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## Relationships between perceived aspects of home and symptoms in a cohort aged 67-70

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**Abstract**

The importance of the home environment increases with age. Perceived aspects of home influence life satisfaction, perceived health, independence in daily activities and well-being among very old people. However, research on health and perceived aspects of home among senior citizens in earlier phases of the aging process is lacking. Therefore, the main aim was to explore whether perceived aspects of home are related to number of and specific domains of symptoms in a cohort of people aged 67-70. Interview and observation data on aspects of home and health, collected with 371 individuals living in ordinary housing in urban as well as rural areas in southern Sweden, were used. Descriptive statistics, correlations, multiple linear and logistic regression models were employed. The results showed that the median number of symptoms was 6.0. Reporting fewer reported symptoms was associated with a higher meaning of home ( $p=0.003$ ) and lower external housing related control beliefs ( $p=0.001$ ) but not with usability in the home. High external control beliefs were significantly associated with symptoms from head ( $p=0.014$ ), gastrointestinal ( $p=0.014$ ) and tension symptoms ( $p<0.001$ ). Low meaning of home was significantly associated with heart-lung symptoms ( $p=0.007$ ), and low usability was associated with depressive symptoms ( $p=0.003$ ). In conclusion, showing that perceived aspects of home are important for health in terms of physical and mental symptoms, this study contributes to the knowledge on the complex interplay of health and home in the third age.

Key Words: Housing, meaning, usability, physical, mental

## 1. Introduction

Well known since long, the home environment provides the major context for aging (Baltes, Maas, Wilms, Borchelt, & Little, 1999) and the importance of the home environment increases with age. Previous research shows that perceived aspects of home influence life satisfaction, perceived health, independence in daily activities and well-being among very old people (Iwarsson, Horstmann, & Slaug, 2007; Oswald et al., 2007). However, research on perceived aspects of home and health among senior citizens during earlier phases of the aging process is to a great extent lacking. In order to develop more efficient health promotion and prevention strategies that support active and healthy aging, there is a need to address this knowledge gap.

As aging involves declines in functional abilities such as vision and mobility, and an increase in self-reported symptoms (Cigolle, Langa, Kabeto, Zhiyi, & Blaum, 2007), old age is a period highly sensitive to environmental influences. Thus, the home environment becomes increasingly important in supporting autonomy, social inclusion and well-being as we age (Wahl, 2006). This is emphasized by the fact that the majority of senior citizens are living in their own homes; in the case of Sweden, 94% of the population aged 65+ live in ordinary housing (Jennbert, 2009). In order to promote health and facilitate good housing solutions for senior citizens, studies that elucidate how perceived aspects of the home environment are related to aspects of health among people also in earlier phases of the aging process are needed.

Housing contributes to everyday life at home in terms of functional links related to behavioural adaptation as well as in terms of meaningful links related to identity (Oswald & Wahl, 2005). As we age, the sense of being in place develops as an expression not only of routines and cognitive awareness of home but also as a result of a psychological integration of person and place (Rowles, Oswald, & Hunter, 2004). Addressing this complexity, a variety of

concepts and terms has been suggested to address perceived aspects of housing. Among these are usability, meaning of home, and perceived environmental control, (Oswald et al., 2006). The major focus of usability in the home is on activity and functionality, addressing perceived possibilities to perform necessary and preferred activities in a given home environment as generated by the person-environment-activity transaction (Fänge & Iwarsson, 1999; Fänge & Iwarsson, 2003). The concept of 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. Based on the assumption that control beliefs reflect a major driving force in explaining the course and outcome of ageing, the concept housing-related control beliefs derives from psychological theories and studies on perceived control in different domains of life (see e.g., Heckhausen & Schulz, 1995). Consequently, it has also been applied to the housing domain (Oswald, Wahl, Martin & Mollenkopf, 2003). Housing-related control beliefs explain events at home either as contingent upon one's own behaviour, or upon luck, fate, and powerful others. For a further elaboration of the theoretical background of perceived aspects of housing, see Oswald et al. (2006).

Previous studies on home and health have provided important knowledge on the complex interplay between home and health in very old age, including aspects of health such as activities of daily living (ADL) difficulty, depression, perceived health, etc. (see e.g., Oswald et al., 2007). Addressing earlier phases of the aging process, a further exploration including symptoms would be of great value because symptoms predict life satisfaction and perceived health (Al-Windi, 2005; Enkvist, Ekström, & Elmståhl, 2012). Even though symptoms are related to aspects of housing such as mold, temperature and air quality (Gemmell, 2001; Gunnbjörnsdottir et al.,

2003), to the best of our knowledge no research on relationships between symptoms and perceived aspects of home has been published.

Therefore, starting out from a description of symptoms in relation to demographical data and ADL difficulty with a cohort of people aged 67-70, living in Sweden, the main aim of the present study was to explore whether perceived aspects of home are related to number of and specific domains of symptoms.

## **2. Material and Methods**

### *2.1. Study Context and Participants*

The participants in the present study - the “Home and Health in the Third Age Study” - were drawn from the Good Ageing in Skåne (GÅS) Project which is part of the Swedish National Study on Ageing and Care (Lagergren et al., 2004). The participants, representing the 67-70 year old GÅS Project cohort ( $N=664$ ), were invited by letter, and 371 individuals (55.9%) accepted to participate. Data was collected at home visits during an eight-month period in 2010-2011 by two occupational therapists trained to conduct the interviews and observations. The mean age of the participants was 68.4 years; 57.1% were women. Close to two thirds (64.2%) were cohabiting and more than half (59.3 %) were living in multifamily housing. The vast majority (88.9%) were living in an urban environment (for details see Table 1).

The Home and Health in the Third Age Study and the GÅS Project were conducted in accordance with the Helsinki Declaration and approved by the Ethical Board in Lund (2010/431, 2002-2012 LU 744-00, respectively).

## 2.2. Measures

### 2.2.1. Demographics

Socio-demographic descriptive variables were age, sex, marital status, level of education, type of housing and years in present dwelling. Marital status was dichotomized into married/cohabitant or unmarried/divorced/widowed. Level of education was divided into three categories: elementary school or less, secondary school and one or more years than secondary school, and university degree. Type of housing was divided into two categories: one-family house/multi-family building. Years in the present dwelling was dichotomized by the median into  $\leq 20$  years or  $>20$  years.

### 2.2.2. Aspects of health

*2.2.2.1. Self-rated difficulty in Activities of Daily Living (ADL).* ADL dependence was assessed by a modified version of the ADL Staircase (Sonn & Åsberg, 1991) including five items of personal ADL (P-ADL; feeding, transfer, toileting, dressing, bathing) and four instrumental ADL items (I-ADL; cooking, transportation, shopping, cleaning). Each assessment was recorded on a three-point scale: independent/partly dependent/dependent. For each item where the participant was rated as independent, he/she was asked to state whether the particular activity was performed with or without difficulty (Iwarsson, Horstmann, & Sonn, 2009). Based on the fact that the majority of the participants were independent in ADL, a dichotomous variable labelled ADL difficulty was constructed, with “no” indicating that the participant performed all 9 activities without difficulty and otherwise “yes”.

2.2.2.2. *Symptoms.* A checklist consisting of 30 symptoms (Tibblin, Bengtsson, Furunes, & Lapidus, 1990) plus three symptoms: frequency in passing urine, incontinence, and dental problems was used to record whether symptoms had been present during the latest three months. The symptoms are divided into the following domains: head (dizziness, headache, impaired hearing, dental problems and eye problems), heart-lung (cough, chest-pain and breathlessness), musculoskeletal (pain in the legs, backache and pain in the joints), metabolism (overweight, loss of weight, sweating and feeling cold), gastrointestinal (abdominal pain, constipation, diarrhea, nausea, anorexia, difficulty passing urine, incontinence and a urge to urinate), tension (restlessness, difficulty in relaxing, impaired concentration, nervousness and irritability) and depression (exhaustion, sleep disturbance, general fatigue, depression and cries easily).

### 2.2.3. *Aspects of home*

2.2.3.1. *Meaning of home.* The 28-item “Meaning of home” questionnaire captures four aspects: behavioral (6 items), for example “being at home for me means doing everyday tasks”, physical (7 items), for example “being at home for me means feeling that home has become a burden”, cognitive/emotional (10 items), for example “being at home for me means feeling safe”, and social (5 items) for example “being at home for me means being excluded from social and community life”. Each item is 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 28-item scale reached an acceptable level of internal consistency, Cronbach’s  $\alpha=0.78$ . We used both the total sum score (range = 0-280) and categories based on quartiles.

2.2.3.2. *Housing-related control beliefs.* Control beliefs in relation to home were addressed using the 24-item Housing-related Control Beliefs Questionnaire. 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” which indicates that an external power such as another person is responsible, or that things happen by plain luck, chance, or fate (Nygren et al., 2007; Oswald et al., 2006). Each item was assessed on a five-point rating scale ranging from 1 (do not at all agree) to 5 (agree very much); higher scores indicate lower perceived control (Oswald, Wahl, Martin, Mollenkopf, 2003). The 16-item scale reached an acceptable level of internal consistency, Cronbach’s  $\alpha=0.69$ . We used both the total sum score (range=16-80) as well as categories based on quartiles.

*2.2.3.3. Usability.* 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; Fänge & Iwarsson, 2003). We used two sub-scales that target activity aspects (4 items), 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 suitable designed in relation to this?” and physical environmental aspects (6 items) of usability for example “How usable do you feel that your home environment is in general?” respectively. 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. The 10-item scale reached an acceptable level of internal consistency, Cronbach’s  $\alpha=0.84$ . We used the sum score from the 10 items (range= 10-50) as well as categories based on quartiles.

### *2.3. Data Analyses*

Frequency distributions of the demographic variables and relationships to number of symptoms were computed. Differences in medians of number of symptoms in relation to sex, age, marital status, education, type of housing, years in present dwelling, place of residence and ADL difficulty, were tested with the Mann-Whitney's *U*-test or Kruskal-Wallis test.

Linear regression models with total number of symptoms as dependent variable and perceived aspects of home as independent variables were analysed. First, bivariate models were constructed and then a multivariate regression model was obtained, including all statistically significant perceived home variables, adjusted for sex and age, and controlled for other possible confounders: marital status, education, type of housing, place of residence, years in present dwelling and ADL difficulty.

In each of the seven domains of symptoms the proportion of participants reporting at least one symptom was calculated in relation to sex, age, marital status, education, type of housing, place of residence, years in present dwelling, and perceived aspects of home. Differences were tested using the  $\chi^2$  test. For each domain of symptoms all perceived home variables were entered in a multivariate logistic regression model. Non-significant variables were removed one by one in a backward manner, adjusted for age, and sex, and controlled for other possible confounders. All analyses were performed using the SPSS software version 20 (IBM Corporation, Armonk, NY, USA). Throughout the study a p-value <0.05 defined a statistical significance; all tests were two-sided.

### **3. Results**

#### *3.1. Total Number of Symptom*

In all, 96% of the total sample had one or more symptoms; the median number was 6.0. Women, participants living alone, those living in multi-family housing and those reporting difficulty in ADL experienced significantly more symptoms (Table 1). The most common symptoms in the total sample were found within the musculoskeletal domain: pain in joints 50 %, legs 40 % and back 40%. Nearly 30% of the participants reported symptoms in up to two of the seven domains; 42 % reported symptoms in three to five domains and 30 % in six to seven domains.

The bivariate linear regression models showed that fewer symptoms during the latest three months were experienced by participants who found meaning in their home ( $p<0.001$ ), believed they were in control over their housing situation ( $p<0.001$ ) and perceived their home as usable ( $p<0.001$ ). In the multivariate model, meaning of home and housing-related control beliefs remained significantly associated with the total number of symptoms ( $p=0.003$ ,  $p<0.001$ , respectively), and ADL difficulty was a confounding factor (Table 2).

### *3.2. Domains of symptoms*

As presented in Table 3, participants who experienced high meaning of home were less likely to have heart-lung and tension symptoms ( $p=0.016$ ,  $p=0.048$ , respectively). Those who experienced high housing-related control beliefs reported more symptoms in the head, gastrointestinal and tension domains ( $p=0.011$ ,  $p=0.032$ ,  $p<0.001$ , respectively). Moreover, participants who experienced high usability in the home reported fewer tension and depressive symptoms ( $p=0.031$ ,  $p=0.003$ , respectively). Women reported more problems in the metabolic, tension and depressive domains ( $p=0.044$ ,  $p<0.001$ ,  $p<0.001$ , respectively). The older age group reported more depressive symptoms ( $p=0.021$ ). Those who lived alone reported more

symptoms from the tension domain ( $p=0.018$ ) and those with ADL difficulty reported significantly more symptoms from all seven domains.

The multivariable models (Table 4) showed that participants who reported low bonding to the home (meaning of home) reported significantly more symptoms in the heart-lung domain ( $p=0.007$ ). Those who experienced high external control in relation to the home (housing-related control beliefs) reported significantly more symptoms in the head, gastrointestinal and tension domains ( $p=0.014$ ,  $p=0.014$ ,  $p= <0.001$ , respectively). Moreover, low usability in the home ( $p=0.003$ ) was associated with more symptoms in the depression domain.

#### **4. Discussion**

With this study, we show that there are associations between perceived aspects of home and symptoms among people aged 67-70. This is the case not only for the total number of symptoms but, most importantly, also for specific domains of symptoms and for different sub-groups of this population. In particular, external control in relation to the home is associated with the head, gastrointestinal and tension domains. Thus, individuals who experience high external control beliefs, implying that they to some extent have lost control over their home situation, can have a tendency to develop physical and mental symptoms.

Another interesting finding is that a low perceived usability in the home was associated with more depressive symptoms. Since women traditionally have a larger responsibility for the domestic duties in the home (Bucaite-Vilke, 2012), this facet of the findings highlights that usability in the home deserves specific attention from a gender perspective.

Keeping in mind that high external control beliefs have an impact on health and well-being among very old people (Wahl, Schilling, Oswald, & Iwarsson, 2009), it seems as if high external control beliefs have a similar impact among people aged 67-70 years. These findings draw attention to the fact that in order to generate knowledge useful for health promotion and preventive efforts targeting people in earlier phases of the aging process, analyses should include detailed data on symptoms as well as perceived aspects of the home environment.

Based on the present study, we cannot be precise about why participants who experience lower control in relation to their homes also report more symptoms. Still, our findings indicate that more negative ratings of perceived aspects of home may contribute to many of the reported symptoms. Subjective evaluations of the home environment are rarely discussed as being health-related (Oswald & Wahl, 2004; Shaw, 2004), in particular not in medical consultations, and are therefore easy to discount in the meeting with the patient. Our findings suggest that health care professionals, not the least geriatricians, need to be aware of the complex interactions between the housing environment and health and take a broader perspective in assessing and treating symptoms. With such information at hand, not only referrals to other members of the interdisciplinary health care teams but also consultations with home modification and relocation counselling services could be more efficiently executed. The health promotion and preventive potential of such referrals remains to be investigated.

When studying different phases of the aging process, there is reason to reflect upon the definitions (Baltes & Smith, 1999) of the third and fourth age. That is, rather than using definitions based on chronological age, the fourth age is characterized by frailty, cognitive decline and functional loss while the third age is characterized by independence, social engagement and good health (Lennartsson & Heimerson, 2012; Philips, Ajrouch, & Hillcoat-

Nallètamby 2010). Considering the results of the present study, it is quite clear that the vast majority (79%) of people aged 67-70 do not report any ADL difficulty, reflecting that our sample to a high extent represents the third age (see Kylén et al., 2014). Still, around half of them or more report having symptoms (Table 3), indicating that there are health problems that need attention – not the least in relation to perceived aspect of home (Table 4). However, with an attrition of about 44% it cannot be ruled out that the results might be somewhat biased. Since our study builds upon a randomly chosen population-based sample (see Kylén et al., 2014) it is nevertheless unlikely that the results would be distorted, which allows us to interpret the generalizability as sufficient. In order to further the knowledge on the association of home and health as related to the dynamics of the third and fourth ages, studies comparing the situation of older and very old people are called for.

As to the new knowledge on associations between symptoms and aspects of home among people aged 67-70 years revealed by the present study, our assumption is that much of the explanation lies in the fact that several of the perceived aspects of home studied are firmly grounded in psychology or health science, with already shown implications for health (see Oswald et al., 2006). For example, since the concept of control beliefs is related to the course and outcome of aging (see e.g., Heckhausen & Schulz, 1995), the stress that might be related to negotiating and effectuating relocation in old age (Nygren & Iwarsson, 2009) could very well trigger tension, head and gastrointestinal symptoms (see Table 4). Moreover, not being able to function in one's own home and perform daily activities to satisfaction (Haak, et al., 2011) could result in depressive symptoms, as indicated by our findings. As to meaning of home, since the concept is related to personality, cognition and emotions it is not farfetched that there are associations with symptoms. However, a major study limitation is that cross-sectional data

makes it impossible to identify cause and effect, and longitudinal studies are required to study the cause and effect between perceived aspects of housing and symptoms. Moreover, since a large number of statistical tests were performed, there is a risk of mass-significance (Bland & Altman, 1995). Thus, given the exploratory nature of the study our results should be interpreted with some caution. Summing up on this, based on a single study any attempt to interpret the association between perceived aspects of housing and symptoms represents first-hand speculations, and more research is needed to further understand and explain such intriguing dynamics.

The conclusion of this study is that health implications of housing should not be restricted to physical attributes of the home such as housing standard or environmental barriers but should also consider perceived aspects of home. By studying people in the third age and exploring the associations between their perceptions of home and symptoms, this study contributes to the knowledge on the complex interplay of home and health dynamics along the aging process. In particular, external control beliefs are important for health regarding physical and mental symptoms, but also usability and meaning of home seem to play a role. 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 aging 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 number of symptoms according to sex, age, marital status, education, type of housing, years in present dwelling, place of residence, and ADL difficulty,  $N=371$ .

Variable	Sample <i>n</i> (%)	Number of symptoms <i>Mdn</i> ( <i>Q</i> <sub>1</sub> - <i>Q</i> <sub>3</sub> )	<i>p</i> -value
Sex			
Men	159 (42.9)	5.0 (2.0-8.0)	0.001
Women	212 (57.1)	6.5 (3.2-12.0)	
Age, years			
67	158 (42.6)	6.0 (3.0-11.0)	0.291
68	99 (26.7)	6.0 (4.0-10.0)	
69	87 (23.5)	7.0 (3.0-11.0)	
70	27 (7.3)	9.0 (4.0-12.0)	
Marital status			
Single/widowed/divorced	133 (35.8)	7.0 (3.0-12.0)	0.016
Married/cohabiting	238 (64.2)	6.0 (3.0-10.0)	
Education			
Elementary school	139 (37.9)	7.0 (3.0-12.0)	0.022
Secondary school	124 (33.8)	6.0 (4.0-10.0)	
University	104 (28.3)	4.0 (2.0-9.0)	
Type of housing			
Multi-family housing	220 (59.3)	7.0 (3.0-12.0)	0.001
One-family house	151 (40.7)	5.0 (2.0-10.0)	
Years in present dwelling			
<20	209 (56.3)	6.0 (3.0-11.0)	0.669
≥20	162 (43.7)	6.0 (3.0-11.0)	
Type of residential area			
Rural	41 (11.1)	4.0 (1.0-8.5)	0.085
Urban	330 (88.9)	6.0 (3.0-11.0)	
ADL difficulty			
No	293 (79.0)	5.0 (3.0-9.0)	<0.001
Yes	78 (21.0)	10.5 (5.0-15.0)	

**Table 2**

Linear regression models with total number of symptoms as the dependent variable, bivariate models with perceived aspects of home as independent variables, and multivariate model with statistically significant aspects of home controlled for confounders,  $N=371$ .

Bivariate and multivariate regression models	<i>B</i> -coefficient	95% CI	<i>p</i> -value	<i>R</i> <sup>2</sup>
<u>Bivariate linear models</u>				
Perceived aspects of home				
Meaning of home	-0.041	-0.061 to -0.021	<0.001	0.043
Housing related control beliefs	0.173	0.111 to 0.235	<0.001	0.076
Usability in my home	-0.245	-0.357 to -0.134	<0.001	0.048
<u>Multivariate model<sup>a</sup></u>				0.203
Perceived aspects of home				
Meaning of home	-0.031	-0.052 to -0.010	0.003	
Housing related control beliefs	0.106	0.045 to 0.168	0.001	
Sex (women)	1.807	0.797 to 2.818	<0.001	
Age	0.390	-0.153 to 0.932	0.159	
ADL difficulty (Yes)	2.972	1.716 to 4.227	<0.001	

<sup>a</sup> The multivariate regression model initially included all three aspects of home and was reduced in a backwards manner to only include statistically significant variables and also sex and age; thereafter the model was controlled for other possible confounders. Only ADL-difficulty was found to be a confounding factor.

**Table 3**Proportion of participants (%) reporting symptoms in each of seven symptom domains during the latest three months,  $N=370$ .

Variable, % (n=number of symptoms within each domain)	Head (n=5)	Heart- lung (n=3)	Musculoskeletal (n=3)	Metabolism (n=4)	Gastro-intestinal (n=8)	Tension (n=5)	Depressive (n=5)
Sex							
Men/Women	60 / 64	46/ 46	65/69	<b>47/57</b>	60/ 59	<b>33/ 53</b>	<b>51/ 69</b>
Age, years							
67/ 68 /69/70	62/61/67/59	<b>44/36/59/48</b>	65/71/66/74	56/48/52/52	57/59/62/70	41/46/44/67	<b>55/61/66/85</b>
Marital status							
Living alone/ Married, Cohabiting	66/ 60	47/ 45	68/ 67	58/ 50	63/ 58	<b>53/ 40</b>	65/ 59
Education							
Elementary / High school / University	65/ 67/ 54	47/ 44/ 45	71/ 68/ 62	50/ 58/ 49	63/ 60/ 54	50/ 44/ 35	60/ 68/ 53
ADL difficulty							
No/ Yes	<b>60/ 73</b>	<b>42/ 59</b>	<b>63/ 85</b>	<b>49/ 65</b>	<b>56/ 73</b>	<b>40/ 62</b>	<b>57/ 78</b>
Type of housing							
Multi-family housing/ One family house	64/ 61	45/ 44	70/ 64	<b>58/ 44</b>	63/ 54	<b>50/ 36</b>	65/ 56
Type of residential area							
Rural/Urban	71/ 61	56/ 44	61/ 68	42/ 54	46/ 61	37/ 46	51/ 62
Years in present dwelling							
<20/ ≥20	64/ 60	43/ 49	66/ 69	54/ 51	59/ 60	46/ 43	63/ 59
Perceived aspects of home							
MOH <sup>a</sup> $Q_1$ - $Q_4$	68/62/59/62	<b>59/40/49/38</b>	76/66/70/60	54/58/52/47	62/69/58/52	<b>54/43/48/34</b>	68/65/59/54
HCQ <sup>b</sup> $Q_1$ - $Q_4$	<b>51/57/72/69</b>	36/47/45/54	60/69/74/67	51/53/50/57	<b>50/53/66/67</b>	<b>29/39/52/56</b>	50/60/64/69
UIMH <sup>c</sup> $Q_1$ - $Q_4$	65/70/55/62	45/50/43/46	68/73/65/ 66	51/61/54/ 49	62/66/59/ 56	<b>55/53/40/ 38</b>	<b>64/81/54/55</b>

Note. Significant differences are marked in bold;  $p$ -values ranged from <0.001 to 0.048.<sup>a</sup>Meaning of Home, categorized into quartiles: higher scores indicate stronger bonding to the home.<sup>b</sup>Housing Related Control-beliefs, categorized into quartiles: higher scores indicate higher external housing related control beliefs.<sup>c</sup>Usability In My Home, categorized into quartiles: higher scores indicate a more usable home.

**Table 4**

Multivariate logistic regression models with all statistically significant perceived aspects of home as independent variables,  $N=371$ .

Variable, (n=number of symptoms within each domain)	Multivariate model; one for each domain of symptoms, <i>OR</i> ( <i>p</i> -value)				
	Head (n=5)	Heart-Lung (n=3)	Gastrointestinal (n=8)	Tension (n=5)	Depressive (n=5)
Perceived aspect of home					
MOH <sup>a</sup>		<b><i>p</i>=0.007</b>			
<i>Q</i> <sub>1</sub>		0			
<i>Q</i> <sub>2</sub>		0.45 (0.009)			
<i>Q</i> <sub>3</sub>		0.65 (0.156)			
<i>Q</i> <sub>4</sub>		0.37 (<0.001)			
HCQ <sup>b</sup>	<b><i>p</i>=0.014</b>		<b><i>p</i>=0.014</b>	<b><i>p</i>&lt;0.001</b>	
<i>Q</i> <sub>1</sub>	0		0	0	
<i>Q</i> <sub>2</sub>	1.23 (0.510)		1.15 (0.658)	1.39 (0.325)	
<i>Q</i> <sub>3</sub>	2.37 (0.006)		1.20 (0.024)	2.46 (0.005)	
<i>Q</i> <sub>4</sub>	2.06 (0.016)		1.98 (0.022)	3.05 (<0.001)	
UIMH <sup>c</sup>					<b><i>p</i>=0.003</b>
<i>Q</i> <sub>1</sub>					0
<i>Q</i> <sub>2</sub>					2.56 (0.021)
<i>Q</i> <sub>3</sub>					0.78 (0.451)
<i>Q</i> <sub>4</sub>					0.66 (0.159)
Sex (women)	1.14 (0.554)	1.06 (0.805)	0.96 (0.852)	2.27 (<0.001)	2.18 (<0.001)
Age	1.07 (0.579)	1.37 (0.008)	1.17 (0.193)	1.24 (0.071)	1.43 (0.006)

Note. All the multivariate logistic regression models initially included all three aspects of housing and were reduced in a backwards manner to only include statistically significant variables; thereafter the models were controlled for age, sex and other possible confounders.

<sup>a</sup>Meaning of Home: higher scores indicate stronger bonding to the home.

<sup>b</sup>Housing Related Control-beliefs: higher scores indicate higher external housing related control beliefs.

<sup>c</sup>Usability In My Home: higher scores indicate a more usable home.