable to buy or eat sufficient adequate food (21.7%),
18 and being unable to go to hospitals (2.89%). 73% of the observations were owner-occupiers. More than
19 half of the older adults were in the lowest income distribution (50.3%).

20 (Table 1 about here)

21 In Table 2, we present the estimate of the association between housing cost burden and material
22 hardship. Severe housing cost burden ($\geq 50\%$ of income) predicted the likelihood of being unable to use
23 the heating system ($b = 0.017$), being unable to pay taxes ($b = 0.015$), being unable to buy or eat food ($b =$
24 0.042) and being unable to go to hospitals ($b = 0.010$). Meanwhile, moderate cost burden (30-50% of
25 income) was significantly associated only with ‘being unable to buy or eat food’ ($b = 0.013$).

26 (Table 2 about here)

27 Table 3 reveals the mechanisms linking housing cost burden to depressive symptoms. The result
28 in column 1 showed that housing cost burden was significantly associated with depressive symptoms, and
29 severe housing cost burden predicted a higher likelihood of depressive symptoms ($b = 0.515$) than
30 moderate housing cost burden ($b = 0.241$). In the subsequent columns 2-5, we proposed mediating
31 variables, i.e., four types of material hardship. In column 2, explaining 7% of the total effects, the
32 observed association between housing cost burden and depressive symptoms was attenuated ($b = 0.241$
33 for 30-50% of income, $b=0.478$ for $\geq 50\%$ of income), while being unable to use heating was
34 significantly associated with depressive symptoms ($b = 2.169$). Column 3 shows that being unable to pay
35 taxes attenuated the association between housing cost burden and depressive symptoms ($b = 0.236$ for 30-
36 50% of income, $b = 0.513$ for $\geq 50\%$ of income), although mediating effects are relatively lower (0.3-
37 2%). Controlling for being unable to eat food explains 8-14% of the association, and housing cost burden
38 was still significantly associated with depressive symptoms ($b = 0.220$ for 30-50%, $b = 0.441$ for $\geq 50\%$
39 of income), as presented in column 4. As shown in column 5, being unable to go to hospitals explains 4%
40 of the association attenuated in this model. These results indicated that while all types of material
41 hardship partly mediate the association between housing cost burden and depressive symptoms, the effect
42 was more significant concerning ‘being unable to secure food’ for both moderate and severe housing cost-
43 burdened groups. We also tested moderating effects of housing tenure on the link between housing cost
44 burden and depressive symptoms, but its moderation effect was insignificant (see *supplementary table 1*).

1 Discussion

2 Despite a growing body of studies on the link between housing cost burden and psychological
3 health from the social causation perspective, it has been unclear how the association works for older
4 adults. Our study seeks to identify the potential mechanism through which housing cost burden is
5 associated with depressive symptoms among older adults in Korea, using the nationally representative
6 longitudinal data. The findings of this study provide several important points worthy of discussion in this
7 section.

8 First, our findings showed that housing cost burden could lead to material hardship. This is
9 consistent with previous studies^{19,20,22,23} identifying that people may be forced to compromise competing
10 demands within the scarce resources when housing cost exceeds a certain level of their income.
11 Specifically, the study revealed that which types of material hardship older adults experience is
12 influenced by the severity of their housing cost burden (30-50% vs 50% or above in our study), and food
13 insecurity is the most common type of material hardship, even among those with moderate housing cost
14 burden. More importantly, the observed associations in this study were statistically significant after
15 accounting for household income. It implies that even relatively upper-income households are subject to
16 material hardship if their housing expenses are excessive. This result is presumably due to the generally
17 low income among older Koreans, as the statistics showed that older Koreans have 26%-point higher
18 poverty rates compared to the total population.³⁹

19 Second, while our results found that older Koreans show a higher level of depressive symptoms
20 than the younger population, they revealed that housing cost burden and material hardship induced by
21 housing cost burden are risk factors for older adults' psychological health. Households under
22 economically challenging circumstances might feel that their basic human needs are unsatisfied and they
23 cannot control their own lives. Such negative perceptions may consequently elevate their worry and
24 anxiety.⁴² Given the significant associations between material hardship and psychological health
25 problems,^{43,44} increased housing expenses due to an increase in rent or tax on the residential property may
26 force older people with fixed low income to scrimp on utility use or food consumption. It is also plausible
27 that the lack of nutrient intake undermines the metabolic systems that regulate older people's emotional
28 control.^{14,43,45} Therefore, our study highlights that, from the social causation perspective, housing cost
29 burden and its resultant material hardship are detrimental to older adults' psychological health. It implies
30 that health inequalities would remain or intensify in older age if unfavorable socioeconomic conditions
31 (e.g., housing cost burden and material hardship) persist.

32 Finally, the results of our analyses showed that housing tenure did not significantly moderate the
33 relationship between housing cost burden and depressive symptoms. This is contrary to the prevailing
34 notion that owner-occupiers are less susceptible than renters to the adverse mental health effect of
35 housing cost burden.⁸ Possible explanations for this counter-intuitive result are that (a) older owner-
36 occupiers are still required to pay off a substantial amount of mortgage principals and interests, and (b)
37 maintenance costs and property taxes might increase financial pressure on older owner-occupiers with
38 limited income. The proportion of tax on property to GDP in Korea was 3.106, substantially higher than
39 the OECD average (1.856).⁴¹ In short, homeownership does not seem to fully guarantee mental health
40 benefits to older adults if older owner-occupiers are forced to tolerate severe housing cost burden due to
41 property taxes and mortgage repayments.

42 These findings provide two important implications for policies to tackle older adults' mental
43 health problems induced by financial constraints. First, given the vulnerability of older people to the
44 adverse mental health effects of housing cost burden, the current housing policy should be recalibrated to
45 alleviate housing cost burden among older adults, regardless of their housing tenure status. Until recently,
46 Korea's affordable housing policy has tended to favor low-income households or young people.⁴⁶ That
47 is, concern about 'being old' has not been reflected in the housing policy framework in Korea. It is partly

1 due to the high rate of homeownership that has been implicitly expected to support older adults' post-
2 retirement welfare. Therefore, policies to reduce elderly owner-occupiers' housing cost burden, including
3 property tax or excessive rent rise, seem necessary. In this regard, the Korean government's recent plan to
4 expand public rental housing for older people seems an appropriate measure to contribute to preventing
5 psychological health problems among older adults.⁴⁷ In parallel, an effort to maintain older adults'
6 financial capability through extended employment is also needed so that older people outside the public
7 housing sector can be more resilient to unpredictable housing market changes.

8 Second, while public assistance to supplement older adults' income has been gradually expanded
9 in Korea in recent years, older people still have limited instruments, compared to the working-age
10 population, to sustain their basic living standards when housing cost rises. Given the mediating role of
11 material hardship between housing cost burden and depressive symptoms demonstrated in our study, it
12 seems vital to reinforce the social safety net (e.g., food aid programs, subsidy to heating bills, an
13 extension of healthcare coverage) to ensure older adults' access to basic needs and services despite
14 housing payment problems. It will likely cushion the adverse mental health effect of housing cost burden.

15 We acknowledge several limitations of this study. First, we were not able to elaborate on other
16 potential moderating effects due to the nature of the dataset. For example, it would be interesting to
17 investigate whether help-seeking behaviors or social support from others can differentiate the link
18 between housing cost burden/or material hardship on depressive symptoms. Second, since the survey
19 collected the information through an in-person interview, there may be measurement errors due to
20 respondents' reluctance to answer about material hardship and psychological health problems. Last but
21 not least, since the dataset focused on community-dwelling older adults, there is a possibility of loss-to-
22 follow up. For example, older adults in poor health conditions are likely admitted to long-term care
23 facilities or hospitals. This may lead to the under- or overestimation of the observed association between
24 housing cost burden, material hardship, and depressive symptoms. Future studies could further identify
25 how housing cost burden leads older adults to move to residential institutions, such as long-term care
26 facilities.

27 Despite these limitations, this study contributes to the existing literature in several aspects. First,
28 we estimated the potential causation between housing cost burden and depressive symptoms by
29 accounting for individual heterogeneity in the fixed effects model. This advances the literature by
30 addressing the problem related to reverse causation between housing cost burden and depressive
31 symptoms. Second, by identifying the mediating effects of material hardship, we add to the knowledge
32 about potential mechanisms linking housing cost burden and depressive symptoms. Housing cost burden
33 is a possible cause of material hardship and detrimental to psychological health among older adults.
34 Third, to the authors' knowledge, this is one of the first studies investigating the relationship between
35 older adults' housing cost burden and material hardship. It is particularly relevant to the super-aged
36 society, such as Korea, where many older adults struggle to pay for housing and meet their basic needs. In
37 the debates drawing on the social causation discussions, future studies should seek to identify protective
38 factors of depressive symptoms among older adults and other potential mechanisms of the association
39 between older adults' socioeconomic conditions and psychological health.

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42 **Conflict of Interest Statement**

43 The authors declare that they have no conflict of interest

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