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Housing and Well-being among the Vietnamese Elderly

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Housing and Well-being among the Vietnamese Elderly

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Abstract

This study examines the relationship between housing and subjective well-being among the Vietnamese elderly, using data from the 2011 Vietnam Ageing Survey. Our regression analysis reveals that permanent housing and better amenities are major factors contributing to housing satisfaction and life satisfaction. Notably, we find that housing satisfaction has a strongly positive impact on life satisfaction and the impact is stronger after controlling for endogeneity problems. Thus, the finding confirms that housing is an important life domain and as a result, housing satisfaction is a strong predictor of life-satisfaction judgments. The findings might suggest that people made a rational choice when they invested a large amount of resources in their houses with notable well-being gains. Also, another implication here is that policies and programs to assist poor families in moving out of temporary accommodation or improving housing amenities are likely to be beneficial in improving well-being for the poor elderly.

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1. Introduction

Subjective well-being (life satisfaction or happiness) is commonly known as a main goal for human beings (Larsen & Eid, 2008) and identifying the factors associated with it can therefore be considered important as well (Herbers & Mulder, 2016). Whether the elderly can be satisfied with their lives is likely to depend on the appropriateness of housing in relation to individual needs (Herbert & Mulder, 2016). This is because when people get older, housing conditions become increasingly important to compensate for and assist in their adaptation to declining functional capacity in order to maintain a sense of well-being and independence in daily activities (Kochera, Straight, & Guterbock, 2005). In addition, housing become more important to the elderly's well-being because ageing in place implies that they spend more time in and around their own house until later life (Oswald & Wahl, 2004; Sixsmith et al., 2014).

The aforementioned discussion suggests that a better understanding of the relationship between housing and well-being in later ages is highly relevant to Vietnam, especially the country has officially entered the aging stage by 2011 and it is expected to take the country 17-20 years to have an ageing population, much shorter than in developed countries (VWU, 2011)[2]. The quality of life of Vietnamese older people has become a main concern for academic researchers (Giang & Pfau, 2009; Pfau & Giang, 2010; Truong, Bui, Goodkind, & Knodel, 1997) as well as for policy makers (VNCA, 2012). A number of studies have examined factors affecting objective well-being of the Vietnamese old population (e.g. employment, poverty or income) (Giang & Nguyen, 2016; Giang & Pfau, 2009; Pfau & Giang, 2010). However, to the best of the author's knowledge, no study

2 According to United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), population starts aging when the share of older-age persons to the total population accounts for more than 10 percent (UNFPA, 2011).

examines the role of housing in subjective well-being among the Vietnamese elderly. This gap in the literature motivates the author to conduct the current study.

This study examines the relationship between housing and subjective well-being. Two research issues are examined: the first explores factors associated with housing satisfaction; the second investigates the impact of housing (housing conditions and housing satisfaction) on subjective well-being among the Vietnamese elderly. Among the domains with potential to be associated with overall life satisfaction, the housing domain is the focus of the current study. This is because previous research shows that housing emerged as one of the central factors of the elderly's overall life satisfaction (Oswald et al., 2007). In addition, the population of Vietnam has been ageing too fast and this process has brought about both opportunities and challenges to policy makers (Tran, Nguyen, Van Vu, & Doan, 2016). Thus, a clear understanding of relationships between housing and life satisfaction is much of importance to designing policy interventions to enhance the elderly' well-being.

The structure of the paper is as follows: Section 2 provides a brief review of the literature on housing and life satisfaction, Section 3 describes data and methods. Results and discussion are given in Section 4. Conclusions and policy implications are reported in Section 5.

2. Theoretical and Literature Review

2.1 Factors associated with housing satisfaction

To assess the performance of housing, an appropriate criterion needs to be developed, and indeed, over the years, several indicators of housing performance have been proposed. Among numerous criteria proposed, the concept of satisfaction has become the most commonly used in evaluating residential environment (Amole, 2009). As noted by Yi (1985), adequate housing is not the same as housing satisfaction. Satisfaction is defined as the gap between consumers' actual and aspired needs (Galster, 1987). Housing satisfaction reflects the perceived quality of the home in terms of a broad attitudinal assessment (Aragonés, Francescato, & Gärling, 2002). It has been used mainly to examine the performance of all types of residential environments (Amole, 2009; Aragonés et al., 2002; Jagun, Brown, Milburn, & Gary, 1990; Kellekci & Berköz, 2006; Lee & Park, 2010; Thomsen & Eikemo, 2010).

The literature shows several attempts to identify factors affecting housing satisfaction for a variety of population groups (Lee & Park, 2010). Several housing-related attributes as well as characteristics of residents have been found to influence housing satisfaction. For instance, household size was found to have a negative association with residential satisfaction (Diaz-Serrano, 2009; Mohit, Ibrahim, & Rashid, 2010; Rohe & Basolo, 1997; Yi, 1985). Age of respondents has mixed impacts on housing satisfaction. While some studies found that older residents tend to be more satisfied with housing than younger residents (Lu, 2002; Varady & Preiser, 1998; Varady, Walker, & Wang, 2001), others showed negative effects of age on residential satisfaction (Mohit et al., 2010). Nevertheless a few studies found no significant effect of age on housing satisfaction, even after controlling for other variables (Lee & Park, 2010).

Households with higher income are more likely to have higher housing satisfaction possibly because they have more financial resources for better houses and for better decorating interiors and furniture. Although a large number of studies found that income has a positive effect on housing satisfaction (Diaz-Serrano, 2009; Hu, 2013; Lu, 1999; Varady et al., 2001; Vera-Toscano & Ateca-Amestoy, 2008), some others show that income has a negative impact (Amole, 2009) or no significant impact on residential satisfaction (Li & Wu, 2013; Zhu & Shelton, 1996). Possibly, those with higher income tend to have higher aspirations relative to their current standards of housing which in turn can reduce their housing satisfaction. Regarding the role of gender, Van Praag and Ferrer-i-Carbonell (2004) and Lu (1999) found that females are more likely to be satisfied with their home than their males, whereas the effects of gender on housing satisfaction were not found in several studies (Amole, 2009; Hasan, Mohamad, & Ramayah, 2005; Lee & Park, 2010; Varady & Preiser, 1998). Education is also found to be a significant determinants of housing satisfaction. However, the effect of education on residential satisfaction might be ambiguous. The association between education and housing satisfaction have been found to be positive in urban Taiwan (Yi, 1985) and urban China (Ren & Folmer, 2016) but negative in Ghana (Baiden, Arku, Luginaah, & Asiedu, 2011). In addition, another study by Liu and Crull (2006) revealed that while educational attainment contributed significantly to housing satisfaction for Asians it was not the case for Whites. Health status also has a significantly positive effect on housing satisfaction (Hu, 2013).

The literature often shows that the level of housing satisfaction is mainly determined by a number of physical characteristics of the environment, i.e. dwelling and neighborhood characteristics (Addo, 2015; Amole, 2009; Baiden et al., 2011; Baillie, 1990; Diaz-Serrano, 2006; Galster, 1987; Ukoha & Beamish, 1997; Yi, 1985). In general, these studies found that larger size of housing, better interior structure of housing, house type (better houses), the location and environment of housing area, are positively linked with housing satisfaction. Also, the length of residency have been found to be positively linked with housing satisfaction in many studies (Amole, 2009; Mohit et al., 2010; Peck & Kay Stewart, 1985) while other studies show negative effects (Onibokun, 1976).

2.2. Factors associated with subjective well-being

Subjective well-being addresses how good an individual feels about his or her life at a given time (Diener, Suh, Lucas, & Smith, 1999). The literature confirms that subjective well-being (e.g., life satisfaction or happiness) is determined by many different factors. Income is often found to have a positive association with life satisfaction (Ball & Chernova, 2008; Dolan, Peasgood, & White, 2008; Oshio, Nozaki, & Kobayashi, 2011). Empirical evidence demonstrates that health status has a strongly positive relationship with subjective well-being (Dolan et al., 2008). Some studies show a positive effect of each additional level of education on life satisfaction (Blanchflower & Oswald, 2005) and this effect is stronger in low income countries (Fehey & Smyth, 2004; Ferrer-i-Carbonell, 2005).

Other individual characteristics have been found to have a close link with subjective well-being. Studies consistently find a negative association between age and life satisfaction and a positive association between age squared and life satisfaction (Blanchflower & Oswald, 2004; Ferrer-i-Carbonell & Gowdy, 2007). Females tend to report being happier than males in many studies but a few studies show no difference (Dolan et al.,2008). Empirical evidence often reports that both religious affiliation and frequency of worship are positively associated with life satisfaction (Dolan et al., 2008; Krause, 2003; Myers, 2000) and the association is stronger for older than younger people (Witter, Stock, Okun, & Haring, 1985). Unemployment is also found to have a negative effect on subjective well-being (Dolan et al., 2008). Generally speaking, those living alone tend to be less happy than those living with partners or with family members (Dolan el al.,

2008) but some other studies found no difference (Sumngern, Azeredo, Subgranon, Sungvorawongphana, & Matos, 2010; Tran et al., 2016).

An individual's quality of life depends on his or her satisfaction with several domains (Campbell, Converse, & Rodgers, 1976; Peck & Kay Stewart, 1985; Richards, O'Leary, & Mutsonziwa, 2007). Housing, among other domains, has been proven to be an important domain that contributes to the overall quality of life (Das, 2008; Oswald, Wahl, Mollenkopf, & Schilling, 2003; Zebardast, 2009). In addition, previous research has found that housing satisfaction is a strong predictor of overall life satisfaction (Lee & Park, 2010; Oswald et al., 2003; Peck & Kay Stewart, 1985; Westaway, 2006) and the relationship is stronger for the elderly (Oswald et al., 2003; Oswald et al., 2007). It has been demonstrated that an increase in housing satisfaction is accompanied by a substantial increase in overall life satisfaction in many studies (Lee & Park, 2010; Oswald et al., 2003; Peck & Kay Stewart, 1985; Westaway, 2006). However, few studies reported no impact of housing conditions on subjective well-being. Using panel data from the German Socio Economic Panel (SOEP) with participants who moved into a new house only once in the waves from 1991 to 2007, Nakazato, Schimmack, and Oishi (2011) found that moving to or living in a better house is not associated with life satisfaction. The authors explained that housing makes a small contribution to life satisfaction judgements. In addition, positive impacts of improved housing are undermined by paying more costs of living in a better house.

3. Data and methods

3.1. Data

This study is based on data collected from the Vietnam Aging Survey (VNAS 2011) which was conducted in 2011 by GSO (General Statistical Office, Vietnam). The VNAS 2011 was the first-ever nationally representative quantitative survey on respondents aged 50 and over. This survey was designed and sampled using the results from the Population and Housing Census 2009 with PPS (proportional to size) approach, so that it could provide information representative of older people across Vietnam, as well as by sex (males vs. females) and by regions (urban vs. rural). The total number of respondents is 4,007, of those, 1,218 were near-elderly (50-59) and 2,789 were 60 and older.

The survey collected data on personal information (such as age, gender, marital status, religion, social activities, life style, education, employment, own income, assets,

etc.) and household characteristics (houssing conditions, living arrangements and household income). Especially, the survey collect information about the quality of life such as housing satisfaction and life satisfaction.

3.1.1. Housing conditions and housing satisfaction

Table 1 reports summary statistics of housing indicators. The data show that about two thirds of the elderly reported living in semi-permanent or temporary houses. About one fifth of the elderly lived in villas or houses with a kitchen and a bathroom inside while about 11% living in houses with a kitchen and a bathroom outside. On average, the living area per household is estimated at about 73 m^2 and the figure is much higher for villas and houses with a kitchen and a bathroom inside. The proportion of households whose houses having a flush toilet accounts for about 63% for the whole sample and the figure is also much higher for better houses.

Table 1. Distribution of housing and residential satisfaction by house type

	House type					
	All	Villa	a kitchen and a bathroom inside	a kitchen and a bathroom outside	Semi-permanent	Temporary
Observations	**3988**	**22**	**789**	**451**	**2458**	**268**
(%)	100	0.55	19.78	11.33	61.63	6.72
Total living area (m^2)	73.00 (50.40)	177.00 (100.45)	116.00 (60.95)	79.00 (50.51)	60.00 (30.90)	74.40 (20.70)
Toilet inside the house (%)	89	100	99	96	87	67
Type of toilet (%)						
Flush toilet	62.91	100	94.44	55.86	56.76	14.92
Double vault compost/latrine	21.85	0.00	4.01	32.87	25.86	24.31
Open air toilet/others	15.24	0.00	1.55	11.26	17.38	60.77
Housing satisfaction						
1. Very dissatisfied (%)	1.70	0.00	0.64	0.00	1.57	9.36
2. Dissatisfied (%)	15.60	0.00	5.97	10.20	17.49	37.08
3. Neither satisfied nor dissatisfied (%)	19.45	4.55	11.44	16.41	22.10	24.72
4. Satisfied (%)	50.29	27.27	54.26	54.77	51.04	26.97
5. Very Satisfied (%)	12.95	68.18	27.70	18.63	7.87	1.87
Mean scores	**3.57** (0.96)	**4.63** (0.56)	**4.02** (0.83)	**3.57** (0.96)	**3.46** (0.92)	**2.75** (1.01)

Notes: standard deviation in parentheses.

Following previous studies (Oswald et al., 2007; Peck & Kay Stewart, 1985; Ren & Folmer, 2016; Yi, 1985), housing performance was also measured by housing satisfaction in the current study. This indicator is measured by asking respondents a single question: "*Taken all together, how are you satisfied with your house at present*? The housing satisfaction scores of respondents, obtained from a multiple-choice question: The five possible responses to the question are "very dissatisfied", "dissatisfied", "neither satisfied nor dissatisfied", "satisfied", and "very satisfied". For the current study, satisfaction with housing was generated with a value ranging from 1 to 5, corresponding to "very dissatisfied", "dissatisfied", "neither satisfied nor dissatisfied", "satisfied", and "very satisfied", respectively.

As can be seen in Table 1, about 63% of all respondents reported being satisfied or very satisfied with housing, while about 20 % were neither satisfied nor dissatisfied and about 17 % expressed their housing dissatisfaction. However, the proportion of residents being satisfied with their home is much higher for those living in villas (95%), houses with a kitchen and a bathroom inside (82%), houses with a kitchen and a bathroom outside (73%) as compared to that of those residing in semi-permanent houses (59%) and temporary houses (28%). Similarly, the mean scores of housing satisfaction are also higher for better houses. The findings suggest that house type is likely to be a strong predictor of housing satisfaction.

3.1.2. Life satisfaction

The measure of life satisfaction is the most widely used in subjective well-being studies (Dolan et al., 2008; Ferrer-i-Carbonell & Ramos, 2014; Schneider, 2015). The outcome variable in the present study is the life satisfaction or happiness scores of respondents, obtained from a multiple-choice question: "Taken all together, how are you satisfied with your life at present?" The five possible responses to the question are "very dissatisfied", "dissatisfied", "neither satisfied nor dissatisfied", "satisfied", and "very satisfied". For the current study, life satisfaction was calculated with a value ranging from 1 to 5, corresponding to "very dissatisfied", "dissatisfied", "neither satisfied nor dissatisfied", "satisfied", and "very satisfied", respectively.

Table 2. Distribution of life satisfaction by house type

	House type					
	All	Villa	a kitchen and a	a kitchen and a	Semi-permanent	Temporary

			bathroom inside	bathroom outside		
Observations	**3988**	**22**	**789**	**451**	**2458**	**268**
Life satisfaction						
1. Very dissatisfied (%)	1.57	0.00	0.40	1.19	1.78	3.61
2. Dissatisfied (%)	9.11	0.00	4.41	7.60	9.61	21.69
3. Neither satisfied nor dissatisfied (%)	22.52	19.05	15.51	21.38	24.30	29.72
4. Satisfied (%)	54.01	42.86	62.17	54.16	53.40	36.14
5. Very Satisfied (%)	12.80	38.10	17.51	15.68	10.91	8.84
Mean scores	**3.67** (0.87)	**42.00** (0.75	**3.92** (0.73)	**3.75** (0.85)	**3.62** (0.87)	**3.24** (1.00)

Notes: standard deviation in parentheses.

Table 2 reports the sample summary statistics about subjective well-being of the Vietnamese elderly. About two thirds of all respondents said that they were satisfied or very satisfied with their lives, while around 22 % reported being neither satisfied nor dissatisfied and about 11 % being dissatisfied or very dissatisfied. A detailed look at the data by house type in Table 2 shows that respondents with better housing conditions tend to have higher levels of life satisfaction. About 80 % of those living in houses with a kitchen and a bathroom inside felt satisfied or very satisfied with their lives, whereas the corresponding figure for those living in temporary houses was only 45%. The differences suggest that housing conditions are strongly linked with subjective well-being among the elderly.

3.1.3. Other socio-economic indicators

The literature indicates that subjective well-being is associated with various factors. Following previous research on life satisfaction (e.g., Brown & Tierney, 2009; Cheah & Tang, 2013; Dolan et al., 2008; Gray, Rukumnuaykit, Kittisuksathit, & Thongthai, 2008; Morawetz et al., 1977; Nguyen, Fleming, & Su, 2015; Schneider, 2015; Smyth & Qian, 2008; Sumngern et al., 2010), a number of control variables, including individual and household attributes, were included in our regression analysis. The definition and measurements of the variables are reported in Table 3.

Table 3 shows that the average age of all respondents was about 66. The oldest respondent was 108 while the youngest one was 50. Female respondents and ethnic majorities (Kinh & Hoa) account for about 60% and 88 % of the whole sample, respectively. With respect to employment status, 58 % of respondents reported that they

were still working and 42 % were not working in the past 12 months. 21 %, 18 % and 9 % of respondents completed primary school, lower secondary school and upper secondary school, respectively while only 7% of respondents had a higher level of education. 30 % of respondents were widowed and 66 % did not live with their children /grandchildren. The data show that 31% of respondents reported that their health was fair, while only 5 % were healthy.

Table 3. Definition, measurements and summary statistics of explanatory variables

Variables	**Definition**	Mean	SD	Min	Max
Living space	The total size of living areas *(m^2)*	73	54	7	650
Length of residency	Number of years living in the house	18	15	0	85
Housing satisfaction	Five-point Likert scale from 1 to 5	3.57	0.96	1	5
Type of house					
House 1	1 if living in a villa or a house with a kitchen and a bathroom inside; 0 otherwise	0.20	0.42	0	1
House 2	1 if living in a house with a kitchen and a bathroom inside; 0 otherwise	0.11	0.32	0	1
House 3	1 if living in a house with a kitchen and a bathroom outside; 0 otherwise	0.62	0.49	0	1
House 4	1 if living in a semi-permanent house; 0 otherwise	0.07	0.25	0	1
Type of toilet					
Flush toilet	1 if living in a house with a flush toilet; 0 otherwise	0.63	0.48	0	1
Double vault compost/latrine	1 if living in a house with a double vault compost/latrine toilet; 0 otherwise	0.22	0.41	0	1
Religious	1= Religious; 0=not	0.34	0.47	0	1
Daily/weekly	1=daily or weekly worship; 0=otherwise	0.23	0.42	0	1
Monthly	1=monthly worship; 0=otherwise	0.44	0.50	0	1
Age	Age of respondents	66.33	11.36	50	108
Gender	1=male; 0=female	0.41	0.49	0	1
Widowed	1=being widowed; 0=not	0.30	0.46	0	1
Living arrangement	1=living with children/grandchildren; 0=not	0.34	0.47	0	1

Ethnicity	1=Kinh &Hoa; 0=minorities	0.88	0.33	0	1
Employment	1=employed; 0=not	0.52	0.50	0	1
Primary	1=completed primary school; 0 otherwise	0.21	0.41	0	1
Lower secondary	1=completed lower secondary; 0 otherwise	0.18	0.38	0	1
Upper secondary	1=completed upper secondary; 0 otherwise	0.09	0.29	0	1
Higher secondary	1= higher than upper secondary; 0 otherwise	0.07	0.25	0	1
Frequency of social activities	0=never; 1=seldom; 2=few times per year; 3=monthly; 4=weekly; 5=daily	0.99	1.37	0	5
Fair health	1= health is fair; 0=otherwise	0.31	0.46	0	1
Good health	1=healthy; 0=otherwise	0.05	0.23	0	1
Middle income	1 if Y (household income) =10 million Vietnam dong per month (MD) &Y<50 MD; 0 otherwise	0.47	0.50	0	1
High income	1 if Y≥50 MD; 0 otherwise	0.31	0.46	0	1
Household size	Total household members	4.02	2.11	1	15
Rural	1 if living in rural areas; 0 urban	0.72	0.44	0	1
North	1 if living in the North; 0 otherwise	0.45	0.50	0	1
South	1 if living in the South; 0 otherwise	0.30	0.46	0	1

The omitted categories in the dummy variable analyses are: temporary and other types of houses; female sex; ethnic minorities; not work; no primary school; married; living without children/grandchildren; non-religious; having worship at special events; not healthy; low household income; urban and the central.

Looking at economic status, about 47 % of respondents said that their average monthly household income ranging from 10 million Vietnam dong (VND) to less than 50 million VND. About 22 % reported that their households earned total income less than 10 million VND per month, while 31 % estimated that their average household income was equal or higher than 50 million VND per month. The average household size is estimated at about 4 members (Min=1, Max=15, Sd=2.11).

3.2. Specification of econometric models

When modeling factors associated with subjective well-being (happiness or life satisfaction), subjective well-being can be treated as cardinal or ordinal, depending on researchers' assumption (Ferrer-i-Carbonell & Ramos, 2014). Many studies have concluded that the regression results did not practically vary whether we used subjective well-being as either a cardinal variable (e.g., using an Ordinary Least Squares (OLS) estimator) or an ordinal variable (e.g., using an ordered categorical estimator) (Ferrer-i-Carbonell & Frijters, 2004). Because OLS coefficients directly show the marginal effects (Wooldridge, 2013) and are more interpretable by a wide range of readers (Jiang, Lu, & Sato, 2012). For ease of estimation and interpretability of regression coefficients, we

decided to use satisfaction housing and life satisfaction as cardinal variables and used the OLS and instrumental variables (IV) methods to investigate what factors affecting satisfaction with housing and life.

The literature shows that the level of housing satisfaction is mainly determined by two groups of factors (Addo, 2015; Baiden et al., 2011; Diaz-Serrano, 2006; Galster, 1987): (i) objective attributes of the individual or household, i.e. personal and socioeconomic characteristics; (ii) objective characteristics of the environment, i.e. dwelling and neighborhood characteristics. The following equation was used to estimate factors affecting housing satisfaction:

$$\boldsymbol{Housing\ satisfaction\ (HSi)} = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon_i \qquad (1)$$

In equations 1 X_{1i} is the vector of individual and household characteristics. Individual variables include age, gender, ethnicity, education, religion, social activities, employment status, marital status, living arrangement, while household variables consist of total number of members and household income, living in rural areas, living in the North and the South. X_{2i} is a set of variables reflecting the physical housing characteristics that are measured by the size of living area, length of residency, type of house and type of toilet. $\boldsymbol{HSi}$ represents the respondent's self-reported housing satisfaction and ε_i is an error term.

The literature suggests that the same factors that affect housing satisfaction also affect life satisfaction. However, as already discussed in the literature, not only the objective housing characteristics but also residents' subjective evaluations of their housing are found to be strong predictors of life satisfaction. Thus, in the current study, we examine how and to what extent physical housing characteristics and housing satisfaction affect life satisfaction. The equation (2) was used to examine factors associated with life satisfaction. The equation (2) used the same explanatory variables as those in equation (1) but added the variable of *housing satisfaction* ($\boldsymbol{HSi}$) and u_i is an error term in the model. Unfortunately, an endogenous problem arises when housing satisfaction is an explanatory variable but is jointly determined with life satisfaction (Wooldridge, 2013). In this situation, the OLS method produces biased and inconsistent estimates (Angrist & Pischke, 2008) and the

method of instrumental variables (IV) can be used to obtain consistent estimators (Wooldridge, 2013).

$$\boldsymbol{Life\ satisfaction}\ (\boldsymbol{LSi}) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 \boldsymbol{HS}(\boldsymbol{housing\ satisfaction})_{3i} + u_i \quad (2)$$

To control for the endogeneity of housing satisfaction in equation (2), we employed the instrumental variable method (IV) estimator. We needed to search for a set of good instrumental variables ($\boldsymbol{Z_i}$) that affect housing satisfaction but not life satisfaction. First, the IV method estimates the impact of instrumental variables ($\boldsymbol{Z_i}$) on housing satisfaction. Second, the IV method estimates the impact of housing satisfaction on life satisfaction. By following this procedure, instruments affect life satisfaction only through their impact on housing satisfaction. The relevance assumption of instruments requires that the instruments should be strongly correlated with the endogenous explanatory variable (housing satisfaction) (Hoogerheide, Block, & Thurik, 2012). If the instruments are weakly correlated with this endogenous explanatory variable, then one suffers from a weak instrument problem that will not get over the bias of OLS estimates and will produce misleading estimates of statistical significance even with a very big sample size (Murray, 2006). In addition, the exogeneity assumption of instruments requires that the instruments should be uncorrelated with the error term of the structural equations, which implies that the instruments should have no direct effect on life satisfaction; they should only affect life satisfaction via their effect on housing satisfaction (Hoogerheide et al., 2012). If the instruments do not meet this condition, the IV method will provide inconsistent and biased estimates that can be even more biased than the corresponding OLS estimates (Murray, 2006).

We used three dummy variables of house type as potential instruments for housing satisfaction[3]. Previous research found that type of house was a strong predictor of housing satisfaction (Baiden et al., 2011; Baillie, 1990; Lu, 1999; Ukoha & Beamish, 1997). However, in the current study, house type might not be linked with housing satisfaction possibly because older people seem to adapt well to different objective living conditions and thus sustaining relatively high levels of housing satisfaction (Oswald et al., 2007). In

3 The omitted category is temporary houses.

addition, using house type as the instruments may fail to meet the assumption of instrument exogeneity because better housing conditions may directly affect life satisfaction. The above discussions imply that several necessary IV tests must be employed to determine whether both requirements of instruments (relevance and exogeneity) are satisfied or at least using a set of invalid and weak instruments that generates imprecise estimates and misleading conclusions can be avoided (Tran, Lim, Cameron, & Vu, 2014).

We used the formal weak instrument test proposed by Stock and Yogo (2005) using the value for the test statistic that is the F-statistic form of the Cragg-Donald Wald F statistic (cited in Cameron & Trivedi, 2009). Table 5 shows that the values of the Cragg-Donald Wald F statistic were 45.60, which greatly exceeds the reported critical value of 13.91, so we can say that the instruments are not weak and satisfy the relevance requirement. The validity requirement of the instruments was checked using a test of overidentifying. The Hansen J-statistics were not statistically significant (*p-value = 0.50*), thus confirmed the validity of the instrumental variables (Baum, Schaffer, & Stillman, 2003). Combined, the above specification tests indicated that the selected instrumental variables are in fact good instruments. Since housing satisfaction was potentially endogenous, an endogeneity test of this variable was conducted. The results showed that the null hypothesis of exogenous regressors was rejected at the level (10%), confirming that housing satisfaction is endogenous (Table 5). This result, therefore, indicated that the IV model is preferred to the OLS model.

4. Empirical results and discussion

4.1 Factors associated with housing satisfaction

Table 4 report the regression results for factors associated with housing satisfaction. The results indicate that gender, ethnicity, employment status, and education are not associated with residential satisfaction. The positive sign of the age of respondents and the negative sign of its squared term imply that the age has a diminishing effect on housing satisfaction. The result confirms a difference in housing satisfaction exists between individuals living with and without their children/grandchildren. Holding all other variables constant, individuals living independently (living without their children/grandchildren) would have residential satisfaction scores that were 0.08 points higher than those living with their children/grandchildren. Surprisingly, frequency of worship is found to be negatively associated with residential satisfaction. As expected,

individuals with better health tend to be more satisfied with their residences. For instance, individuals with good heath would have housing satisfaction scores that were 0.32 points higher than those who were unhealthy, keeping all other factors constant. We also find that individuals that belonged to middle-income households would be more satisfied with housing than those belonging to low-income households. Surprisingly, we find no difference in housing satisfaction between those belonging to high-income households and those belonging to low income households. This might be explained that rich individuals tend to have higher aspirations relative to their current housing conditions which in turn can reduce their satisfaction with housing.

Regarding regional variables, the result shows that individuals with equal individual, household and other characteristics would on average have life satisfaction scores that were higher in the North and lower in the South than in the Central. Also, individuals living in rural areas tended to be more satisfied with their home than those living in urban areas. Possibly, this might be explained by the fact that that residents living in urban areas tend to have higher standards and aspirations, which might make them less satisfied with their home. Also, the negative effect of paying more costs of living in a better house might outweigh the positive impacts of better living conditions on housing satisfaction among urban residents.

Table 4. Factors associated with housing satisfaction

VARIABLES	Coefficient	SE
House1	0.97***	(0.075)
House2	0.86***	(0.071)
House3	0.59***	(0.067)
Living space	0.02***	(0.003)
Length of residency	-0.00***	(0.001)
Flush toilet	0.17***	(0.060)
Double vault compost/latrine	0.01	(0.058)
Age	0.04*	(0.018)
Age squared	-0.01*	(0.000)
Gender	-0.05	(0.043)
Widowed	0.01	(0.036)
Living arrangement	0.08***	(0.029)
Ethnicity	0.00	(0.045)
Employment status	-0.08	(0.053)
Primary	0.03	(0.044)
Lower secondary	-0.02	(0.036)
Upper secondary	-0.04	(0.056)
Higher secondary	-0.03	(0.066)
Religious	-0.02	(0.030)
Daily/weekly	-0.20***	(0.045)

Monthly	-0.12***	(0.043)
Social activities	0.01	(0.011)
Fair health	0.08*	(0.042)
Good health	0.32***	(0.052)
Middle income	0.10**	(0.043)
High income	0.09	(0.065)
Household size	0.01	(0.007)
Rural area	0.15***	(0.036)
The North	0.13***	(0.039)
The South	-0.12*	(0.064)
Constant	1.29**	(0.626)
Observations	3,598	
R-squared	0.158	

Note: Robust standard errors (SE) are in parentheses.
*, **, *** mean statistically significant at ten percent, five percent and one percent, respectively.

With respect to housing characteristics, the results suggest that housing quality appears to have the most influence on residential satisfaction. Holding all other variables constant, individuals living in villas or houses with a toilet and a bathroom inside would have residential satisfaction scores that were 0.97 points higher than those living in temporary houses. The corresponding figures for those living in houses with a toilet and a bathroom outside and those living in semi-permanent houses were 0.86 points and 0.59 points, respectively. In addition, individuals who had houses with a flush toilet tend to be more satisfied with housing than those who living in houses without a flush toilet. Similar finding was also reported in several studies (Baiden et al., 2011; Lu, 1999; Ukoha & Beamish, 1997). For instance, Baiden et al. (2011) found that house type (better houses) and better housing amenities made a major contribution to housing satisfaction in Accra Ghana. In line with previous finding in Taichung, Taiwan (Yi, 1985) and urban China (Ren & Folmer, 2016), the current study also finds that living spaces are positively associated with housing satisfaction among the Vietnams elderly.

4.1 Factors associated with life satisfaction

Table 5 reports the results of factors associated with life satisfaction using different sets of housing indicators. Because housing satisfaction is strongly linked with house type, we did not include both variables in the model of life satisfaction. The results from Model 2 show that living conditions have a strong and positive effect on life satisfaction. Specifically, individuals living in villas or houses with a toilet and a bathroom inside would have life satisfaction scores that were 0.37 points higher than those living in temporary houses. Similar but smaller impacts were also observed for those living in

houses with a toilet and a bathroom outside and those living in semi-permanent house. We also find that living in houses with better amenities increases life satisfaction. The same findings were found by Zebardast (2009) who reported that quality of housing and amenities were main drivers of life satisfaction among residents in the Tehran Metropolitan Fringe.

As aforementioned, one of main purposes in our study is to examine the relationship between housing satisfaction and life satisfaction. Model 1 used OLS estimator to examine the impact of housing satisfaction on life satisfaction, ignoring the endogenous issue[4]. To address the endogeneity problem, we used the IV method and the results are reported in Model 3. Both models provide evidence that housing satisfaction has a significant and positive effect on life satisfaction. However, IV analysis estimates that improving housing satisfaction scores by one point is associated with an increase of life satisfaction scores by 0.36 points, as compared to 0.24 points when OLS estimator is used. Hence, the IV analysis confirms that the OLS estimation might underestimate the effect of housing satisfaction on life satisfaction. Our finding confirms that housing satisfaction plays an important role in the elderly's subjective- wellbeing. The finding is in line with several studies (Lee & Park, 2010; Oswald et al., 2003; Peck & Kay Stewart, 1985; Westaway, 2006) which found that housing satisfaction was a major contributor to life satisfaction.

Table 5. Factors associated with life satisfaction

VARIABLES	OLS estimation with housing satisfaction (Model 1)		OLS estimation with house type (Model 2)		IV estimation with housing satisfaction (excluded instruments: house type) (Model 3)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Housing conditions						
House1			0.37***	(0.078)		
House2			0.28***	(0.092)		
House3			0.22**	(0.086)		
Housing satisfaction	**0.24*** **	(0.014)			**0.36*** **	(0.064)
Living space	0.00	(0.003)	0.01**	(0.003)	-0.00	(0.003)
Length of residency	0.00***	(0.001)	0.00***	(0.001)	0.01***	(0.001)
Flush toilet	0.20***	(0.040)	0.22***	(0.050)	0.16***	(0.041)
Double vault compost/latrine	0.15***	(0.033)	0.14***	(0.040)	0.14***	(0.034)
Age	-0.00	(0.017)	0.01	(0.018)	-0.01	(0.018)

[4] Endogeneity test in Table 5 confirms that housing satisfaction is endogenous and thus the IV estimator should be preferred.

Age squared	0.00	(0.000)	0.00	(0.000)	0.00	(0.000)
Gender	0.02	(0.038)	0.01	(0.040)	0.03	(0.037)
Widowed	-0.14***	(0.036)	-0.14***		-0.14***	(0.037)
Living arrangement	-0.00	(0.025)	0.02		-0.01	(0.023)
Ethnicity	-0.01	(0.046)	-0.01		-0.01	(0.050)
Employment status	0.00	(0.042)	-0.02		0.01	(0.042)
Primary	0.08*	(0.047)	0.09*	(0.046)	0.08	
Lower secondary	0.02	(0.035)	0.01	(0.033)	0.02	(0.035)
Upper secondary	0.00	(0.045)	-0.02	(0.049)	-0.01	(0.044)
Higher secondary	0.08	(0.061)	0.08	(0.061)	0.08	(0.061)
Religious	-0.02	(0.040)	-0.02	(0.037)	-0.01	(0.041)
Daily/weekly	-0.08*	(0.042)	-0.13***	(0.043)	-0.06	(0.041)
Monthly	-0.05	(0.051)	-0.08	(0.049)	-0.04	(0.049)
Social activities	0.03***	(0.009)	0.03***	(0.008)	0.02***	(0.009)
Fair health	0.23***	(0.024)	0.24***	(0.022)	0.21***	(0.026)
Good health	0.27***	(0.066)	0.35***	(0.065)	0.23***	(0.073)
Middle income	0.11***	(0.035)	0.14***	(0.039)	0.10***	(0.036)
High income	0.30***	(0.039)	0.32***	(0.041)	0.29***	(0.040)
Household size	0.01	(0.01)	0.01	(0.01)	0.00	(0.01)
Rural area	0.11***	(0.021)	0.16***		0.10***	(0.018)
The North	0.07*	(0.038)	0.09**	(0.034)	0.04	(0.043)
The South	0.11**	(0.044)	0.08*	(0.048)	0.13***	(0.036)
Constant	2.14***	(0.607)	2.33***	(0.627)	2.00***	(0.563)
Observations	3,598		3,598		3,598	
R-squared	0.171		0.112		0.155	
Excluded instrumental variables:			house1; house2; house3			
Weak identification test (Cragg-Donald Wald F statistic)			45.60			
[Stock-Yogo weak id test critical value at 5 percent]			13.91			
Hansen J statistic (*p-value*)			0.50			
Endogeneity test of housing satisfaction (*p-value*)			0.068			

Note: Robust standard errors (SE) are in parentheses.
*, **, *** mean statistically significant at ten percent, five percent and one percent, respectively.

The current study also identified several other factors affecting life satisfaction among the Vietnamese Elderly. Consistent to the literature (Dolan et al., 2008), this study finds that being widowed tended to reduce life satisfaction. Holding all other factors constant, widowed individuals would have life satisfaction scores that were 0.10 points lower than their counterparts. In accordance to previous research (Ball & Chernova, 2008; Dolan et al., 2008), we find that both health and income have a positive effect on life satisfaction. For instance, individuals who belonged to middle or high-income households would have life satisfaction scores that were 0.10 points and 0.29 points higher than those belonging to low-income households, holding all other variables constant. Interestingly, we find that rural people tended to be more satisfied with their lives than urban people. The finding is in line with previous studies (Guillen-Royo & Velazco, 2012) which found that people living in rural areas reported being happier than those living in cities.

5. Conclusion and policy Implications

The main purpose of this study was to explore relationship between housing and well-being among the Vietnamese elderly, using data from the 2011 VNAS. We find that only about one-third of old people reported living in permanent houses, while about two thirds lived in semi-permanent or temporary houses. However, it was estimated that around 63 % of the elderly expressed their housing satisfaction and about 67% felt satisfied with their lives. Our regression analysis confirms that housing is an important life domain and as result, housing satisfaction is a strong predictor of life-satisfaction judgments. For instance, we find that individuals with better houses or better housing amenities tended to be much more satisfied with their lives. Notably, using different model specifications, we find that housing satisfaction has a strongly positive impact on life satisfaction and the impact is stronger when the instrumental variables (IV) method is used. Thus, the IV analysis suggests that a traditional approach that often used the OLS method, ignoring the endogeneity of housing satisfaction, is likely to underestimate the impact of housing satisfaction on life satisfaction.

We also identified some factors contributing to housing satisfaction as well as life satisfaction among old people in Vietnam. While living independently is positively associated with housing satisfaction, it is unrelated to life satisfaction. Age is found to have an inverted U shaped relationship with housing satisfaction but no association with life satisfaction. Better health is found to be closely linked with higher levels of housing satisfaction and life satisfaction. It is also observed that life satisfaction tended to be higher for those living in middle or high-income households than for those living in low-income households. Housing satisfaction is found to be higher for those living in middle-income households than for those living in low-income households, but a similar finding is not found for those living in high-income households. Interestingly, our regression analysis confirms that rural people tended to be more satisfied with housing and life than urban people. Also, we find that the level of housing satisfaction and life satisfaction vary across regions. Those living in the North felt more satisfied with their home than those living in the central, while those living in the South were less satisfied with their home than those in the central. The people in the South also felt more satisfied with their lives than those in the central but this is not the case of those in the North.

The current study offers some useful implication. According to standard economic theory, individuals are assumed to be rational agents who allocate their resources to maximize their individual well-being (Diener, 2009). The finding on the strongly positive effect of housing satisfaction on life satisfaction might suggest that people made a rational choice when they invested a large amount of resources in their houses with notable well-being gains (Nakazato et al., 2011). Also, another implication here is that policies and programs to assist poor families in moving out of temporary accommodation or improving housing amenities are likely to be beneficial in improving housing and life satisfaction for the poor elderly.

We acknowledge that the current study has some limitations. First, similar to many other subjective well-being studies, this study considers life satisfaction as well as housing satisfaction only as a single term which is based on the survey results of a subjective assessment. Because life satisfaction as well as housing satisfaction are multi-dimensional, the validity of perceived housing satisfaction and life satisfaction as reported from the survey should be further considered. Second, we were unable to examine the link between housing and life satisfaction over time due to lack of longitudinal data. According to Ferrer-i-Carbonell and Ramos (2014), using panel data for estimating a subjective well-being equation mitigates the bias because it controls for time invariant unobservable individual characteristics. This suggests that further research is needed to address this issue. We are also unable to account for neighborhood characteristics (e.g., location, environmental quality) that might affect housing satisfaction in regression models because such information was unavailable in the 2011 VNAS. This implies that such variables should be accounted for in future research. Finally, the study sample focuses only on the elderly. Different groups might have different experiences with housing conditions. Future research should examine the housing-life satisfaction relationship with the sample covering all other age groups.

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