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RUNNING HEAD: Housing-Related Subjective Well-Being

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ABSTRACT

In the present study, we conceptualized housing-related subjective well-being (HRSWB) as a three-dimensional construct, defined by positive and negative emotions related to housing and housing satisfaction. Moreover, we predicted the construct via a mediated model, with the objective characteristics of the household as exogenous variables and its subjective evaluation as a mediator. A survey performed on 409 participants (285 residents in Torino, Italy, women = 52.3 per cent, M_{age} = 42.81, SD = 12.73, and 124 residents in Havana, Cuba, women = 58.1 per cent, M_{age} = 40.48, SD = 19.21) showed that fewer square meters per capita and living in an apartment had a negative association with perceived housing quality, which in turn had a positive association with HRSWB. Home ownership was not associated with HRSWB. The model was invariant across genders, age classes, and cities of residence. Possible developments and limitations of this research are discussed.

KEY WORDS: Emotions; Housing; Subjective Well-Being; Housing-Related Subjective Well-Being; Housing Satisfaction; Italy; Cuba

1. Introduction

Subjective Well-Being (SWB) is "a person's cognitive and affective evaluations of his or her life" (Diener et al. 2002, p. 63). These evaluations include both cognitive judgments of satisfaction and emotional reactions to life events. Thus, SWB encompasses a broad category of phenomena, including high life satisfaction, high frequency of positive emotions, and low levels of negative emotions (Diener et al. 1999). Life satisfaction refers to the cognitive evaluation of the gaps between the actual and desired situations in many life domains (Diener et al. 1985). Emotions are complex events, with a mental component, referring to the quality of subjective experience, and a somatic component, referring to the psychophysiological activation. Emotions prepare the organism to react to relevant events for well-being and survival, promoting appropriate strategies and behavioral plans to deal with threats and opportunities met in the environment, and causing significant changes at the mental and physical levels that are functional to the realization of such behavioral plans (Frijda 1986). Different authors have identified a limited number of so-called basic emotions (e.g., six in Ekman 1992; eight in Plutchick 1980) that have specific psycho-behavioral correlates and result from the integration of several functional components including motivational, perceptual/sensory, cognitive processes (attention, memory, appraisal, and reappraisal), motor behavior (action tendency), physiological changes, and subjective feelings (Scherer 1984; Tettamanti et al. 2012). Previous studies (e.g., Galati et al. 2008; Testa et al. 2016) performed in relation to the emotional lexicon showed that basic emotions are also related to different clusters of emotional terms presenting common features across different languages.

Contemporary theories unanimously recognize emotions as the first forms of assessment of the surrounding environment in positive or negative terms (Arnold 1960; Ekman 1992; Scherer 1984). This first affective evaluation then gives rise to a feeling of comfort or discomfort and thus to the primitive approaching and fleeing behaviors (Arnold 1960). In this perspective, SWB is connected to a high frequency of positive emotions (and therefore of positive assessments of the environment) indicating a good person-environment fit and, in sum, an optimal adaptation (Scherer

1984), while discomfort and stress are connected to a prevalence of persistent negative, disruptive, and maladaptive emotions. Thus, SWB includes both individuals' cognitive and affective evaluations of their lives and their fit with the environment (Diener 2000). Hence, analyses of SWB should consider these three dimensions to gain a complete picture of the construct.

SWB has been mainly investigated regarding the workplace and individuals' adaptation responses to that environment (McCann et al. 2013; Shier and Graham 2011). However, people spend most of their everyday lives and perform many of their activities at home (European Commission 2004; World Health Organization Regional Office for Europe [WHO/Europe] 2007), making housing a fundamental component of their quality of life (Ariffin et al. 2010; Camfield and Skevington 2008). Consistent with this, previous studies conducted within the field of positive psychology have identified housing as one of the main domains of individuals' SWB (e.g., Galati et al. 2006; Sotgiu et al. 2011a; van Praag et al. 2003) and applied housing satisfaction as a predictor. However, housing satisfaction gives only a partial picture of the variables at play in that it focuses on an individual's cognitive dimension only, neglecting their affective dimension.

1.1 Aims and Contexts of the Present Study

In this study, we attempted to overcome these limitations, pursuing three main goals. First, we conceived and tested a novel construct: housing-related subjective well-being (HRSWB). Based on Diener et al. (1999), we hypothesized it as a latent variable, measured by three manifest indicators: positive and negative emotions associated with home, and housing satisfaction (H1).

Second, we predicted it empirically. In the housing literature, dependent variables are often predicted via multiple regression models (Herbers and Mulder 2017). Such models are undoubtedly fruitful. However, they force the researcher to consider all of the predictors analyzed in the study at the same hierarchical level, not considering that variables may be predictors of some, and outcomes of other, variables at the same time. Indeed, according to Amérigo and Aragonés (1997), people systematically evaluate the objective features of their residential environment, making them become subjective in terms of perceived housing quality and then giving rise to a certain degree of

satisfaction. Thus, we hypothesized different objective household variables to show an association with perceived housing quality that, in turn, should show an association with HRSWB.

As concerns the objective features of the household, based on Clapham et al. (2017) and Herbers and Mulder (2017), we focused on housing tenure, crowding, and type of dwelling. Based on Herbers and Mulder (2017), we expected home ownership to show a positive association with the perceived quality of the home environment (H2). Based on Herbers and Mulder (2017; see also Mohit et al. 2010; Rudolf and Potter 2015), we hypothesized that living in a crowded (in terms of square meters per person) house would show a negative association with perceived housing quality (H3). As concerns the type of dwelling, inconsistent results are reported in the literature. Therefore, we tests two competing hypotheses. If, like in Rudolf and Potter (2015), living in an apartment increases satisfaction because it may be related to higher inclusion and social support, it should show a positive association with perceived quality of the home environment (H4a). On the contrary, if, like in Pekkonen and Haverinen-Shaughnessy (2015), living in an apartment decreases satisfaction because it reduces the sense of personal control over one's property, it should show a negative association with perceived quality of the home environment (H4b). Finally, based on Amérigo and Aragonés (1997), we expected the perceived home environment quality to have a positive association with HRSWB (H5).

Our third goal was to test the structural invariance of our model. In addition to making comparisons across genders and age classes, we compared the model across two cities, namely Turin and Havana, located in two countries (Italy and Cuba, respectively). As we will explain later, these cities are very different in some significant socio-economic and cultural variables, which proved to affect environmental beliefs and behaviors (Iwarsson et al. 2007) The relevance of the latter comparison is particularly notable, as it appears that the relation between housing and HRSWB may depend on contextual (e.g., cultural, legislative, economic) differences (Iwarsson et al. 2007; Oswald et al. 2007). For instance, Elsinga and Hoekstra (2005) have argued that living in a rented house offers basic security in some countries, but not in others. Nevertheless, at present, the

110 understanding of contextual similarities and differences in the relation between housing and
111 wellbeing is limited (Iwarsson et al. 2004).

112 We compared Torino and Havana because this study was a product of international
113 cooperation between the University of Turin and universities and research centers in Havana, which
114 has previously fostered other studies regarding emotions and SWB (Galati et al. 2006, 2008; Sotgiu
115 et al. 2011). We also considered that the Turin and Havana contexts were suitable for testing this
116 invariance because they represent countries with dramatic differences in geographical position,
117 climate, type of population, economic structure (capitalistic versus collectivistic), economic status
118 (considerable differences in average income), family and social organization, and cultural aspects
119 (for a detailed account, see Galati et al., 2004, 2005, 2006; Sotgiu et al. 2011a, 2011b; McCarty and
120 Shrum 2001; Yau 2011, 2014).

121 Regarding the housing market, in Italy, 72.1% of households own the house in which they
122 live, whereas 18% live in a rented house and 9.9% in a house they use for free (Istituto Nazionale di
123 Statistica [ISTAT] 2010). The households have on average 2.4 members, with an average floor area
124 per person of 40.7 m^2 (ISTAT 2010). Households live mainly in apartments (54.9%), while 38.1%
125 live in villas, cottages or detached/semi-detached (with independent access) houses (ISTAT 2010).
126 With regard to Cuba, within the past few decades, Cuban housing has begun to catch up to
127 population demand. Nearly 1.3 million housing units were built between 1959 and 1993. In the
128 1980s, over half of all housing units constructed were detached houses. The others were apartments,
129 palm huts called *hohios*, and *cuarterias* (housing units in buildings composed of several detached
130 rooms where occupants share some or all facilities). For 50 years, the great majority of Cuban
131 households have legally owned their homes as a form of "personal property," but with some
132 limitations. In November 2011, the Cuban government legalized free-market sales (Hamberg,
133 2012).

134 **2. Method**

2.1 Participants and Procedure

Italian and Cuban participants were recruited in five different neighborhoods of the cities of Turin (Piedmont region, North-Western Italy) and Havana using a snowball procedure. According to the latest census data in the two countries (Oficina Nacional de Estadísticas 2010; Città di Torino – Ufficio di Statistica 2007) the neighborhoods were comparable in characteristics of the inhabitants, presence of services and facilities, and location within the city, going from the city center to the suburbs. The questionnaire was first developed in Italian and then translated into Spanish. A back-translation, performed by two bilingual speakers not involved in the study, witnessed its cultural invariance. Participants completed the questionnaire at their own homes after signing an informed consent. No incentive was offered to induce people to participate in the survey. Completion of the questionnaire took approximately 30 minutes. The total sample consisted of 409 individuals, aged between 25 and 65 years: 285 lived in Turin (women = 52.3 per cent, M_{age} = 42.81, SD = 12.73) and 124 in Havana (women = 58.1 per cent, M_{age} = 40.48, SD = 19.21). The distributions of gender, $\chi^2(1, N = 409) = 1.164$, $p = .17$, and age, $t(407) = 1.450$, $p = .15$, within the two sub-samples was statistically equal.

2.2 Instrument

The present investigation was part of a wider project requiring the administration of questionnaires and paper-and-pencil drawings about actual and ideal housing situations. In this section, we will present only the three questionnaire sections and variables we used in our analyses. The whole questionnaire is available upon request.

The first section of the questionnaire referred to the participants' actual housing situation. Based on the items used in Rudolf and Potter (2015), this section included two items concerning the type of dwelling and the floor area and one item concerning the household size (i.e., number of persons living together, Mohit et al. 2010). Based on Rudolf and Potter (2015), the floor area was divided by the household size for subsequent analyses to obtain square meters per capita, an index of house overcrowding. In the second section of the questionnaire, based on the model developed

by Amérigo and Aragonés (1997) and the review by Clapham et al. (2017), we measured the perceived housing quality in terms of participants' evaluation of physical housing conditions. Using a subsection of Caffaro et al.'s (2016) Perception of Housing Quality Scale (PHQS), we asked participants to evaluate on a 1-7 scale how much each of eight environmental aspects of their home was functional in answering the needs of his/her everyday life at home (rooms' area, ventilation, home maintenance, artificial lighting, home accessibility, winter microclimate, home exposure, and summer microclimate). Based on $\alpha = .78$, we computed participants' PHQ scores as the average of these eight items.

In the third section of the questionnaire, referring to the theoretical models that postulate the existence of distinct basic emotions (Ekman 1992) each expressed by specific verbal labels (Galati et al. 2008), participants indicated the prevalent emotion they associated with their home, choosing one option from the following 15 emotional labels: fear, safety, happiness, neutral, recreation, unfamiliarity, sadness, calm, annoyance, anger, boredom, comfort, disgust, frustration, and aversion. These labels were based on the responses obtained in an open-ended pre-test.[1] In the model we tested (see Figure 1), we used the neutral emotions as the reference category. After choosing the prevalent emotion they associated with their home, participants rated on a 7-point scale (from 'not at all' to 'extremely') their overall satisfaction with their current housing, phrased as in Mridha (2015) as "living here."

In the last section, participants were administered a standard sociodemographic form.

--- Figure 1 about here ---

2.3 Analytic Strategy

Based on Hu and Bentler (1999) and Primi (2002), we evaluated the fit of the model by combining different indexes: the Root Mean Square Error of Approximation (*RMSEA*: Steiger 1980), the comparative fit index (*CFI*: Bentler 1990), and the Tucker-Lewis coefficient (*TLI*: Tucker and Lewis 1973) also known as *NNFI* (Bentler and Bonnett 1980). We considered the *CFI* and the *TLI* as satisfactory if higher than .90 and the *RMSEA* as satisfactory if lower than .05, as

suggested by Bentler (1990) and Browne (1990), respectively. Even when we reported it, we did not take into consideration the χ^2 of the model because it depends at least in part on the *N* of the dataset. However, we used it to test the structural invariance of our model. Based on Reise et al. (1993), we initially tested our model simultaneously in the groups in which we were interested (Italian vs. Cuban participants, men vs. women, and young vs. adults: baseline model). Subsequently, we tested another model expected to have invariant parameters across groups. We accepted the hypothesis of invariance if the difference between the χ^2 of the baseline and of the invariant model was not significant with a number of degrees of freedom equal to the difference in the degrees of freedom of the two models.

3. Results

Table 1 shows the descriptive statistics for our variables and the correlations among them.

--- Table 1 about here ---

Consistent with H1, a confirmatory factor analysis showed that HRSWB could be modeled as a latent variable, measured by three manifest indicators: housing satisfaction, positive affect, and negative affect toward the home environment, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* = .00 (90% CI = .00, .06).

A first structural equations model, combining a measurement and a dependence model (based on Frijda (1986), we tested it after correlating the errors of the positive and the negative emotions) showed that, contrary to H2, the relation between home ownership and perceived housing quality was not significant, *b* = .12, *ES* = .11, *p* = .29. Thus, we re-ran our model after deleting this variable. All of the parameters of the resulting model reached statistical significance, and the fit of the model was good, $\chi^2(7) = 7.28$, *p* = .40, *TLI* = 1.00, *CFI* = 1.00, *RMSEA* = .01 (90% CI = .01, .06). Figure 2 reports the standardized parameters of the model. All *p*s were < .01.

--- Figure 2 about here ---

Consistent with H3 and H4b, and contrary to H4a, living in a crowded household and living in an apartment showed a negative association with perceived housing quality, R^2 = .06. In turn, consistent with H5, this last variable showed a positive association with HRSWB, R^2= .22. Table 2 shows that all of the indirect effects in the model (tested using bootstrapping with 5,000 resamples to compute 95% confidence intervals) reached statistical significance. Table 3 shows the results of our tests of the structural invariance of the model. Besides being invariant across genders and across age classes, the models' parameters were invariant between Torino and Havana.

--- Table 2 about here ---

--- Table 3 about here ---

4. Discussion and Conclusion

In the present study, we proposed the construct of HRSWB, we predicted it with a mediation model and we tested the invariance of the model across two cities from two countries that are very different in socio-economic and cultural structure. Our results showed the feasibility of conceiving HRSWB as a three-dimensional latent variable, measured by housing satisfaction as well as positive and negative emotions toward housing. Moreover, they showed that housing crowding and the type of dwelling are significant predictors of perceived housing quality. In particular, housing overcrowding and living in an apartment showed negative associations with perceived housing quality, which in turn showed a positive association with HRSWB.

The result concerning the relationship between housing crowding and perceived housing quality was consistent with previous evidence in the field of residential satisfaction (Mohit et al. 2010). With regard to the type of dwelling, we showed a negative association between HRSWB and living in an apartment, contributing to the debate about the role played by apartment living in promoting or hindering satisfaction (see Pekkonen and Haverinen-Shaughnessy 2015; Rudolf and Potter 2015). Our mediated model helped clarify the sources of negative associations between housing overcrowding and living in an apartment on the one hand, and HRSWB on the other. These

associations were mediated by a subjective variable: the perception of a low environmental quality. Operationally, this result shows that compliance with technical standards, laws and regulations is not sufficient in itself to design spaces able to enhance occupants' well-being. Rather, it is necessary to collect and consider the opinions of the future inhabitants, since subjective perception plays a crucial role in the chain of associations leading to HRSWB (Vischer 2008).

Our results did not confirm the relationship found in previous studies between homeownership and HRSWB (Herbers and Mulder 2017). The level of freedom an individual has in choosing or adjusting the residential environment in order to get closer to his or her preferences appeared to have an impact on resultant satisfaction. In their study involving different European countries, Elsinga and Hoekstra (2005) showed that since home owning offers more freedom than renting, and it provides people with a sense of self-respect and pride, home owners appear to be more satisfied than renters. Our results showed, instead, that home ownership was not associated either with perceived housing quality or HRSWB, indicating that the availability of a greater personal space is a more determinant variable, regardless of whether this personal space is rented or owned.

With regard to the components of HRSWB, the model tested and the association pointed out in the present study confirmed emotion as a key factor in determining individuals' good or bad fit to the environment (Arnold 1960; Frijda 1986). Both objective and subjective components of the environment (Amérigo and Aragonés 1997) can evoke different emotional responses directing our motivations, behaviors, and subjective feelings toward it (Scherer 1984). The present study showed that this also holds true for the home environment in which the affective aspects have usually been under-investigated in favor of satisfaction (see, for instance, Mohit et al. 2010). The role played by emotional variables should be particularly considered regarding issues such as moving from one house to another (Clapham et al. 2017) and the relation between housing and children's and adolescents' development (Coley et al. 2013).

Our model was invariant across genders and age classes. More interesting for our purposes, our test of structural invariance showed that the same pattern of associations was evidenced in Turin and Havana, despite the relevant differences between Italy and Cuba in terms of socio-cultural organization and housing solutions detailed earlier. This seems to indicate that, whether you are living in a collectivistic or individualistic country, and whether you own your house or not, SWB related to the dwelling is mainly due to a feeling that the home is a sufficiently spacious, comfortable and cozy place, able to answer to one's affective needs.

These results raise considerations regarding the role played by the availability of living space and the ability to control it, which is shared with other components of the household in the case of a crowded dwelling, and shared with neighbors in the case of apartments. To improve the perception of housing quality, and in turn HRSWB, the space available for each occupant, as well as his or her control over it, should be upgraded through improved housing design.

Overall, our results highlighted the importance of taking a user-centered approach (Vischer 2008) to the design of housing solutions. This is consistent with the data showing that, especially in the Western world, new family needs may arise in terms of space use and availability as the traditional family evolves in size, composition and function, becoming more flexible to adapt to each member's individual needs and choices (Baxter et al. 2005; Volpi 2007).

Limitations of the present study and future research development

Despite its strong points regarding consideration of both objective and subjective aspects of housing and both cognitive and affective components of HRSWB, some limitations of the present study should be acknowledged. First, the snowball procedure adopted to select the participants did not allow us to generalize the results of the present study. Further investigations based on a random sampling will give more generalizable results. Second, the sample was composed of only adults. In future development of the research, it would be useful to also consider the elderly, as the fit between the individual, his or her needs and evaluations, and the home environment becomes more relevant with the aging process (Lawton and Nahemow 1973). Third, even though the participants

were asked to indicate the emotions they associated with their home by focusing only on its physical characteristics, we cannot be sure that the social life within the house and the quality of the relationships with other family members did not affect participants' evaluations. In future research, it would be useful to integrate these data with information coming from qualitative instruments, allowing further investigation of the role played by the physical home environment in determining people's affective responses. Even before performing these new studies, however, we believe that the present research sheds new and interesting light on psychological processes linking housing and SWB, leading to a better and deeper understanding of the chain of relations we analyzed.

Finally, our study compared an Italian and a Cuban city, not allowing a complete comparison between Italy and Cuba. Multilevel studies, performed in a much higher number of Italian and Cuban towns, will allow researchers to formally control the housing and living features of the contexts considered. In doing so, consistent with Bonaiuto et al. (2003, 2015) who showed its relevance in this field of study, the incorporation of neighborhood quality as a control variable would be interesting.

Competing interests: None to declare.

[1]**Note.** In the pre-test, 40 participants received a questionnaire and were asked to indicate the prevalent emotion they associated with their home. Participants listed between 1 and 3 emotions, for a total of 55 emotional terms. At this point, three independent judges categorized those terms using a criterion of semantic similarity. The judges were all graduates in Italian Literature. They produced a number of categories ranging from 18 to 21. Among these categories, we finally chose the 15 that were cited by all the judges. This final list included 5 positive and 10 negative feelings and emotions. This imbalance between positive and negative emotions is not surprising, since it is consistent with the ratio between positive and negative emotional terms (about 70% vs 30%) usually reported in previous studies investigating the lexicon of emotions in different languages (Barrett and Fossum 2001; Galati et al. 2008; Shaver et al. 2001).

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456 Figure captions.

457 **Fig. 1** The model we tested

458 **Fig. 2** Prediction of HRSWB

Table 1 Descriptive statistics for the variables we used and correlations among them

	Mean	SD	1	2	3	4	5	6	7
1. Home ownership	.77	.42	-	.03	-.16***	.07	-.02	-.05	.10
2. Occupancy rate	.70	.32		-	.14**	-.20***	-.03	.08	-.10*
3. Living in an apartment	.63	.48			-	-.17***	.05	.01	-.11*
4. Perceived housing quality	5.44	.88				-	.15**	-.09	.49***
5. Positive emotions	.88	.32					-	-.54***	.33***
6. Negative emotions	.04	.19						-	-.23***
7. HRSWB	5.63	1.37							-

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. When dummy variables are concerned. The "mean" represents the proportion, on a 0-1 scale, of the participants coded as 1. When a dummy and a metric variable are concerned, the point-biserial correlation is displayed. When two dummy variables are concerned, the tetrachoric correlation is displayed.

Table 2 Indirect effects detected

	Occupancy rate	Living in an apartment	Perceived housing quality	HRSWB
Perceived housing quality	.00	.00	.00	.00
HRSWB	-.03*	-.02**	.00	.00
Negative emotions	-.01**	-.01**	-.02*	
Positive emotions	-.37*	-.21*	.76*	.00
Housing satisfaction	-.03*	-.02**	-05*	.00

Note. ** $p < .01$. * $p < .05$

Table 3 Structural invariance of the model

	χ^2	df	*p*	*TLI*	*CFI*	*RMSEA*
Invariance across nations (Italy: *n* = 285; Cuba: *n* = 124)						
Baseline model	9.57	14	.79	1.00	1.00	.00 (*CI* = .00, .03)
Invariant model	14.04	19	.78	1.00	1.00	.00 (*CI* = .00, .03)
Invariance across genders (men: *n* = 188; women: *n* = 221)						
Baseline model	16.54	14	.28	.98	.99	.02 (*CI* = .00, .06)
Invariant model	17.58	19	.55	1.00	1.00	.00 (*CI* = .00, .04)
Invariance across ages (max 39: *n* = 200; 40 and over: *n* = 209)						
Baseline model	14.92	14	.38	.99	1.00	.01 (*CI* = .00, .05)
Invariant model	16.76	19	.61	1.00	1.00	.00 (*CI* = .00, .04)

Figure 1.

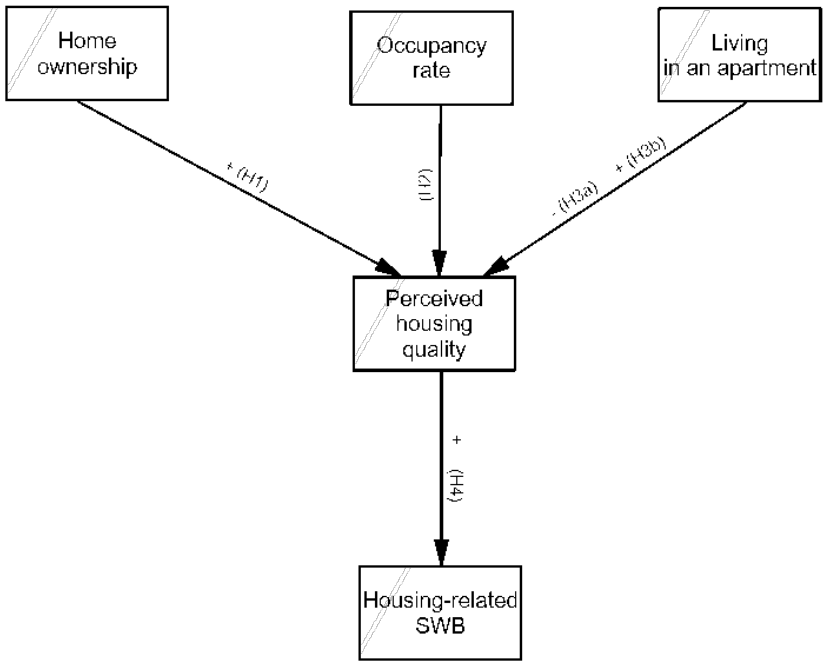
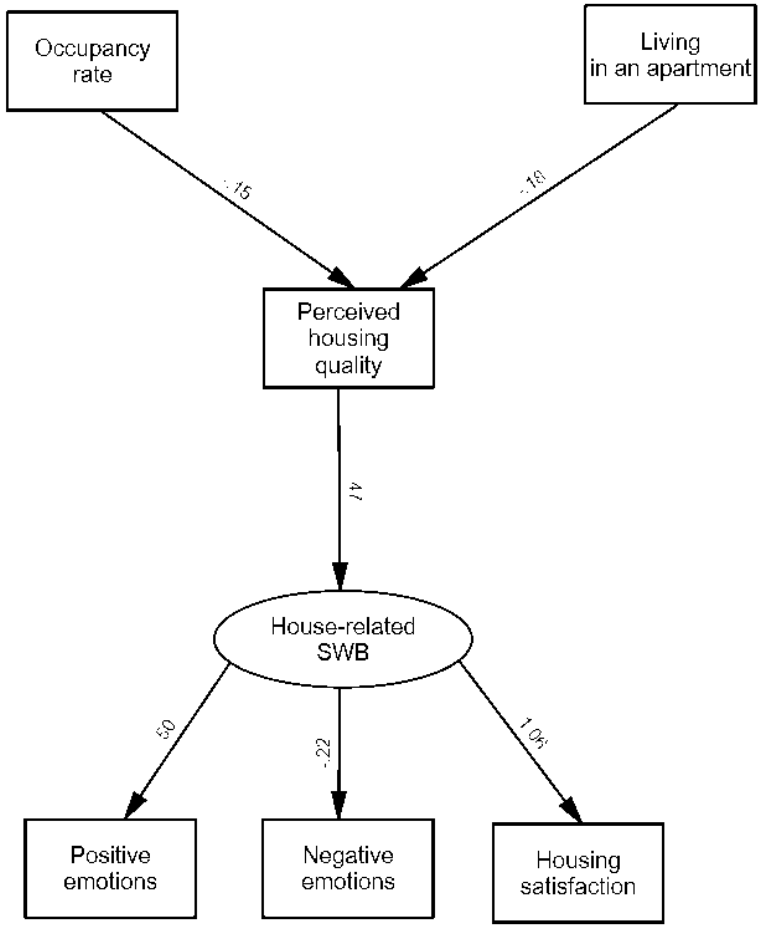

Home ownership
Occupancy rate
Living in an apartment
+ (H1)
(-) (H2)
- (H3a)
+ (H3b)
Perceived housing quality
+ (H4)
Housing-related SWB

Figure 2.


Occupancy rate
Living in an apartment
-.15
-.18
Perceived housing quality
.41
House-related SWB
.50
-.22
1.04
Positive emotions
Negative emotions
Housing satisfaction