

**Perceived housing conditions, home satisfaction, control beliefs over aging experience, and life satisfaction among Chinese older adults: a path analysis study**

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# Perceived housing conditions, home satisfaction, control beliefs over aging experience, and life satisfaction among Chinese older adults: a path analysis study

## Abstract

Background: Knowledge about the mechanisms of home satisfaction affecting life satisfaction among elderly during the aging process is limited. This study aims to investigate the mediating effect of perceived control over aging experience on the relationship between home satisfaction and life satisfaction.

Methods: The secondary data collected from face-to-face questionnaire interviews with a sample of 755 community-dwelling Chinese older adults were used. The path analysis was applied to examine the mediating effect of perceived control in the relationship between home satisfaction and life satisfaction after controlling for other covariates. The bootstrap approach was employed.

Results: Goodness-of-fit indices were obtained for the final model and the model explained 30% of the variance of life satisfaction. Perceived housing conditions include poor lighting ( $\beta = -0.32, p < 0.001$ ), uneven thresholds/floors ( $\beta = -0.10, p = 0.007$ ), and lack of emergency alarm ( $\beta = -0.14, p < 0.001$ ) and were associated with lower home satisfaction. Home satisfaction was positively associated with life satisfaction ( $\beta = 0.23, p < 0.001$ ), and control belief over aging experience was a significant mediator, explaining 11.5% between home satisfaction and life satisfaction. Such mediating effect was only significant among those aged 60 – 79 years old.

Conclusion: The mediation effect of perceived control over aging experience underscores the importance of accommodating housing needs among older adults.

**Keywords:** age-friendly community; self-perception over aging; home environment; path analysis

## Introduction

The World Health Organization's (WHO) age-friendly community (AFC) initiative has gained worldwide momentum. In age-friendly communities, services and infrastructures are designed to support and enable older people to live in security, enjoy good health and continue to participate fully in society (World Health Organization, 2007). An age-friendly home environment profoundly influences older adults' daily life (World Health Organization, 2007) and contributes to life satisfaction in later life (Wahl *et al.*, 2009). Understanding the psychological wellbeing of older people in relation to their home environment has been widely discussed (Oswald *et al.*, 2011; Scharlach, 2017).

Life satisfaction is one of the most important indicators of psychological wellbeing and one of the effective indices for explaining an older person's mental health status (Bowling, 1990). In addition, life satisfaction, a general appreciation for life in the face of aging-related changes in one's self and one's environment, is frequently identified as an essential component of successful aging (Laditka *et al.*, 2009). Phillips, Siu, Yeh & Cheng (2005) found that dilapidated interior dwelling conditions, such as poor lighting, slippery floor surfaces, uneven door thresholds, unsafe stairs, and the absence of handrails, exert greater adverse impact on older persons' life satisfaction than the exterior conditions (green zones, rest areas, etc.).

In addition, the association between home satisfaction and life satisfaction among older adults has been well established (Phillips *et al.*, 2005; Fernandez-Portero *et al.*, 2017). Home satisfaction, defined as the individuals' appraisal or evaluations of home environment that can be considered at various level of scale (e.g., house, building, and neighborhood) (Bonaiuto, 2004), has effects on psychological wellbeing (Phillips *et al.*, 2005). On the basis of the urban ecological model, Brown (1995) revealed the importance of subjective evaluations of the home environment and its surroundings as people with a living environment that meets their needs or expectations are more satisfied with their life. A substantial body of empirical studies

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3 indicated that home satisfaction is a mediator between dwelling conditions and life satisfaction  
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5 (Phillips *et al.*, 2005; Fernandez-Portero *et al.*, 2017).  
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8 Limited studies explored about how home satisfaction further strengthens or weakens  
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10 individual psychological resources during the aging process. Lawton and Nahemow (1973)  
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12 described the interaction between older adults' competence and environmental features. When  
13  
14 older people's competence (P) adapts to environmental (E) challenges, they will maintain  
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16 independence in their daily lives. Wahl *et al.* (2012) further proposed that the process of agency  
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18 helps explain the relationship between environment and wellbeing. The processes of agency  
19  
20 refer to becoming a change agent in one's own life (Wahl *et al.*, 2012), including perceived  
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22 control over the home environment (Lachman and Burack, 1993). Perceived control refers to  
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24 a person's beliefs to determine one's states and behavior, influence one's environment, and/or  
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26 bring about desired outcomes (Schulz and Heckhausen, 1999). Emerging empirical studies  
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28 show that domain-specific conceptions of control were found to be associated with the  
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30 wellbeing of older adults. Oswald *et al.* (2007), Gefenaite *et al.* (2019), and Andrew and Meeks  
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32 (2018) found that house-specific control beliefs, defined as perceiving everyday activity as  
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34 being contingent upon one's own behavior related to housing arrangement or external  
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36 influences, mediate the home accessibility problems and physical functioning. However, no  
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38 studies looked beyond the house-related specific control beliefs and explored the role of  
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40 perceived control more relevant to the aging experience.  
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### 48 ***Perceived control over aging experience as a potential mediator***

49 Perceived control over the aging is defined as the beliefs about personal ways of managing  
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51 one's experience of aging (Barker *et al.*, 2007). Different from house-related control beliefs,  
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53 perceived control over aging experience emphasizes on the internal control beliefs, with the  
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55 process including control over positive experience (e.g., "The quality of my social life in later  
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57 years depends on me") and control over negative experiences (e.g., "Immobility in later life is  
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3 not up to me”) related to aging (Barker et al., 2007). Research shows clear benefits of control  
4 among older adults on psychological health and wellbeing (Mallers *et al.*, 2013). Existing  
5 literature documented that income status, living alone and health-related conditions were  
6 associated with perceived control over aging (Moser *et al.*, 2011).  
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12 Scharlach (2017) pointed out that perceived control should be studied in the context of  
13 the aging process of the individual and environmental adaptation because a dependency-  
14 inducing home environment can foster the subjective experience of helplessness and being out  
15 of their mastery and/or comfort zone. It is also because any possible home environmental  
16 stressors and barriers would “confront people with dogged evidence of their own failures and  
17 with inescapable proof of their inability to alter the unwanted circumstance of their lives”  
18 (Pearlin et al., 1981). Therefore, theoretically, the home environmental demands or press would  
19 be interpreted and internalized by aging individuals into their own aging experience. In other  
20 words, if an older adult feels satisfied with their home environment, they are more likely to  
21 perceive control of their own aging process and experience, and thus have better life  
22 satisfaction. In contrast, older adults who are unsatisfied towards their home environment are  
23 more likely to consider such unsatisfied residence as a sign of losing control over their life  
24 when they are getting older, which further feel less satisfied with their lives. Even though there  
25 is evidence that perceived control over aging experience contribute to life satisfaction (Ingrand  
26 *et al.*, 2018), no study explored whether perceived control over aging experience is a mediator  
27 in the relationship between home environment satisfaction and life satisfaction.  
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### 50 ***Age group difference in mediating role of perceived control over ageing***

51 Previous studies suggest the mediating role of perceived control over aging experience may  
52 differ across age group (e.g. those aged 80 and above vs. aged 80 below). People’s level of  
53 perceived control in general may vary over life course, with a peak in midlife and then a  
54 decrease in later life (Drewelies *et al.*, 2017). Such declines in general perceived control in the  
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3 very old age are related to the increasing pervasiveness of age-related changes in health, social  
4 relationship (e.g., bereavement) and financial resource (e.g. social status and income)  
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6 (Robinson and Lachman, 2017).  
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10 Relatedly, the agency process like perceived control decreases in importance for aging  
11 well when people move into the very old age because very old adults tend to develop strong  
12 sense of belonging to their home and surrounding neighborhoods, a process of developing  
13 emotional evaluation attachment / experiences to the places, and tend not to undertake repeated  
14 relocations (Wahl et al., 2012). Oswald et al. (2011) found that the “old-old” (80 years old and  
15 over)’s place attachment become stronger than the “young-old” (65 – 79 years old) in the  
16 community settings. Therefore, it is possible that perceived control related to aging experience  
17 may make its mediating role less important in the relationship between home satisfaction and  
18 life satisfaction among old-old compared to the young- and middle- old. However, no studies  
19 examined the difference across age groups in the relationships among home satisfaction,  
20 perceived control over aging experience and life satisfaction.  
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### 37 ***Home environment for older adults in China***

38 China is one of the fastest aging countries in the world. The total population of people aged 60  
39 and above was more than 249 million at the end of 2017 and accounted for 17.9% of the total  
40 population (National Bureau of Statistics of China, 2019). In China’s 12th Five-Year Plan, a  
41 “9073” old-age care model was proposed by the government, for which 90% of older adults  
42 depend on their family support, 7% depend on community support and related community-  
43 based service, and 3% rely on institutional nursing (Jing *et al.*, 2019). From this policy, up to  
44 97% of Chinese older people are expected to age in their homes and communities. Thus,  
45 building age-friendly communities plays a critical role in influencing most Chinese older  
46 people’s psychological wellbeing. As first introduced in China in 2007, age-friendly  
47 environments became the priority of the government since 2009, followed by a nationwide and  
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3 regional campaigns of age-friendly communities' initiatives being launched (Wang *et al.*,  
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5 2017).  
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8 A gap exists between policy wish and reality. China promotes aging in place, but  
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10 housing conditions are still worrying. A national survey found that most older adults (66%)  
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12 lived in the buildings built in the 1990s, approximately 40% of older adults did not have an  
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14 emergency alarm facility, 22% complained of poor lighting, and 12.5% reported housing  
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16 problems related to uneven thresholds/floor (Cheng and Hou, 2018). Therefore, policies that  
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18 promote an age-friendly home environment are urgently needed. Given that housing is an  
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20 important item on which Chinese people spend much thought, effort, and financial resources,  
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22 the impacts of living conditions on psychological wellbeing for people in the aging process call  
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24 for investigation. Likewise, many Asian countries encounter rapid population aging. Without  
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26 proper policy intervention, the market-driven housing design may not create age-friendly home  
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28 environments for elderly people. This study may provide policy implications for those  
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30 countries which face similar challenges in China.  
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### 37 ***Research objectives***

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39 To fill these two gaps, the current study has two objectives. First, the study aims to examine  
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41 whether the decaying dwelling conditions, and home satisfaction influence aging-specific  
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43 perceived control and sequentially impacts the life satisfaction of Chinese older adults while  
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45 controlling for individual characteristics. Second, this study aims to test whether the mediating  
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47 role of perceived control over aging experience in the association between home satisfaction  
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49 and life satisfaction becomes less important among those aged 80 and above compared to those  
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51 aged 80 below. This study included the following hypotheses: (H1) home satisfaction mediates  
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53 the relationship between perceived dwelling conditions and perceived control over aging; (H2)  
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55 perceived control over aging experience mediates the effects of home satisfaction on life  
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57 satisfaction among older adults; (H3) the mediating role of perceived control over aging  
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3 experience in the association between home satisfaction and life satisfaction becomes  
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5 insignificant among those aged 80 and above.  
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## 8 9 **Methods**

### 10 11 12 *Sample*

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15 **Study site:** Data were collected from Nanhai City in South China, located at the center of the  
16 Pearl River Delta region and neighboring Guangzhou. Nanhai is a medium-size city with a total  
17 population of 2.78 million in 2015 (Nanhai Bureau of Civil Affaris, 2017). The city is rapidly  
18 aging with more than 222,000 older people aged 60 and above and accounting for 17.6% of its  
19 total local population. The year-to-year increase of elders in the population is 3.5% (Nanhai  
20 Bureau of Civil Affaris, 2017). Like many cities in China, Nanhai has been following the  
21 “9073” old-age care model in recent years as a response to the growing aging population.  
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33 **Survey data collection:** Data for this study came from a Fourth Sample Survey on the Living  
34 Conditions of China’s Urban and Rural Older Persons collected in Nanhai City in 2015. “The  
35 Fourth Sample Survey on the Living Conditions of Elderly People in Urban and Rural China  
36 (2015)”, was initiated by China’s National Working Commission on Aging. This study adopted  
37 a probability-proportional-to-size sampling method. First, the study randomly selected 26 of  
38 the 267 neighborhoods in the city (10%). A neighborhood is defined by local administrative  
39 boundaries and is one of the smallest political divisions in China (Li *et al.*, 2018). Within each  
40 neighborhood, the study randomly selected 30 older people (60 years or older) to participate in  
41 a face-to-face interview with experienced interviewers. Respondents with a severe physical or  
42 cognitive impairment which hindered their communication were excluded. A total of 755  
43 respondents were successfully interviewed (97% success rate), and 50 (6.6%) cases had  
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3 missing data and were eventually excluded in the data analysis. The final sample size was 705.

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5 Written informed consent was obtained from all study respondents.  
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## 8 9 *Measures*

### 10 11 12 *Perceived dwelling problems*

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15 We included three outstanding perceived dwelling problems showed by the national survey:  
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17 poor lighting, uneven thresholds/floors, and no emergency alarm. Respondents were asked  
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19 whether they encountered the above three dwelling problems in their houses, respectively. The  
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21 possible answers were “Yes” (1) or “No” (0).  
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### 26 27 *Home satisfaction*

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29 Home satisfaction was assessed with a single question “How satisfied are with your  
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31 home/house environment?” Responses were categorized as “not satisfied,” “fair,” and  
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33 “satisfied.” Scores ranged from 1 to 3. A higher score indicates higher satisfaction with home  
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35 conditions.  
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### 39 40 *Perceived control over aging*

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42 Perceived control over aging experience was assessed with the subscale of the Brief Aging  
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44 Perceptions Questionnaire (B-APQ). This scale specifically measures internalized and  
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46 perceived control of one’s aging process, including the following: (1) “The quality of my social  
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48 life in later years depends on me,” (2) “The quality of my relationships with others in later life  
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50 depends on me,” (3) “Whether I continue living life to the full depends on me,” (4) “Slowing  
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52 down with age is not something that I can control,” and (5) “I have no control over the effects  
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54 which getting older has on my social life.” Items 1–3 and 4–5 measure the control over positive  
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56 and negative experience, respectively. The subscale consists of five items rated on a five-point  
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58 scale from 1 (strongly disagree) to 5 (strongly agree), with items 4–5 reverse coded. Reverse-  
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3 coded items were recoded so that all items were based on the same scale. Scores were summed  
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5 to create a scale that ranged from 5 to 25, with higher scores indicating more perceived control  
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7 over aging. The subscale of perceived control has been psychometrically validated for use with  
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9 the Chinese population (Wong, et al., 2020) and has been found to have good internal  
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11 consistency and construct validity (Sexton *et al.*, 2014). The internal consistency of the scale  
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13 in our sample was 0.80 as measured using Cronbach's alpha.  
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### 17 18 *Life satisfaction*

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21 Life satisfaction was measured using The Satisfaction with Life Scale (SWLS) (Diener et al.,  
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23 1985), which is comprised of five items rated on a seven-point Likert scale ranging from 1  
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25 (*strongly disagree*) to 7 (*strongly agree*). The five items are as follows: "In most ways, my life  
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27 is close to my ideal," "The conditions of my life are excellent," "I am satisfied with my life,"  
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29 "So far, I have gotten the important things I want in life," and "If I could live my life over, I  
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31 would change almost nothing." The total score ranges of 7–35, with a higher score indicating  
32  
33 a higher level of life satisfaction. The Chinese version of this scale has been validated (Bai, et  
34  
35 al., 2011). The internal consistency of the scale in our sample was 0.88 as measured using  
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37 Cronbach's alpha.  
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### 42 43 *Control variables*

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46 Control variables are individual characteristics, namely, age, gender (female vs. male), marital  
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48 status (married vs. divorced/widowed/unmarried), education (below primary education,  
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50 primary education, and secondary education and above), number of chronic diseases, number  
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52 of children, and household income. These control variables were selected because they were  
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54 found to be associated with life satisfaction and perceived control over aging experience among  
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56 older adults (Moser *et al.*, 2011; Li *et al.*, 2013).  
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### *Analysis*

Descriptive statistics were calculated for sample characteristics, home satisfaction, and life satisfaction. The independent-samples t-test was used to compare the means of home satisfaction, perceived control over aging experience and life satisfaction between two age groups (60-70 years old vs. 80 years old and above). Pearson correlation was tested among perceived dwelling conditions, home satisfaction, perceived control over aging experience, and life satisfaction.

To test the hypotheses, we applied path analysis in the structural equation modeling (SEM), which allows for simultaneous evaluation of more than one dependent variable and both the direct and indirect effects of one variable on another (Preacher and Hayes, 2008). Noting the tendency of the skewed distribution of indirect effects, this study examined the standard errors of indirect effects with 1,000 bootstrap samples. The independent variable of interest was housing conditions. This study examined the hypothesis that housing conditions influenced life satisfaction through home satisfaction. Older persons who live in an age-friendly housing environment will have better home satisfaction, which subsequently promotes their life satisfaction. This study tested the hypothesis that home satisfaction influence life satisfaction through perceived control over aging. Older persons who live with a better home satisfaction will experience more sense of control over aging, which subsequently promotes their life satisfaction. The model was tested with adjustments for age, gender, marital status, number of chronic diseases, number of children and household income for home satisfaction, perceived control over aging experience and life satisfaction. This study conducted the subgroup analysis for those aged 80 and above and those aged below, to examine whether the mediating effect of perceived control over aging experience remain the same across the age group. Standardized path coefficients for direct, indirect, and total effects were reported. Standardized coefficients that indicated the strength of correlation among variables were also reported. All analyses were

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3 performed using Stata version 15 (College Station, TX: StataCorp LLC).  
4

5 To evaluate model fit, this study followed the cut-off criteria suggested by Hu and  
6 Bentler (1999) and Browne and Cudeck (1992) as the test is sensitive to large sample sizes.  
7  
8 The  $\chi^2$  hypothesized model and the observed data were of a relatively good fit where the  
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10 comparative fit index (CFI)  $\geq 0.95$ , standardized root mean square residual (SRMR)  $\leq 0.08$ ,  
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12 and root mean square error approximation (RMSEA)  $\leq 0.08$  (Hu and Bentler, 1999).  
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## 18 **Results**

### 19 ***Sample Description***

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22 *Table 1* shows the respondent characteristics. Less than half (42.01%) were males, with a mean  
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24 age of 70.25 (standard deviation [SD] = 7.74), 86.18% were aged 60 – 79 years old, 70.92%  
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26 were married, 18.58% had below primary education, and 63.26% had primary education. The  
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28 average number of chronic diseases was 1.44 (SD = 1.07), and the average household income  
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30 in 2014 was US\$ 7,453 (SD = 5,616), an amount comparable to the national Gross Domestic  
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32 Product per capita in China (World Bank, 2019). The average number of children was 2.71  
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34 (SD = 1.22). More than one-tenth of respondents (12.91%) reported poor lighting, 3.40%  
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36 reported uneven threshold/floors, and 6.81% reported the lack of emergency alarms in their  
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38 homes. The mean of home satisfaction was 2.65 (SD = 0.57), and the mean of perceived control  
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40 over aging experience was 16.96 (SD = 3.61). The mean life satisfaction score was 24.98 (SD  
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42 = 6.11). The independent sample T-test showed that the perceived control over aging  
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44 experience among old-old was significantly lower than that among young- and middle- old.  
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52 [Insert Table 1]  
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### 56 ***Correlation***

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58 Table 2 shows that home satisfaction and perceived control over aging experience were  
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3 positively correlated with life satisfaction ( $r = 0.33, p < 0.001$  and  $r = 0.26, p < 0.001$ ).  
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5 However, all perceived dwelling problems, including poor lighting ( $r = -0.19, p < 0.001$ ),  
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7 uneven thresholds/floors ( $r = -0.11, p < 0.01$ ), and no emergency alarm ( $r = -0.14, p < 0.001$ ).  
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9 were negatively correlated with life satisfaction. Home satisfaction was modestly correlated  
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11 with perceived control over aging experience ( $r = 0.16, p < 0.001$ ). And all perceived dwelling  
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13 problems, including poor lighting ( $r = -0.37, p < 0.001$ ), uneven thresholds/floors ( $r = -0.20,$   
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15  $p < 0.001$ ), and no emergency alarm ( $r = -0.20, p < 0.001$ ) were negatively correlated with  
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17 home satisfaction. Only perceived poor lighting was negatively correlated with perceived  
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19 control over aging experience ( $r = -0.08, p < 0.05$ ). All the perceived dwelling conditions were  
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21 significantly correlated with each other.  
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26 [Insert Table 2]  
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### 30 *Path analysis and model fit*

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32 Figure 1 and Table 3 show the results of the testing of the proposed model using path analysis.  
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34 In this model, life satisfaction was the dependent variable; perceived control over aging  
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36 experience and home satisfaction were mediators; perceived dwelling housing conditions,  
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38 including poor lighting, uneven threshold/floors, and lack of emergency alarm, were the  
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40 independent variables; and age, gender, education, chronic diseases, and annual household  
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42 income, and the number of children were the control variables. The model presents a good fit  
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44 of the four indices used: chi-square (9) = 11.84,  $p = 0.223$ , CFI = 0.992, RMSEA = 0.021, and  
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46 SRMR = 0.012. Overall, this model explained 30% of the variance ( $R^2$ ) of life satisfaction.  
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51 Figure 1 shows the standardized estimates of the path coefficients, which are interpreted  
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53 as regression coefficients, thereby allowing for comparisons of the relative impact of variables  
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55 in different scales (Weston and Gore, 2006). Poor lighting, uneven threshold/floors, and lack  
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57 of emergency alarm facility were found to have negative effects on home satisfaction ( $\beta = -$   
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0.32,  $p < 0.001$ ,  $\beta = -0.10$ ,  $p = 0.007$ ,  $\beta = -0.14$ ,  $p < 0.001$ , respectively). Compared with the standardized coefficients of three perceived housing conditions on home satisfaction, poor lighting had a stronger impact on home satisfaction. Only lack of emergency alarm had direct and negative effects on life satisfaction ( $\beta = -0.08$ ,  $p = 0.034$ ), whereas the two other housing problems were not directly associated with life satisfaction ( $\beta = -0.06$ ,  $p = 0.139$ ;  $\beta = -0.02$ ,  $p = 0.494$ ). Home satisfaction was positively associated with life satisfaction ( $\beta = 0.23$ ,  $p < 0.001$ ) and perceived control over aging experience ( $\beta = 0.15$ ,  $p < 0.001$ ). Perceived control over aging experience was positively associated with life satisfaction ( $\beta = 0.21$ ,  $p < 0.001$ ).

[Insert Figure 1]

Table 3 shows the direct, indirect, and total effects. The indirect effects of housing conditions on life satisfaction were significant. The indirect ( $\beta = -0.09$ ,  $p < 0.001$ ) and total ( $\beta = -0.15$ ,  $p < 0.001$ ) effects of poor lighting on life satisfaction were significant. The indirect effect of poor lighting on life satisfaction was mainly mediated by home satisfaction ( $-0.32 * 0.23 = -0.07$ , or 49%). The indirect effect of uneven thresholds/floors on life satisfaction was also statistically significant ( $\beta = -0.03$ ,  $p = 0.03$ ). Thus, home satisfaction was a significant mediator ( $-0.10 * 0.23 = -0.023$ , or 46%) of the effect of uneven threshold/floors on life satisfaction despite its non-significant total effects on life satisfaction. No indirect effect of lack of emergency alarm on life satisfaction was found. In addition, the indirect effect of home satisfaction on life satisfaction was significant ( $\beta = 0.03$ ,  $p = 0.001$ ), thereby showing that perceived control over aging experience mediated 11.5% between home and life satisfaction.

Table 3 also displays that the indirect effects of all three perceived dwelling conditions including poor lighting ( $\beta = -0.05$ ,  $p < 0.001$ ), uneven thresholds/floors ( $\beta = -0.01$ ,  $p < 0.05$ ) and lack of emergency alarm ( $\beta = -0.02$ ,  $p < 0.01$ ) on perceived control over aging experience was significant. Home satisfaction fully mediated the associations between all these three perceived dwelling conditions and control beliefs over aging experience.

[Insert Table 3]

Table 4 displays the comparison on the mediating effects of perceived control over aging experience between two age groups. Home satisfaction ( $\beta = 0.24$ ,  $p < 0.001$  in those aged 60-79 years old;  $\beta = 0.22$ ,  $p < 0.05$  in those aged 80 and above) and perception of control over aging experience ( $\beta = 0.18$ ,  $p < 0.001$  in those aged 60-79 years old;  $\beta = 0.41$ ,  $p < 0.01$  in those aged 80 and above) were significantly associated with life satisfaction in both age groups. However, only significant association between perceived control over aging experience and home satisfaction was found among those aged 80 below ( $\beta = 0.15$ ,  $p < 0.05$ ). Therefore, the mediating effect was only significant among those aged below 80 years old ( $\beta = 0.03$ ,  $p = 0.005$ , or 11.5%).

[Insert Table 4]

## Discussion

The conceptual framework of the AFC movement is driven by the explicit assumption that age-friendly features in the living environment promote psychological wellbeing. This is the first study to provide a new approach to better understand person–environment dynamics as people age by addressing the relations of perceived control over aging experience with home and life satisfaction. This study firstly provided empirical evidence for the mediating effects of control beliefs over aging experience on the relationship between home and life satisfaction.

This study found that home satisfaction fully mediated the associations between perceived home environment (including poor lighting, uneven floors, and no emergency alarm). Older adults with poor perception of their home conditions felt less satisfied with their home environment, which further lowered their perceived control over aging experience. Previous studies seldom explored whether home hazards linked to the aging process. Existing literature focused on the effects of home hazards on negative health outcomes, like falls

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3 (Oswald & Wahl, 2004) and dependence in daily living (Oswald *et al.*, 2007); perception of  
4 control over aging experience was only linked with social demographic factors (e.g. income  
5 status, living alone) and health-related conditions (e.g. multiple chronic medical conditions)  
6 (Moser *et al.*, 2011). This study firstly attempted to highlight that the home environment  
7 matters not only because it influenced older adults' home satisfaction but also indirectly  
8 associated how older adults perceived control over their own aging experience. These findings  
9 imply that home modification can be used as the strategies to help older adults increase and  
10 maintain their sense of control over aging.  
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22 In addition, this study also found that perceived control over aging experience partially  
23 mediated the impact of home satisfaction on life satisfaction, providing evidence to the  
24 argument that satisfaction-inducing home environment can foster the subjective experience of  
25 mastery on people's age-rated changes, and further lead to better life satisfaction (Scharlach,  
26 2017). When older adults felt satisfied with their home environment, it indicated there was a  
27 good fit between personal competence and environmental press (Lawton and Nahemow, 1973).  
28 Older adults likely internalized such a good fit as within their aging experience, increased their  
29 sense of control with age-related changes in physical, social and cognitive functions, leading  
30 to better life satisfaction. These findings imply that combination with the interventions to  
31 improve the perceived control over aging experience (Mallers *et al.*, 2013), the effects of home  
32 modification programmes on life satisfaction can be maximized among older adults.  
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47 This study found the difference in the relationship between home satisfaction, perceived  
48 control over aging, and life satisfaction between old-old and young- and middle- old. This study  
49 found that older adults aged 80 years old and over perceived less control over aging experience  
50 than young- and middle- old, lending support to the decrease in perceived control in the later  
51 life (Drewelies *et al.*, 2017). In addition, this study found that even though home satisfaction  
52 and perception of control over aging experience were significantly associated with life  
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3 satisfaction in both age groups, the mediating effect was only significant among those aged  
4 below 80 years old. Consistent with the hypothesis, the mediating role of perceived control  
5 over aging experience became insignificant between home satisfaction and life satisfaction  
6 among the old-old. Previous studies suggest other potential mechanisms like sense of  
7 belonging, place attachment may explain the association between home satisfaction and life  
8 satisfaction (Wahl *et al.*, 2012). Future studies can further explore the mediating roles of sense  
9 of belonging and perceived control over aging experience in the home satisfaction and life  
10 satisfaction simultaneously among different age groups.  
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21 The findings of this study should be interpreted in light of several limitations. As  
22 secondary data analysis, this work exerted no control on site nor sample selection. Therefore,  
23 the findings cannot be generalized into other areas in China. This study did not consider the  
24 affective aspect of wellbeing, which has been emphasized by recent literature (Wahl *et al.*,  
25 2009), the sense of belonging and other potential aspect of external control over aging, because  
26 this work exerted no control on the variable collection. In addition, the cross-sectional design  
27 hindered the ability to capture the trajectory of life satisfaction related to the change of the  
28 home environment among older adults. Thus, no any causal relationship can be determined.  
29 Longitudinal national studies to assess the causal relationships among the home environment,  
30 control beliefs over aging experience, and life satisfaction will provide more information  
31 relevant to the interaction between environmental and individual factors.  
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47 Despite these limitations, this study has its strengths. This work is the first to highlight  
48 the importance of the mediation effects of perceived control over aging experience in the  
49 relationship between home satisfaction and psychological wellbeing among older adults, a  
50 feature that has been ignored in the previous studies. This research also uses a random sample  
51 from a non-Western country, thereby filling a knowledge gap about how the home environment  
52 influences older Chinese adults' life satisfaction in the aging process as the home is a critical  
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3 asset and symbol for Chinese elders in their lifetime. This study also examined the age  
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5 difference in the mediating role of perceived control over aging.  
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### 8 9 **Conclusion**

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11 To conclude, older adults living in the home environment with poor conditions, such as poor  
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13 lighting, uneven thresholds/floors, and lack of emergency facilities, are less satisfied with their  
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15 home environment. Their home satisfaction further influenced their control beliefs over the  
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17 aging experience. Moreover, perceived control over aging experience mediates the effects of  
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19 home satisfaction on life satisfaction. Such mediating effect was only significant among those  
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21 aged below 80 years old. The findings are relevant to individuals living in other increasingly  
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23 urbanized and population aging cities in East Asia who share a similarly urgent need to promote  
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25 age-friendly home environment. For the policy implication, this study underscored the  
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27 importance of home modification for older adults and the use of relevant strategies to increase  
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29 their control beliefs over aging experience.  
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Table 1. Descriptive analysis (N = 705)

Variables	Mean (SD)/n (%)
Male	297 (42.01)
Age (range = 60–99)	70.25 (7.74)
Young- and middle- old (60 – 79 years old)	611 (86.18)
Old-old (80 years old and above)	98 (13.82)
Married	500 (70.92)
Educational level	
Below primary school	131 (18.58)
Primary school	446 (63.26)
Secondary school or above	128 (18.16)
Number of chronic diseases (range = 0–6)	1.44 (1.07)
Household income in the previous year (range = 288–69,329 USD)	7,453 (5,616)
Number of children (range = 0–9)	2.71 (1.22)
Dwelling problems	
Poor lighting	91 (12.91)
Uneven thresholds/floors	24 (3.40)
No emergency alarm	48 (6.81)
Residential satisfaction (range = 1–3) <sup>a</sup>	2.65 (0.57)
Young- and middle- old (60 – 79 years old)	2.66 (0.56)
Old-old (80 years old and above)	2.66 (0.58)
Independent T-test	0.008
Perceived control (range = 5–25)	16.97 (3.61)
Young- and middle- old (60 – 79 years old)	17.27 (3.42)
Old-old (80 years old and above)	15.11 (4.2)
Independent T-test	11.36***
Life satisfaction (range = 7–35)	24.98 (6.11)
Young- and middle- old (60 – 79 years old)	24.88 (6.14)
Old-old (80 years old and above)	25.55 (5.79)
Independent T-test	0.49

<sup>a</sup> Three-point scale, ranging from 1 = *unsatisfied* to 3 = *satisfied*.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

Table 2. Pearson correlations among perceived dwelling conditions, home satisfaction, perceived control over aging experience and life satisfaction

	Life satisfaction	Home satisfaction	Perceived control over aging experience	Poor lighting	Uneven thresholds/floors
Home satisfaction	0.33***				
Perceived control over aging experience	0.26***	0.16***			
Poor lighting	-0.19***	-0.37***	-0.08*		
Uneven thresholds/floors	-0.11**	-0.20***	-0.04	0.23***	
No emergency alarm	-0.14***	-0.20***	-0.03	0.11**	0.17***

\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001.

Table 3. Test of mediation with bootstrapping standard errors

Paths	Direct effect (path c')		Indirect effect (path a*b)		Total effect	
	Coeff	95% CI	Coeff	(95% CI)	Coeff	(95% CI)
<b>Life satisfaction</b>						
Poor lighting	-0.06	(-2.33 to 0.33)	-0.09***	(-2.12 to -0.97)	-0.15***	(-3.94 to -1.28)
Uneven thresholds/floors	-0.02	(-3.15 to 1.52)	-0.03*	(-1.74 to -0.09)	-0.05	(-4.18 to 0.73)
No emergency alarm	-0.08*	(-3.49 to 1.40)	-0.02	(-1.14 to 1.24)	-0.10**	(-4.06 to -0.58)
Home satisfaction	0.23***	(1.67 to 3.27)	0.03**	(0.13 to 0.54)	0.26***	(1.99 to 3.62)
Perceived control over aging	0.21***	(0.23 to 0.47)				
<b>Perceived control over aging</b>						
Poor lighting	-0.02	(-1.02 to 0.63)	-0.05***	(-0.81 to -0.23)	-0.07	(-1.50 to 0.07)
Uneven thresholds/floors	-0.01	(-1.65 to 0.25)	-0.01*	(-0.54 to -0.03)	-0.02	(-1.94 to 0.97)
No emergency alarm	-0.02	(-1.04 to 0.56)	-0.02**	(-0.53 to -0.09)	-0.04	(-1.71 to 0.19)
Home satisfaction	0.15***	(0.46 to 1.40)				
<b>Home satisfaction</b>						
Poor lighting	-0.32***	(-0.67 to -0.43)				
Uneven thresholds/floors	-0.10**	(-0.52 to -0.08)				
No emergency alarm	-0.14***	(-0.48 to -0.17)				

\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

Note: CI, confidence interval; Coeff, standardized coefficient

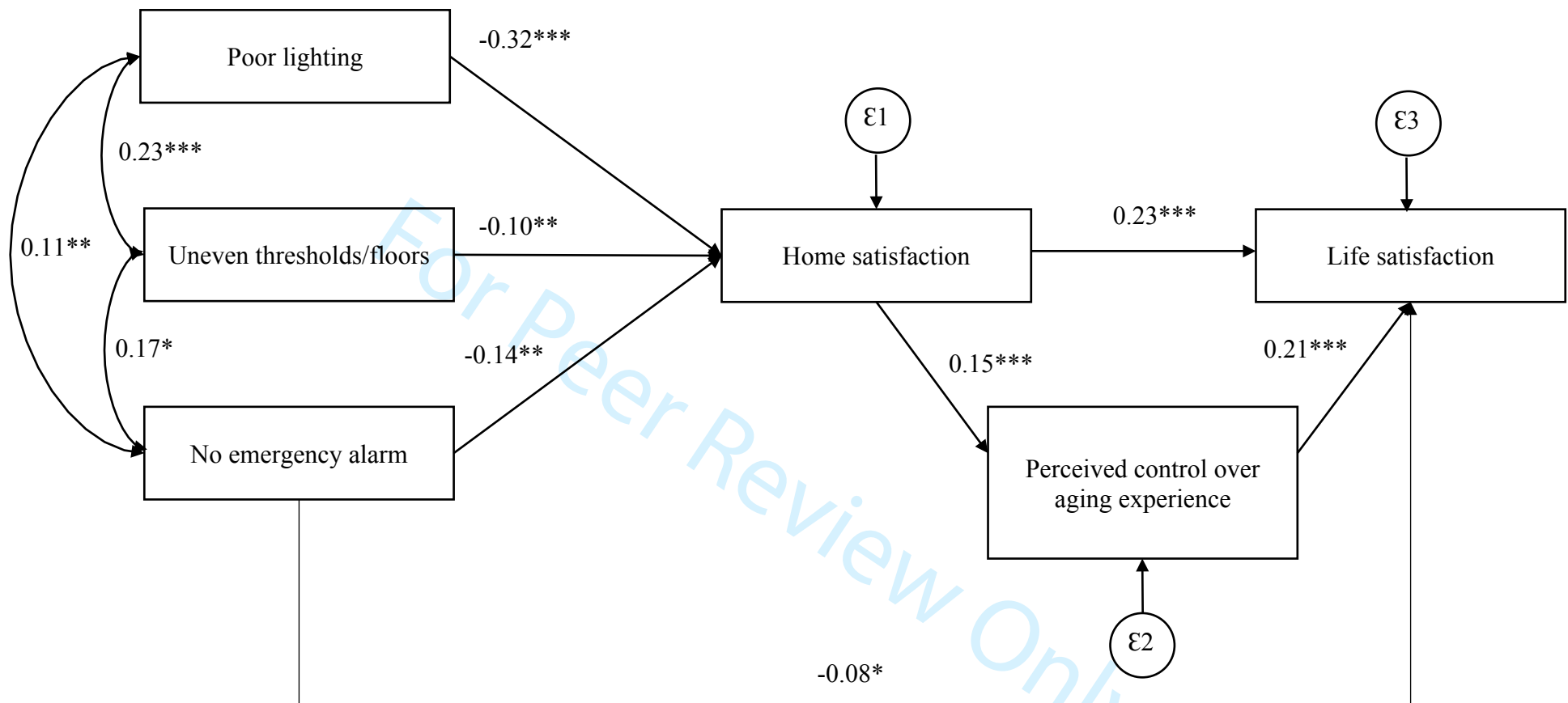
Table 4. Subgroup analysis of test of mediation with bootstrapping standard errors for age groups.

	60 – 79 years old			80 years old and above		
	Direct effect (path c')	Indirect effect (path a*b)	Total effect	Direct effect (path c')	Indirect effect (path a*b)	Total effect
	$\beta$ (95%CI)	$\beta$ (95%CI)	$\beta$ (95%CI)	$\beta$ (95%CI)	$\beta$ (95%CI)	$\beta$ (95%CI)
<b>Life satisfaction</b>						
Home satisfaction	0.24*** (0.16 to 0.31)	0.03** (0.01 to 0.05)	0.26*** (0.19 to 0.34)	0.22* (0.01 to 0.48)	0.05 (-0.08 to 0.17)	0.27 (-0.02 to 0.56)
Perceived control over aging experience	0.18*** (0.11 to 0.26)			0.41** (0.14 to 0.63)		
<b>Perceived control over aging experience</b>						
Home satisfaction	0.15* (0.07 to 0.23)			0.11 (-0.18 to 0.38)		

\*p <0.05; \*\*p < 0.01; \*\*\*p < 0.001

Note: CI, confidence interval; Coeff, standardized coefficient; Control variables includes age, gender, marital status, number of chronic diseases, number of children and household income





35 Figure 1. Standardized estimates of the path model with adjustment (r-squared = 0.30). Only statistically significant paths are shown.

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37 \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$