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# Perceived Home is Associated with Psychological Well-being in a Cohort Aged 67-70 Years

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- Depressive mood and purpose in life are associated with a low control of home
- Depressive mood is associated with low emotional and social attachment to home
- High behavioural meaning of home is associated with feeling autonomous
- The physical and social experience of home is associated with purpose in life
- Perceptions about home must be considered when planning age-friendly communities

## **Abstract**

Research on very old people has shown that perceived aspects of home are important for health, but research on such associations in younger cohorts of older people is lacking. The aim of this study was to investigate whether perceived aspects of home were associated with psychological well-being among community-living people aged 67-70. Interview data were collected with 371 individuals living in ordinary housing in southern Sweden. Statistical analyses revealed that depression was less common among participants who reported cognitive-emotional and social bonding to the home, and among those who felt that they had control over their housing situation. The behavioral, social and physical aspects of meaning of home as well as external control beliefs were associated with psychological well-being. Showing that perceived aspects of home are relevant for psychological well-being among people aged 67-70, this study adds to the knowledge on home and health dynamics during the ageing process.

*Keywords:* housing, meaning of home, ageing, third age, depression

## 1. Introduction

The world population is rapidly ageing, and in Western countries, the vast majority of people aged 65 years and older live in privately owned or rented dwellings (Jennbert, 2009; U.S. Department of Health and Human Services [HHS], 2014), are often emotionally attached to their home environment, and wish to remain living in their own home (Oswald & Wahl, 2005). It is argued that the home is important in old age as it serves as a source of identity and coherence (Chaudhury & Rowles, 2005). Previous literature suggests that living in a home that is perceived as usable, meaningful, and familiar influences health, independence in daily activities, and well-being among very old people (Oswald et al., 2007; Iwarsson et al., 2016). However, comparable research among senior citizens during earlier phases of the ageing process is to a great extent lacking.

As the pattern of ageing is changing and people are living longer, healthier lives - we do not know whether later generations would express similar perceptions of home as those of previous generations. Old age inevitably comes with an increase in functional limitations (Cigolle, Langa, Kabeto, Zhiyi, & Blaum, 2007) which influences the use of domestic space, perceived control, usability and meaning related aspects (Tomsone, Horstman, Oswald, & Iwarsson, 2013). While hitherto not addressed in research, these associations might be different among well-functioning younger older people.

Home is a complex concept and differs from housing in the sense that a house is simply a space, a building, or a structure in which people can reside. A home on the other hand is a place imbued with personal meanings that over time transform space (house) into place (home) (Rowles & Bernard, 2013). Research that only targets objective features of the house neglects the possibility that perceived experiences of the home, accumulated over time, also may have an impact on health and well-being in very old age (Iwarsson, Wahl, et al., 2007). In this paper we use the term *perceived home* to address the personal connection and

symbolic representations that make a house into a home (Oswald et al., 2006). These perceptions become increasingly important over time because after retirement older people spend a continually increasing proportion of time inside their home (Baltes, Maas, Wilms, & Borchelt, 1999). During the later stages of life, the home develops into the key spatial focus of the ageing person's life and a means to preserve identity and independence in the face of possible declining function (Rowles & Bernard, 2013). Still, research addressing perceived home in different phases of the ageing process is to a large extent lacking.

According to Oswald and colleagues, perceived home includes concepts such as meaning of home, external environmental control and usability (Oswald et al., 2006). Meaning of home refers to phenomena concerned with symbolic representations of space and place and personal meanings linked to one's home. That is, the home is not only considered to fulfil objective functions but represents individual meanings related to the individual's experience and personality (Oswald & Wahl, 2005). Control beliefs derive from psychological theories and studies on perceived control in different domains of life (see e.g., Heckhausen & Schulz, 1995) and this concept has been applied to the housing domain (Oswald, Wahl, Martin, & Mollenkopf, 2003). Additionally, it is assumed that control beliefs reflect a major driving force in explaining the course and outcome of ageing. Housing-related control beliefs explain events at home either as contingent upon one's own behavior, or upon luck, fate, and powerful others. The major focus of usability in the home is on activity and functionality and addresses perceived possibilities to perform necessary and preferred activities in a given home environment as generated by person-environment-activity transaction (Fänge & Iwarsson, 1999). For a further elaboration of the theoretical background of perceived aspects of home, see Oswald et al. (2006). These perceived aspects of home have been found to be associated with different health outcomes among people aged 80-89 years

(see Iwarsson et al., 2016) but have not yet been explored among people in earlier phases of the ageing process.

Depression and psychological well-being are of great importance in later life (Blazer, 2003; Steptoe, Deaton, & Stone, 2015). Depression is a common cause of emotional distress and decreases quality of life in later life (Blazer, 2003). The World Health Organization (WHO) ranked depression as the leading cause of disability worldwide (WHO, 2016). Results from studies among people aged 80-89 years show that high external housing-related control beliefs are associated with depression and more dependence in activities of daily living (ADL) (Wahl, Schilling, Oswald, & Iwarsson, 2009). Addressing the broader age group of people aged 60 years and older, research shows that ADL capacity is related to depression (Nyunt, Lim, Yap, & Ng, 2012). The two psychological well-being domains, purpose in life and autonomy are particularly important as we age (Ryff, 1989a). These domains belong to the eudaimonic (growth, purpose) side of well-being as opposed to the hedonic (happiness) side (Ryff, 1989b). Studies involving older people who live in privately owned/rented dwellings in the community have shown that high levels of eudaimonic well-being are associated with a reduced risk of mortality (Boyle, Barnes, Buchman, & Bennett, 2009) and have a positive effect on biomarkers such as cortisol levels as well as on cardiovascular risk (Ryff, Singer, & Dienberg Love, 2004).

It is a key societal aspiration to improve the well-being of older people, and policy makers are trying to find ways to accomplish this ambition (Department for Work and Pensions, 2005). While hitherto scarcely addressed in research, it is important to investigate the relationships among perceived home, depressive mood, and psychological well-being (eudaimonic well-being) as we age. The present study builds upon a previous study showing that perceived aspects of home are important for health in terms of physical and mental symptoms among community-dwelling people aged 67-70 years (Haak et al., 2015).

Taking further steps to expand this kind of investigation, the overarching aim of the present study was to investigate the relationships between perceived aspects of home (i.e., meaning of home, external housing-related control beliefs, usability), depressive mood, purpose in life, and autonomy. Based on previous research (Haak et al., 2015; Iwarsson et al., 2016) the following hypotheses guided the study design:

I) People who report high levels of meaning of home, high housing-related internal control, and believe that their home is usable for everyday activities are less likely to have depressive mood than people who experience high external housing-related control, low meaning of home, and low usability in the home.

II) People who report high levels of meaning of home, high housing-related internal control, and believe that their home is usable for everyday activities have better psychological well-being (eudaimonic well-being) than people who experience high external housing-related control, low meaning of home, and low usability in the home.

## **2. Material and methods**

### **2.1. Study context and participants**

The study sample for the “Home and Health in the Third Age Study” was extracted from the Good Aging in Skåne Project which is a sub study of the Swedish National Study on Aging and Care (Lagergren et al., 2004). The participants in GÅS were randomly selected from the general population. Participants from the 67-70-year-old GÅS sub-study cohort ( $N = 664$ ) were invited by mail, and 371 individuals (56%) agreed to participate (see Kylèn, Ekström, Haak, Elmståhl, & Iwarsson, 2014 for a detailed attrition analysis). The mean age of the participants was 68 years; 57% were women. Close to two thirds (64%) were cohabiting, and more than half (59%) were living in multifamily housing. The vast majority (89%) were living in an urban environment, and 79% had a good financial situation (for details see Table



1). Data was collected at home visits during an eight-month period in 2010-2011 by two registered occupational therapists trained to conduct the interviews and observations. The present study is based on a subset of the quantitative data collected in this sample.

## 2.2. Ethical considerations

The Home and Health in the Third Age Study (2010/431) and the SNAC-GÅS Project (2002- 2012 LU 744-00) were conducted in accordance with the Helsinki Declaration and approved by the Ethical Board in Lund and by the Ethical Committee at Lund University, Sweden, respectively. All participants gave written informed consent.

## 2.3. Instruments

See Table 2 for an overview of included instruments and domains.

### 2.3.1. Independent variables

Aspects of perceived home were the independent variables of interest. We included three different aspects of perceived home: Meaning of home; external housing-related control beliefs, and usability in the home (see Oswald et al., 2006).

Meaning of home (MOH). The 28-item “Meaning of home” questionnaire has four domains, each with items rated on a scale ranging from 0 (*strongly disagree*) to 10 (*strongly agree*). Higher scores indicate a stronger bonding/attachment to home (Oswald et al., 2006). The behavioral domain has 6 items (range 0-60), for example, “being at home for me means doing everyday tasks,” and the physical has 7 items (range 0-70), for example, “being at home for me means feeling that home has become a burden,”. The cognitive/emotional domain has 10 items (range 0-100), for example, “being at home for me means feeling safe,” while the social has 5 items (range 0-50), for example, “being at home for me means being excluded from social and community life.” We used the sum score of each sub-scale. Cronbach’s alpha in our dataset indicated acceptable internal consistency (Arnold, 1991) in all four domains;

behavioral ( $\alpha = 0.59$ ); physical ( $\alpha = 0.53$ ); cognitive/emotional ( $\alpha = 0.61$ ), and social ( $\alpha = 0.62$ ).

External housing-related control beliefs (HCQ). External control beliefs in relation to home were addressed using the Housing-related Control Beliefs Questionnaire (Oswald et al., 2003). We used and combined the two sub-scales that targeted External Control: Powerful others (8 items), for example, “In order to do anything interesting outside of my home I have to rely on others,” and Chance (8 items), for example, “Having a nice place is all luck. You cannot influence it; you just have to accept it.” That is, external control indicates that an external power such as another person is responsible or that things happen by plain luck, chance, or fate (Oswald et al., 2006). Each item is assessed on a five-point rating scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*); higher scores indicate lower perceived control. We used the total sum score of the two combined sub-scales (range = 16-80). The 16-item scale reached an acceptable level of internal consistency (Arnold, 1991); Cronbach’s  $\alpha = 0.69$ .

Usability in my home (UIMH). The Usability in My Home questionnaire was used to capture to what degree the physical environment is perceived to support performance of daily activities in the home (Fänge & Iwarsson, 1999). The items are rated on a five-point scale ranging from 1 (*not at all suitable/usable*) to 5 (*fully suitable/usable*); higher scores mean higher usability. We used two sub-scales that target activity aspects (4 items, range 4-20), for example, “In terms of how you normally manage your cooking/heating of food or preparation of snacks, to what extent is the home environment suitably designed in relation to this?”, and physical environmental aspects (6 items, range 6-30) of usability, for example, “How usable do you feel that your home environment is in general?”. We used the sum score of each sub-scale. Cronbach’s alpha on both sub-scales indicated acceptable internal consistency (Arnold, 1991): Activity aspects,  $\alpha = 0.79$  and physical environmental aspects  $\alpha = 0.72$ .

### 2.3.2. Dependent variables

Depressive mood. To capture depressive mood, the 15-item version of the Geriatric Depression Scale (GDS) (Almeida & Almeida, 1999) was used. The interviewer presented each item and asked the participant to answer yes/no based on how he/she felt over the past week. Five items indicate a depressive symptom when rated negatively while the remaining 10 items indicate a depressive symptom when rated positively. The total sum score range is 0-15. The GDS is commonly used as a screening tool in clinical settings; we used a cut-off  $>5$  points to indicate a depressive mood (Almeida & Almeida, 1999). Cronbach's alpha on our dataset indicated acceptable internal consistency (Arnold, 1991);  $\alpha = 0.77$ .

Psychological well-being (PWQ). Psychological well-being was self-rated using a modified 18-item questionnaire based on Ryff's and Keyes's scales of Psychological Well-being (Ryff, 1989b; Ryff & Keyes, 1995). The version used in the present study included autonomy (9 items, range 9-45) and purpose in life (9 items, range 9-45). Statements were presented to the participants with the instruction to rate each statement on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Examples of statements are "I am not afraid to voice my opinions even when they are in opposition of most people" (autonomy), and "Many daily activities often seem trivial and unimportant to me" (purpose in life). Some items are negatively phrased and are thus reversed to compute a sum score with higher scores on all items indicating better well-being. Cronbach's alpha in our dataset indicated rather low but acceptable internal consistency for group comparisons (Arnold, 1991): Purpose in life  $\alpha = 0.65$  and autonomy  $\alpha = 0.71$ .

### 2.3.3. Confounding variables

Focusing the analyses on perceived aspects of home as independent variables, a set of possible confounding variables was used in the regression models (described below). That is,

sociodemographic characteristics as well as self-rated difficulty in activities of daily living (ADL) were included in the analyses.

The sociodemographic variables were sex, marital status, level of education and financial situation. Marital status was dichotomized into married/cohabiting or unmarried/divorced/widowed. Level of education was categorized into primary school or less, secondary school, or one year of university or more. Financial situation was dichotomized into poor/sufficient or good.

ADL difficulty was constructed based on assessments of ADL dependence using the ADL Staircase (Sonn & Åsberg, 1991) including five personal and four instrumental ADL items. Each item is assessed using a three-point scale: Independent, partly dependent, or dependent. For each item rated as independent, the participant was asked to state whether the activity was performed *with* or *without* difficulty (Iwarsson, Horstmann, & Sonn, 2009). A dichotomous variable was constructed with “no” indicating that the participant performed all 9 activities without difficulty and otherwise “yes.”

#### 2.4. Statistical methods

Treatment of missing data. In order to reduce internal attrition, variables with up to 25% missing data were subjected to imputation when practical. Two variables needed such consideration: the GDS (sum score) (11% missing) and HCQ (sum score) (20% missing). Imputations were done on an individual level; if less than one third of the values were missing per respondent, the mean of non-missing values was used to impute a total score. No participant was missing more than one third of the items on the GDS. However, four had more than one third missing on the HCQ scale, so these four cases were excluded in analyses with HCQ. As far as our confounders are concerned, four people did not answer questions regarding education and five people did not answer questions concerning their financial situation. However, as our data did not allow us to impute scores for these confounders, these

cases were excluded in analyses that included these variables. Hence, the number included in each analysis varied due to missing values.

To exclude multicollinearity among independent variables, we used Spearman's correlation coefficient ( $\rho$ ). None of the correlations exceeded  $\rho = 0.5$ . Differences in proportions of GDS (dichotomized by cut-off  $>5$  points) and sociodemographic variables (sex, marital status, education, financial situation, ADL difficulty) were tested with Person's Chi-squared test (Table 1). Associations between GDS (dependent variable) and each perceived aspect of home were tested with bivariate logistic regressions (Table 3). Comparisons of mean values of PWQ Autonomy and PWQ Purpose in life with sex, marital status, education, financial situation, and ADL difficulty were made with Student's T-test for two-group comparisons and with Analysis of variance (ANOVA) for multi-group comparisons (Table 4). Associations between PWQ Autonomy and PWQ Purpose in life as dependent variables and each aspect of perceived home as independent variables were tested with bivariate linear regression models (Tables 5 and 6).

Multivariate regression models. Logistic regression was applied for GDS and linear regression for PWQ Autonomy and PWQ Purpose in life. For both types of models, the analysis proceeded in a similar way. The perceived aspects of home variables that appeared as significant in the bivariate models were entered in the respective multivariate regression model and controlled for those possible confounders showing a  $p$  value  $< .3$  (Tables 1 and 4). This  $p$  value was not used as an indicator of statistical significance but as a cut-off to reduce the risk for type-2 error. In the multivariate regression models, non-significant variables were removed one by one in a backward manner until all independent variables showed a significant association ( $p < .05$ ) with the dependent variable (Tables 3, 5 and 6). Explained variance was assessed by Nagelkerke's Pseudo  $R$ -square (logistic regression models) or Adjusted  $R$ -square (linear regression models).

In all the analyses,  $p$  values  $<.05$  were considered statistically significant and all tests were two-sided. All analyses were performed using the SPSS software version 21 (IBM 211 Corporation, Armonk, NY, USA).

### 3. Results

#### 3.1. Hypothesis I: Perceived home is related to depressive mood

A larger proportion of women, participants living alone, participants with a poor financial situation and those with difficulty in ADL were more likely to report a depressive mood (Table 1). The bivariate logistic regression models showed that participants with a depressive mood perceived less meaning of home within physical ( $p < .001$ ), behavioral ( $p = .001$ ), cognitive-emotional ( $p < .001$ ) and social ( $p < .001$ ) aspects of home. Additionally, participants with a depressive mood believed that they had less control of their housing situation ( $p < .001$ ) (Table 3).

In the multivariate model, external housing-related control beliefs ( $OR = 1.08$ , 95% CI = 1.02, 1.14) as well as social ( $OR = 0.91$ , 95% CI = 0.85, 0.98) and cognitive-emotional bonding ( $OR = 0.95$ , 95% CI = 0.90, 0.99) to the home remained significantly associated with depressive mood (Table 3). That is, participants who felt that they were in control over their housing situation, experienced a good relationship with fellow-lodgers or neighbors as well as having a biographical bonding to the home were less likely to report depressive mood ( $GDS \leq 5$ ). No usability aspect of home was found to be associated with depressive mood. The final model explained 31% of the variance.

#### 3.2. Hypothesis II: Perceived home is related to psychological well-being

On the descriptive level, single-living participants ( $p < .001$ ) reported more autonomy whereas married/cohabiting participants ( $p < .001$ ), those with higher education ( $p < .001$ ), a good financial situation ( $p = .010$ ) and without ADL difficulties ( $p = .046$ ) reported higher

purpose in life (Table 4). This means that people who are cohabiting and functioning well in their everyday life view their life as having more purpose.

In the bivariate models, only the variable behavioral aspects of meaning of home (related to everyday behavior and to proactive ways of manipulating items in the home) was significantly associated with autonomy ( $p = .001$ ). This means that participants reporting high behavioral meaning of home felt more autonomous. The association remained in the final multivariate analyses ( $B = .09$ , 95% CI = 0.02, 0.15). The final model explained 6% of the variance (Table 5).

In the bivariate models with purpose in life as dependent variable, all four aspects of meaning of home (physical,  $p < .001$ ; behavioral,  $p = .034$ ; cognitive-emotional,  $p = .001$  and social,  $p < .001$ ) were significantly associated with higher levels of purpose in life. Low external housing-related control beliefs ( $p < .001$ ) and high activity aspects of usability ( $p = .038$ ) were also associated with higher levels of purpose in life (Table 6).

In the multivariate linear regression models, social ( $B = 0.15$ , 95% CI = 0.06, 0.24) and physical ( $B = 0.08$ , 95% CI = 0.01, 0.15) meaning of home and external housing-related control beliefs ( $B = -0.09$ , 95% CI = -0.15, -0.03) remained significantly associated with higher levels of purpose in life. In other words, individuals who thought that their home was socially meaningful and appreciated the physical experience of the residential area, access, and furnishing also had goals and a sense of directedness in life. Moreover, participants who experienced high external control beliefs, indicating that they had lost some control over their home situation, also experienced lower purpose in life. The final model explained 24% of the variance (Table 6).

#### **4. Discussion**

With this study, we examined relationships hitherto not targeted in research among community dwelling people aged 67-70 years. Investigating associations between perceived

home on the one hand and depressive mood and aspects of psychological well-being on the other, the two hypotheses posed were both supported on an overarching level. That is, experiencing high levels of positive perceived aspects of home was associated with lower depressive mood and higher purpose in life as well as with feeling more autonomous.

#### Hypothesis I: Perceived home is related to depressive mood

The bivariate analysis results showing that all four aspects of meaning of home were significantly associated with experiencing less depressive mood highlight that meaning of home is a complex construct containing several different conceptual aspects (Oswald & Wahl, 2005). Furthermore, the results seem to be generalizable because 14% of the sample reported a depressive mood which is consistent with the prevalence of depression in people aged 67-70 years in the general population (Blazer, 2003). Depressive mood has previously been found to be associated with how very old people perceive their home environment (Wahl et al., 2009), and we found similar results also among this younger well-functioning cohort. More specifically, we identified that those who do not have a depressive mood find more cognitive-emotional and social meaning in their home, and they feel more in control of their housing situation.

Based on our previous study (Haak et al., 2015), we expected to find an association between usability and depression, but this part of hypothesis I was not supported. This can very well be the case in this high-functioning younger cohort, but might also be explained by the different outcome variables used in the two studies. That is, in the previous study, depression was captured by one of the domains of a symptoms list developed in Sweden (Tibblin, Bengtsson, Furunes, & Lapidus, 1990) whereas in the present study, we used the more common GDS (Almeida & Almeida, 1999). Still, as we know that usability is associated with health outcomes among very old people (Tomson, Horstman, Oswald, & Iwarsson, 2013) it is important to further explore this relationship in forthcoming studies.



Turning to another reflection, the social aspect of meaning of home showed a significant association to depressive mood in the younger cohort of the present study. Examining the specific items in the social domain of the meaning of home questionnaire, this might reflect that compared to those in very old age (Oswald et al., 2006), 67-70 year olds have more active social lives, including spending time with children, grandchildren, friends and neighbors. We only found one other study on very old people that looked at the relationship between housing and healthy ageing (Oswald et al., 2007). They used multivariate cluster analysis but did not look at the direct relationship between meaning of home and depression; therefore, it is not possible to compare our finding to a cohort of people representing a more advanced age.

Hypothesis II: Perceived home is related to psychological well-being

Psychological well-being was associated with perceived aspects of home, which supported this hypothesis. However, we found different relationships between the two psychological well-being aspects autonomy and purpose in life. Hence, we will discuss each of these aspects separately rather than discussing overall psychological well-being.

While we hypothesized that a high degree of autonomy is associated with low external housing-related control beliefs as well as with high perceived aspects of meaning of home and usability, this hypothesis was only partly supported. That is, a high degree of autonomy was found to be associated only with a feeling of being proactive and able to rearrange things in the home according to individual desire (behavioral aspects of meaning of home). Autonomy is one of many aspects of the complex and multidimensional psychological well-being construct, and although the variance explained by this multivariate model is small, it shows that the behavioral aspect of meaning of home is somewhat related to autonomy.

Further, the results show that purpose in life is associated with high social and physical bonding to the home as well as to perceived environmental control. When it comes to the psychological processes regulating the person-environment transaction at home (i.e.,

experience of housing-related control) our study shows that people aged 67-70 years who experience high external control also experience less purpose in life. As similar results were found among very old people (Oswald et al., 2007), the present study, based on a younger cohort, underpins the need to consider housing-related control as an important dimension of perceived home that has implications for health along the course of ageing. It has been suggested that a lack of control itself does not cause illness; however, it might alter the physiological condition of the individual and result in physical and mental vulnerability (Lachman, Neupert, & Agrigoroaei, 2011).

Housing and gerontology researchers have been studying ageing in place for many years (Greenfield, 2012). In addition to the scientific relevance per se, this endeavor to increase the knowledge in this field is underpinned by the political ambition to enable older people to continue living in their own home for as long as possible. However, in Sweden, this ambition has started to disintegrate (Sandstedt & Abramsson, 2012), and reports from the Swedish government stress the need for a greater diversity of housing options for seniors (Ministry of Health and Social Affairs, 2008). The housing options which senior citizens typically ask for are diverse types of accessible age-restricted housing with services such as restaurants and spaces for socializing with peers (Sandstedt & Abramsson, 2012). Current policy developments in Sweden show that the provision of diverse housing options for seniors is important (Ministry of Health and Social Affairs, 2008). However, in order to understand the complexity of ageing in place in these environments more research is warranted. As housing seems to provoke psychological reactions already in an earlier phase of ageing, it could also be important for municipalities to provide housing counselling services addressing the concerns people might have. As shown by Granbom et al. (2014), residential reasoning is a process hitherto not taken sufficiently into consideration as a health promotion strategy (Granbom et al., 2014; Löfqvist et al., 2013). Ageing in place research on baby boomers in the

U.S. has shown that a strong desire to age in place is associated with higher residential satisfaction (Kwon, Ahn, Lee, & Kim, 2015). Our study, which included a similar cohort of younger older people, shows that social aspects of home are relevant for health outcomes such as depression and well-being. Although there are many private and public initiatives to increase the number and types of housing options, the shortage of housing is a major concern for all age groups in Sweden (Emanuelsson, 2015). The paucity of diverse housing options can potentially generate feelings of loss of control when it comes to home, which in the present study, was found to be associated with depressive mood and lack of purpose in life.

Additionally, housing options for seniors are important because loneliness is a well-known risk factor for depression and other negative health outcomes (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). In Sweden 8% of people aged 65-74 years report that they feel lonely and would like to have more social contact (Jennbert, 2009). Moreover, almost half of those aged 75 years and older live alone (Statistics Sweden 2012, HHS, 2014). Our study clearly shows that less social relationships with fellow-lodgers, neighbors or visitors are associated with negative health outcomes such as depressive mood and lower psychological well-being for people aged 67-70 years. Hence from a societal perspective, it is important to supply different kinds of housing options that offer social meeting places and activities for older people (The Ministry of Enterprise and Innovation, 2015).

A word of caution is needed because the present study was based on a cross-sectional design which impedes the determination of causality. Consequently, longitudinal studies analyzing how perceived home and health relationships change over time along the process of ageing are necessary. Also, since a large number of statistical tests were performed, there is a risk of mass-significance (Bland & Altman, 1995). In addition, with an attrition of about 44% it cannot be ruled out that the results might be somewhat biased. However, our study was based on a randomly chosen sample from the general population (Kylan et al., 2014), so it is

nevertheless unlikely that the results would be distorted, which allows us to interpret the generalizability as sufficient. Finally, since psychological well-being is a multidimensional concept, further studies should include a broader spectrum of domains. In order to deepen the knowledge in this area of inquiry, future research designs may also benefit from the inclusion of a qualitative approach.

## **5. Conclusions**

Housing for the growing proportion of older people in the population is a key welfare challenge of our time. The majority of older people remain in their owned/rented homes in the community well into old age. This has generated a need for a more comprehensive understanding of which aspects of the home support active and healthy ageing. In the present study, we show that perceived aspects of home are vital for the understanding of psychological well-being and depression among people aged 67-70 years. While the dynamics of these kinds of associations among people in an earlier phase of ageing are largely unknown and further studies are warranted, the findings provide impetus to widen the public view to consider more than just impediments in the physical home environment. From a public health perspective, housing that supports active and healthy ageing is a necessity, especially in counties with a strong ageing in place policy. This research suggests that less social interactions with fellow-lodgers, neighbors or visitors are associated with negative health outcomes such as depressive mood and lower psychological well-being for people aged 67-70 years. The findings could be used to raise awareness about these issues for policy makers and housing authorities. When planning for age-friendly environments it is important to consider factors such as how the built environment can create natural meeting places nurturing social participation, etc. Moreover, our findings suggest that professionals involved in housing-related interventions and counselling should use a client centered approach enhancing older people's sense of control. In order to shed light on causal relationships further research based

on longitudinal analyses is needed, and similar studies involving samples representing other phases of the ageing process are called for.

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### **Conflict of interest statement**

The authors declare no competing interests.

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Table 1. Description of study sample and comparison of results on the GDS<sup>a</sup>,  $N = 371$

Variable	Study sample <i>n</i> (%)	GDS $\leq 5$ <i>n</i> (%)	GDS $> 5$ <i>n</i> (%)	<i>p</i> Value <sup>b</sup>
Sex				
Men	159 (42.9)	153 (96.2)	6 (3.8)	.016
Women	212 (57.1)	188 (89.5)	22 (10.5)	
Marital status				
Single/widowed/divorced	133 (35.8)	114 (85.7)	19 (14.3)	<.001
Married/cohabiting	238 (64.2)	227 (96.2)	9 (3.8)	
Education				
Primary school or less	139 (37.9)	129 (93.5)	9 (6.5)	
Secondary school	124 (33.8)	116 (93.5)	8 (6.5)	.587
University	104 (28.3)	94 (90.4)	10 (9.6)	
Financial situation				
Poor/sufficient	78 (21.3)	67 (85.9)	11 (14.1)	.017
Good	288 (78.7)	269 (94.1)	17 (5.9)	
ADL difficulty				
No	293 (79.0)	274 (93.8)	18 (6.2)	.044
Yes	78 (21.0)	67 (87.0)	10 (13.0)	

Notes. <sup>a</sup>Geriatric Depression Scale, dichotomized by cut-off  $> 5$  points. <sup>b</sup>Differences in proportions were tested with Person's Chi-squared test.

Table 2. Overview of instruments and domains

Instrument	Domain	Items, n	Reference
<i>Dependent variables</i>			
Geriatric Depression Scale (GDS)	Depressive symptoms	15	Almeida and Almeida, 1999
Psychological well-being (PWQ)	Autonomy	9	Ryff, 1989b; Ryff and Keyes, 1995
	Purpose in life	9	
<i>Independent variables</i>			
Meaning of Home (MOH)	Behavioural aspects	6	Oswald et al. 2006
	Physical aspects	7	
	Cognitive/emotional aspects	10	
	Social aspects	5	
Housing-Related Control Beliefs (HCQ)	External control combined	16	Oswald et al. 2006
Usability In My Home (UIMH)	Activity aspects	4	Fänge and Iwarsson, 1999
	Physical environmental aspects	6	

Table 3. Bivariate and multivariate logistic regression models with GDS<sup>a</sup> as the dependent variable and perceived aspects of home as the independent variables,  $N = 371$

Logistic regression model	$n^b$	OR	95% CI	$p$ Value	Nagelkerke $R^2$
<i>Bivariate logistic model</i>					
Perceived aspects of home					
Meaning of home <sup>c</sup>					
Physical aspects	356	0.91	[0.87, 0.95]	<.001	.135
Behavioral aspects	359	0.93	[0.90, 0.97]	.001	.065
Cognitive-emotional aspects	349	0.94	[0.91, 0.97]	<.001	.102
Social aspects	360	0.88	[0.84, 0.93]	<.001	.180
Ext. housing control-beliefs <sup>d</sup>	367	1.09	[1.04, 1.14]	<.001	.097
Usability in my home <sup>e</sup>					
Activity aspects	344	0.85	[0.73, 1.00]	.054	.022
Physical environmental aspects	354	0.95	[0.84, 1.06]	.348	.005
<i>Multivariate logistic model<sup>f</sup></i>					
Meaning of home					
Cognitive-emotional aspects		0.95	[0.90, 0.99]	.028	
Social aspects		0.91	[0.85, 0.98]	.008	
Ext. housing control-beliefs		1.08	[1.02, 1.14]	.008	
Sex <sup>g</sup>		4.14	[1.39, 12.35]	.011	

Notes. <sup>a</sup>Geriatric Depression Scale, dichotomized by cut-off >5 points. <sup>b</sup> $n$  varies due to internal missing. <sup>c</sup>Higher score indicates stronger bonding to the home. <sup>d</sup>Higher score indicates higher external housing-related control beliefs. <sup>e</sup>Higher score indicates perceiving a more usable home. <sup>f</sup>Multivariate model, initially including all aspects of home and controlled for confounders ( $p < 0.3$ ) through backward elimination. <sup>g</sup>Being a woman was set as reference. Multivariate model: Hosmer-Lemeshow goodness of fit  $\chi^2$  (df:8, n=346) =8.931,  $p=.348$ .

Table 4. Comparison of means of PWQ Autonomy and Purpose in life with potential confounding variables,  $N=371$

Variable	PWQ <sup>a</sup>			PWQ <sup>c</sup>		
	Autonomy <i>M (SD)</i>	<i>n</i> <sup>b</sup>	<i>p</i> Value <sup>d</sup>	Purpose in life <i>M (SD)</i>	<i>n</i>	<i>p</i> Value <sup>d</sup>
Sex						
Men	34.8 (4.1)	156	.643	32.6 (4.9)	153	.074
Women	34.6 (5.0)	199		31.6 (4.8)	186	
Marital status						
Single/widowed/divorced	36.0 (4.9)	129	<.001	30.5 (5.5)	122	<.001
Married/cohabiting	33.9 (4.2)	226		33.0 (4.3)	217	
Education						
Primary school or less	34.5 (4.7)	130		30.5 (5.0)	122	
Secondary school	34.9 (4.6)	119	.707	32.3 (5.1)	115	<.001
University	34.6 (4.4)	102		33.8 (4.0)	98	
Financial situation						
Poor/sufficient	35.1 (5.1)	74	.311	30.8 (5.0)	73	.010
Good	34.5 (4.5)	277		32.4 (4.8)	261	
ADL difficulty						
No	34.6 (4.5)	286	.347	32.3 (5.0)	272	.046
Yes	35.1 (4.8)	69		31.0 (4.4)	67	

Notes. <sup>a</sup>Psychological Well-being higher score indicates more autonomy, scoring range: 9 – 45. <sup>b</sup>*n* varies due to internal missing. <sup>c</sup>Higher score indicates a higher purpose in life, scoring range: 9 – 45. <sup>d</sup>Two-group comparisons tested with Student's T-test; multi-group comparisons tested with ANOVA.



Table 5. Bivariate and multivariate linear regression models with PWQ Autonomy as the dependent and perceived aspects of home as the independent variables,  $N = 371$

Linear regression model	$n^a$	$B$ - coefficient	95% CI	$p$ Value	Adjusted $R^2$
<i>Bivariate linear model</i>					
Perceived aspects of home					
Meaning of home <sup>b</sup>					
Physical aspects	344	0.03	[-0.03, 0.09]	.266	.001
Behavioral aspects	348	0.11	[0.04, 0.17]	.001	.026
Cognitive-emotional aspects	338	0.03	[-0.02, 0.08]	.231	.001
Social aspects	347	-0.05	[-0.13, 0.03]	.219	.001
Ext. housing control-beliefs <sup>c</sup>	354	-0.02	[-0.08, 0.03]	.416	.00
Usability in my home <sup>d</sup>					
Activity aspects	329	0.12	[-0.15, 0.39]	.382	.00
Physical aspects	339	0.10	[-0.06, 0.27]	.228	.001
<i>Multivariate linear model<sup>e</sup></i>	348				.062
Meaning of home					
Behavioral aspects		0.09	[0.02, 0.15]	.007	
Marital status <sup>f</sup>		-1.88	[-2.87, -0.90]	<.001	

Notes.<sup>a</sup> $n$  varies due to internal missing. <sup>b</sup>Higher score indicates stronger bonding to the home. <sup>c</sup>Higher score indicates higher external housing related control beliefs. <sup>d</sup>Higher score indicates perceiving a more usable home. <sup>e</sup>The multivariate model, initially including all aspects of home, was reduced through backward elimination to include only significant home variables. The model was then controlled for possible confounders ( $p < .3$ ). <sup>f</sup>Single living was set as reference. Multivariate model:  $F$ -test ( $df: 2, n=346$ ) = 12.474,  $p < .001$ .

Table 6. Bivariate and multivariate linear regression models with PWQ Purpose in life as the dependent variable and perceived aspects of home as the independent variables,  $N = 371$

Bivariate and multivariate linear regression models	$n^a$	$B$ -coefficient	95% CI	$p$ Value	Adjusted $R^2$
<i>Bivariate linear models</i>					
Perceived aspects of home					
Meaning of home <sup>b</sup>					
Physical aspects	330	0.18	[0.12, 0.24]	<.001	.088
Behavioral aspects	333	0.08	[0.01, 0.15]	.034	.010
Cognitive-emotional aspects	324	0.03	[0.03, 0.14]	.001	.029
Social aspects	331	0.24	[0.16, 0.32]	<.001	.087
Ext. housing control-beliefs <sup>c</sup>	338	-0.18	[-0.24, -0.12]	<.001	.094
Usability in my home <sup>d</sup>					
Activity aspects	314	0.30	[0.02, 0.59]	.038	.011
Physical environmental aspects	323	0.13	[-0.05, 0.31]	.142	.004
<i>Multivariate linear model<sup>e</sup></i>	329				.237
Meaning of home					
Social aspects		0.15	[0.06, 0.24]	.002	
Physical aspects		0.08	[0.01, 0.15]	.018	
Ext. housing control-beliefs		-0.09	[-0.15, -0.03]	.004	
Marital status <sup>f</sup>		1.60	[0.56, 2.63]	.003	
Education <sup>g</sup>					
Secondary school		1.61	[0.48, 2.75]	.005	
University		2,82	[1.60, 4.04]	<.001	

Notes.<sup>a</sup> $n$  varies due to internal missing. <sup>b</sup>Aspects of meaning of home: Higher score indicates stronger bonding to the home. <sup>c</sup>Housing related control-beliefs: Higher score indicates higher external housing related control beliefs. <sup>d</sup>Aspects of usability in my home: Higher score indicates a more usable home. <sup>e</sup>The multivariate model initially including all aspects of home was reduced through backward elimination to include only significant home variables. The model was then controlled for possible confounders ( $p < .3$ ). <sup>f</sup>Single living was set as reference. <sup>g</sup>Primary school was set as reference. Multivariate model:  $F$ -test ( $df: 7, n=315$ ) = 15.258,  $p < .001$ .