

# Living Arrangement and its Association with Residential Needs of Community-dwelling Older Adults in China

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## Abstract

**Background:** In China for decades, the most desirable living arrangement for older adults has been held to be the traditional multigenerational household. However, along with the growing economy and dramatic social changes, Chinese older adults' living arrangement could have changed as well. The present study examined and compared the patterns and correlates of actual and preferred living arrangement of Chinese community-dwelling pre-old and old, and investigated the association between their residential needs and living arrangement preferences accordingly.

**Methods:** Nine hundred and forty-seven community-dwelling participants from three typical metropolises as Shenyang, Wuhan, and Guangzhou were enrolled and included in the final data analyses. Self-reported scales were used as measurement tools for older adults' demographics, actual and preferred living arrangement, and residential needs.

**Results:** We found a high proportion of coresidence in both actual 54.8% and preferred 48.5% living arrangement in Chinese pre-old and old. The main impact factors for realities were marital status and income, while for preferred living arrangement it was education level. Moreover, older adults' living arrangement preferences had different association patterns with residential needs, in which four dimensions of perceived housing-safety, accessibility, relatedness, and leisure were more cherished by elderly living separately from children compared to those who live with children.

**Conclusions:** The present study showed that throughout the tremendous social-economic changes happening in contemporary China, living with children was still the first choice for Chinese older adults in both actual and preferred situations. Moreover, older adults' living arrangement preferences had different association patterns with their residential needs, in which elderly who prefer to live separately from children attached more importance to all the safety, accessibility, relatedness, and leisure aspects of housing. The present study makes substantial contributions to the understanding of the living arrangement issue in China, and such knowledge sheds light on the conceptual and practical meanings of housing, elder care and health in old age.

**Keywords:** China; Aging; Living arrangement; Coresidence; Residential needs

## Living Arrangement and Its Association with Residential Needs of Community-Dwelling Older Adults in China

China, as a developing country in its rapid socioeconomic transition era, is aging at its fastest rate ever. The age-related issues attracted concerns of society and government, and one fundamental aspect is the living arrangement issue for elderly. The most desirable living arrangement for Chinese has been held to be the traditional multigenerational household [1]. For some 2,500 years, Chinese people followed the Confucian doctrine of filial piety, placing emphasizes on family ties and intergenerational bonds. The coresidence living arrangement has special importance to the Chinese older adults [2,3].

However, along with China's modernization and urbanization, the traditional living arrangement pattern could have been changed. Open policies, stable political environments, and rising incomes of family provided the possibility of separated households for different generations. According to the national censuses from years of 1982, 1990 and 2000, coresidence rate as older adults living with their children declined gradually [4]. The China Health and Nutrition Longitudinal Survey conducted in eight provinces also found that there was a trend of decline in coresidence from 1991 to 1997 [5]. Living arrangement changes between generations, therefore, sampling time is very important for the illustration of this transformation. Most of the related studies are based on the Chinese Longitudinal Healthy Longevity

Survey (CLHLS) [6], with data waves before 2005. Community-based investigations conducted after 2012 are rarely reported.

Other than the economic transition, social norms changed as well. Nowadays, filial piety is more often thought of as one traditional virtue while less thought of as obligations by both adult children and their parents [7-9]; thus, the separate living arrangement has become increasingly acceptable. These value-orientation changes tend to reduce the need for coresidence, while they increase the desire for independence from both parents and their adult children [10]. Thus, the observed high proportion of coresidence could be a response to practical constraints in reality, and cannot fully reflect people's expectation changes dictated by the ideological shifts. Limited preliminary work had ever investigated the association

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between older adults' actual and preferred living arrangements, including their correlates.

The residential needs of the elderly are another variable that can interact with the pattern of living arrangement. Early studies mainly focused on the objective housing characteristics, such as lighting, temperature, ventilation, noise, etc., trying to illustrate variables that may be of particular importance for older adults [11-13]. Recently, researchers have shown an increased interest in the subjective or perceived aspects of housing [14-17]. Other than directly measuring housing satisfaction using one single question, multiple meanings attached to home, such as the physical, behavioral, cognitive, emotional, social aspects of ones' living arrangement have been studied [18]. Previous research concerning the elderly's perceived housing has been mostly conducted in Western countries, whereas Chinese elderly's perceived aspects of housing is less known. In the present study, residential needs were measured based on the framework of the perceived housing, which was developed to assess the older individual's objective and subjective meanings of home [16]. Safety, accessibility, relatedness, and leisure, these four pillars were taken into account in the current study. Safety is the basic need for housing in old age due to its critical importance. Accessibility represents the relationship between people's functional capacity and the environmental barriers in the home [19]. Accessibility of the house allows people to feel autonomous, which is one essential aspect of basic psychological needs [20]. Relatedness concerns the closeness to others and the desire for social connections and support in the community. The social environment can facilitate or forestall people's welling-being by supporting versus thwarting people's relatedness needs [21]. Leisure is perceived as the extent to which people evaluate the housing and community fulfilling their competence for recreational activities.

In sum, the patterns and correlates of Chinese older adults' living arrangement have received some research supports, but few if any studies have been conducted in very recent years. Furthermore, very few previous studies have ever investigated the association between elderly's residential needs and their living arrangements preferences. The main objectives in the present study were: (1) to examine the patterns and correlates of actual living arrangements of Chinese community-dwelling elderly in very recent years; (2) to examine the pattern and correlates of preferred living arrangements, and to explore its concordance with their actual living arrangements; (3) and most importantly, to investigate elderly's residential needs and its association with their living arrangement preferences.

## Method

### Participants

Mainland China is considerably heterogeneous in culture, living conditions, and industrialization across different regions, which could influence older adults' living arrangement. In present study, three typical metropolises, Shenyang, Wuhan, Guangzhou representing the north, central, and south region of mainland China, were selected. Rural areas in these regions were not included in current study (Figure 1). It is a sampling of older adults living in the commercial housing in urban which were built in the first wave of commercial community in China around 1990s.

Two communities from Shenyang, two communities from Wuhan, and four communities from Guangzhou were then selected from which to recruit the participants. The sampling was stratified with geographical region: age, sex, and educational level as strata according

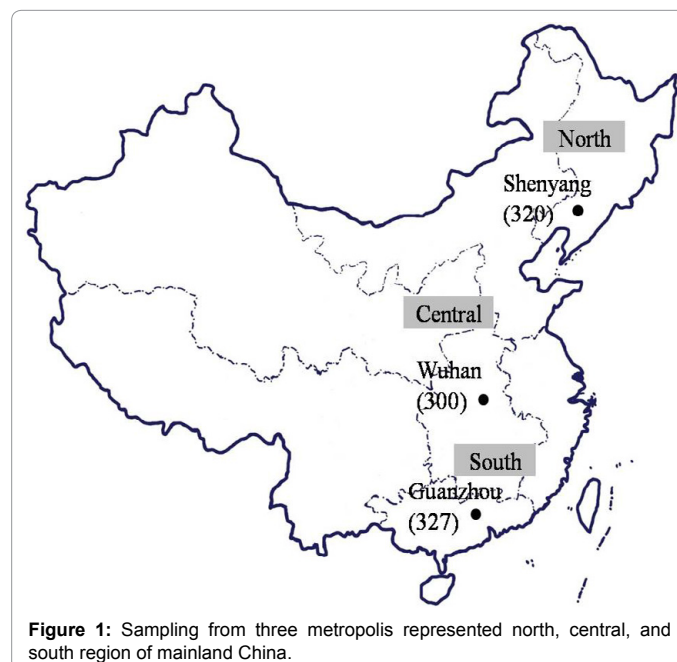


Figure 1: Sampling from three metropolis represented north, central, and south region of mainland China.

to the resident distribution provided by each census of the community center, then convenience sampling was applied within each stratum. Residents listed in the census of the community center who were 50 or older were randomly contacted for participation. In each city, 350 residents were contacted and required to fill in the questionnaire and returned it within one week. In total, 320 participants in Shenyang, 300 participants in Wuhan, and 327 participants in Guangzhou completed and returned the questionnaires, yielding a response rate of 90.2% overall and a rate of 91.4%, 85.7% and 93.4% respectively. Eventually, 947 community-dwelling participants from these three cities were enrolled and included in the final data analyses.

This study was approved by the ethics committees of the Institute of Psychology, Chinese Academy of Science. Informed consent was obtained from each participant.

### Measures

The questionnaire contained three sections measuring participants' demographic characteristics, preferred living arrangement, and residential needs, respectively.

**Demographic information:** The demographic information contains data on participants' characteristics such as age, sex, education, marital status, monthly income, health status, living city, and current living arrangement. All the demographic data were collected as categorical variables.

**Preferred living arrangement:** The preferred living arrangement was asked as "Your ideal living arrangement for elderly life is: (1) Living with children, (2) Living separately from children while supported by family or community, (3) Living in senior housing and supported by relevant agencies." For ease of expression, the three possible responses are referred to as preferring "live with children," "live separately from children," and "institutionalized" respectively.

**Residential needs:** Elderly's potential residential needs were measured based on the theoretical framework of perceived housing. Participants were instructed to evaluate the importance of the statements

as their personal thoughts regarding the ideal residential conditions for elderly life on a five-point scale, and the rated importance is indicative of corresponding residential needs.

**Safety:** Safety concerns were assessed by a five-item scale. Two items measured the safety characteristics in the interior dwelling (safe devices/ alarm system), two items measured the safety characteristics in the exterior dwelling (security in the neighborhood/ community medical service), and one item asked about the safety characteristic in both interior and exterior dwelling (non-slip surface) (Cronbach's alphas = 0.75).

**Accessibility:** Accessibility was measured by an eight-item scale. Four items investigated the activity aspect, i.e., the importance of the home being suitably designed for daily life activities (visiting the toilet/ cooking food/ using elevator/ taking care of flowers or pets), and four items evaluated the environment aspect, i.e., the importance of the home being suitably designed for the access to daily life-related environments (hospital/ bank/ supermarket/ park) (Cronbach's alphas = 0.76).

**Relatedness:** Relatedness was measured by a five-item scale. Three items investigated the importance of social connections with others in the community (neighbors/community management staff), and two items investigated the importance of the home being suitably designed for social activities (Cronbach's alphas = 0.68).

**Leisure:** The leisure aspect was examined by a four-item scale, with items evaluating the importance of the home being suitably designed for recreational activities (recreational resources/ centers for senior/ fitness facilities) (Cronbach's alphas = 0.67).

## Analysis

The number and percentage of each sub-category in demographic

variables were presented to illustrate the sample distribution, including sex, age, marital status, education, health status, monthly income, living city, and current living arrangement. Living arrangement preference and its concordance with living arrangement in reality were presented using descriptive statistics. Binary logistic regressions were constructed to estimate odds ratio (OR) and 95% confidence interval (CI) of different choices and preferences for actual and preferred living arrangement associated with all the selected demographic characteristics, taken living separately from children as the reference category. Differences of residential needs (safety, accessibility, relatedness, and leisure) by different preferred living arrangement groups were analyzed with analysis of variance (ANOVA). All statistical analyses were conducted using SPSS 16.0 (IBM Corporation, Somers, NY).

## Results

### Respondents' characteristics and their current living arrangement

A total of 947 respondents' demographic characteristics and the current living arrangement are summarized in Table 1. As seen from Table 1, the sampling seems to be in agreement with demographic distribution in the Chinese general population, in which the older adults are more likely to be around 60-69 years old, married, have low education level (below 12 years), in good health, have low family monthly income (below 4000 CNY, equals about 644 USD), and live with their children.

As for the living arrangement, the results revealed that the majority of respondents live with their children, while the proportion of other living arrangement patterns, such as living with spouse only, living alone or with others were much less. This living arrangement distribution

| Demographics                      | Sub-categories                        | Number | Percentage (%) <sup>a</sup> |
|-----------------------------------|---------------------------------------|--------|-----------------------------|
| Sex                               | Male                                  | 455    | 48.1                        |
|                                   | Female                                | 490    | 51.7                        |
| Age                               | 50-59 years                           | 229    | 24.2                        |
|                                   | 60-69 years                           | 431    | 45.5                        |
|                                   | 70 years+                             | 283    | 29.9                        |
| Marital status                    | Married                               | 825    | 87.1                        |
|                                   | Single (widowed, divorced, unmarried) | 117    | 12.4                        |
| Education                         | 0-9 years                             | 307    | 32.4                        |
|                                   | 10-12 years                           | 369    | 39.0                        |
|                                   | 13 years+                             | 266    | 28.1                        |
| Health status <sup>b</sup>        | Good health                           | 691    | 73.0                        |
|                                   | Fair or poor health                   | 230    | 24.3                        |
| Monthly income (CNY) <sup>c</sup> | ¥ 0-2000                              | 204    | 21.5                        |
|                                   | ¥ 2001-4000                           | 407    | 43.0                        |
|                                   | ¥ 4001+                               | 317    | 33.5                        |
| Living city                       | Shenyang (north region)               | 320    | 33.8                        |
|                                   | Wuhan (central region)                | 300    | 31.7                        |
|                                   | Guangzhou (south region)              | 327    | 34.5                        |
| Living arrangement <sup>d</sup>   | Living with children                  | 519    | 54.8                        |
|                                   | Living with spouse                    | 354    | 37.4                        |
|                                   | Living alone or others <sup>e</sup>   | 71     | 7.5                         |

<sup>a</sup> The totals may not add to 100% because there were non-responses for some categories.

<sup>b</sup> Health status was measured by a self-rating item including *healthy*, *fair*, *minor illness*, and *serious illness* four options. Fair to serious illness was merged in one category due to its low proportion.

<sup>c</sup> Monthly income is defined as the couple's income if married or one's own income if single.

<sup>d</sup> Respondents living with both children (including children in law) and spouse were classified in the category of Living with children.

<sup>e</sup> 'Living alone or others' includes elderly living alone, living with relatives beside children and spouse, or living with unrelated persons.

**Table 1:** Distribution of the sample.

was similar to the sixth national population census in 2010 in which 58.8% of citizens were found living as inter-generational arrangements (Data reported by the sixth national population census official website in 2012, from <http://www.stats.gov.cn/tjsj/pcsj/rkpc/6rp/indexch.htm>).

### Living arrangement preference and its concordance with living arrangement in reality

Nearly half of respondents (48.50%) preferred coresidence with children as their ideal living arrangement for elder care, while 44.80% preferred living separately from their children and only 6.70% preferred living in institutions. Furthermore, we analyzed the concordance between the actual living arrangement and the preferred one. Details of each concordance and discordance were shown in Table 2. The data showed that the concordance among those in the most common patterns, namely living with children or spouse, was fairly high,

| Actual living arrangement                 | Preferred living arrangement |                      |                                 |                          |
|---|------------------------------|----------------------|---------------------------------|--------------------------|
|   |                              | Living with children | Living separately with children | Living in senior housing |
| Living with children (n = 516)            | n                            | 307                  | 168                             | 41                       |
|   | %                            | <b>59.50</b>         | 32.56                           | 7.95                     |
| Living separately with children (n = 349) | n                            | 124                  | 212                             | 13                       |
|   | %                            | 35.53                | <b>60.74</b>                    | 3.72                     |
| Living alone or others (n = 70)           | n                            | 24                   | 37                              | 9                        |
|   | %                            | 34.29                | 52.86                           | <b>12.86</b>             |

<sup>a</sup>The concordance percentages were in bold.

**Table 2:** The concordance <sup>a</sup> of actual living arrangement and preferred one.

whereas the discordance mainly existed in the option of living alone, shown as 87.15% of those respondents who live alone or with others in reality would prefer to live with children or a spouse as ideal living arrangement. Meanwhile, the concordance in living with children (59.50%) and living separately from children (60.74%) was very similar.

Overall, the majority of Chinese older adults preferred to live with their family, even those who currently lived alone or with others also preferred to live in a more traditional way, namely with their children or spouse.

### The correlates of older adults' actual and preferred living arrangement

Although the acceptance of institutional care is rising, living in the institutions has not been a mainstream arrangement in China yet [22]. A more interesting question concerns the differences of older adults who live with or prefer to live with their spouses only, compared with those who live with or prefer to live with their children for elder care.

In the binary logistic regressions, taking living separately from children as the reference category, different correlates were found of actual and preferred living arrangement. Among the demographics, the variable of marital status, monthly income and living city were significantly associated with the actual living arrangement, shown that people who were married, have higher monthly income and live in Wuhan or Shenyang are mostly like to live separately from their children. Meanwhile, regarding the preferred living arrangement, people who have higher education level and live in Wuhan and Shenyang are mostly like to live separately from their children (Table 3). The most interesting

| Demographics         | Sub-categories      | Living arrangement (LA) <sup>c</sup> |                     |               |            |
|----------------------|---------------------|--------------------------------------|---------------------|---------------|------------|
|                      |                     | Actual LAs                           |                     | Preferred LAs |            |
|                      |                     | OR <sup>a</sup>                      | 95% CI <sup>b</sup> | OR            | 95% CI     |
| Sex                  | Female              | 1.00                                 | Ref.                | 1.00          | Ref.       |
|                      | Male                | 1.18                                 | 0.85-1.65           | 0.77          | 0.57, 1.04 |
|                      | p for linear trend  | 0.321                                |                     | 0.089         |            |
| Age                  | 50-59 years         | 1.00                                 | Ref.                | 1.00          | Ref.       |
|                      | 60-69 years         | 0.91                                 | 0.61-1.36           | 0.96          | 0.67, 1.38 |
|                      | 70 years +          | 1.31                                 | 0.82-2.07           | 1.42          | 0.93, 2.15 |
|                      | p for linear trend  | 0.199                                |                     | 0.082         |            |
| Marital status       | Single              | 1.00                                 | Ref.                | 1.00          | Ref.       |
|                      | Married             | 16.53                                | 5.58-48.94          | 1.49          | 0.92, 2.40 |
|                      | p for linear trend  | < 0.001                              |                     | 0.102         |            |
| Education            | 0-9 years           | 1.00                                 | Ref.                | 1.00          | Ref.       |
|                      | 10-12 years         | 0.73                                 | 0.48-1.10           | 1.40          | 0.97, 2.00 |
|                      | 13 years+           | 0.64                                 | 0.41-1.02           | 2.24          | 1.48, 3.39 |
|                      | p for linear trend  | 0.157                                |                     | < 0.010       |            |
| Health status        | Fair or poor health | 1.00                                 | Ref.                | 1.00          | Ref.       |
|                      | Good health         | 0.99                                 | 0.67-1.46           | 1.32          | 0.94-1.87  |
|                      | p for linear trend  | 0.958                                |                     | 0.110         |            |
| Monthly income (CNY) | ¥ 0-2000            | 1.00                                 | Ref.                | 1.00          | Ref.       |
|                      | ¥ 2001-4000         | 2.59                                 | 1.57-4.26           | 1.04          | 0.70-1.55  |
|                      | ¥ 4001+             | 3.69                                 | 2.16-6.28           | 1.32          | 0.84-2.06  |
|                      | p for linear trend  | < 0.001                              |                     | 0.327         |            |
| Living city          | Guangzhou           | 1.00                                 | Ref.                | 1.00          | Ref.       |
|                      | Wuhan               | 4.46                                 | 2.97-6.70           | 2.69          | 1.88-3.85  |
|                      | Shenyang            | 9.86                                 | 6.42-15.14          | 1.82          | 1.26-2.63  |
|                      | p for linear trend  | < 0.001                              |                     | < 0.001       |            |

<sup>a</sup>OR, odds ratio.

<sup>b</sup>CI, confidence interval.

<sup>c</sup>In the binary logistic regressions, living separately with children was taken as the reference category.

**Table 3:** The potential correlates of Chinese older adults' actual and preferred living arrangement.

| Four- dimension residential needs | Preferred living arrangement for elder care ( <i>M ± SD</i> ) |                                 |                   | <i>F</i> | <i>p</i> |
|-----------------------------------|---|---------------------------------|-------------------|----------|----------|
|                                   | Living with children  | living separately with children | Institutionalized |          |          |
| Safety                            | 4.53 ± 0.57   | 4.64 ± 0.54                     | 4.69 ± 0.51       | 5.65     | < 0.010  |
| Accessibility                     | 4.09 ± 0.71   | 4.22 ± 0.60                     | 4.32 ± 0.55       | 6.76     | < 0.010  |
| Relatedness                       | 4.27 ± 0.63   | 4.42 ± 0.56                     | 4.42 ± 0.55       | 6.89     | < 0.010  |
| Leisure                           | 4.14 ± 0.72   | 4.26 ± 0.67                     | 4.16 ± 0.76       | 3.25     | < 0.050  |

**Table 4:** The differences of preferred living arrangement for older adults on the importance of residential needs.

result is that in reality the economic status, measured by the monthly income, plays an important role in the actual living arrangement. However, in the ideal situation the variable of education influences the older adults' preferred living arrangement.

### Residential needs and the role of preferred living arrangement

The four dimensions of perceived housing were all rated above 4 on a five-point Likert-type scale, indicating the special importance of these aspects of housing for elderly. The cross-dimensional differences were significant ( $F(3, 3675) = 85.55, p < 0.001$ ); the rated importance of safety was highest ( $ps < 0.001$ ), followed by the importance of relatedness ( $ps < 0.001$ ), and the comparison between accessibility and leisure did not reach the significance ( $p = 0.236$ ).

Table 4 presents the means, standard deviations, and ANOVA results in each dimension of residential needs by different living arrangement preference groups. Results showed that all four dimensions of residential needs had significant between-group differences. Moreover, the group differences still exist even after controlling the confounding variable of education and monthly income. Further analysis showed that elderly who prefer to live separately from children attached more importance to all the four dimensions of housing compared with those preferring to coreside with children ( $ps < 0.010$ ), indicating older adults living separately with children emphasized more on each aspect of perceived housing when the supports from children are comparatively unavailable.

### Discussion

Unlike Americans' strong preference to live independently and reside in the community for as long as possible [23], Chinese older adults primarily received care from their children or other family members, particularly through coresidence. The present study revealed that over half of investigated Chinese pre-old and old live with their children, and over forty percent of them chose coresidence as the most desirable living arrangement for elder care. Interestingly, the correlates of living arrangement were different between actual and preferred situations. Specifically, the main impact factors for realities were marital status and income, while for preferred living arrangement it was education level. Moreover, the results of the present study showed that older adults' living arrangement preferences had different association patterns with residential needs, in which elderly preferring to live separately from children put more emphasis on all the four dimensions of perceived housing, compared with older adults coresiding with children.

In the present study, we found a high proportion of coresidence with children in the Chinese pre-old and old population. Evidence indicates that pre-1949, most of Chinese older adults lived with their family, and China took this living arrangement pattern as a major support for elder care [23]. However, as proposed by modernization theory, the industrialization, urbanization, and improved living condition could change the social norms and consequently transform the family structure from an extended to a nuclear form [24]. Accordingly, both national census and earlier empirical research reported a growing acceptance of living separately from adult children in contemporary

China. The proportion of three-generation families was estimated to be around 49% in 1930 and changed to 20-30% in 1980 [25]. This dramatic declining of coresidence could be attributed to the economic reforms and the one-child policy adopted by Chinese government in the late 1970s [26]. However, after the 1990s the rate of change of living arrangement slowed down. Based on the fifth 2000 and sixth 2010 national census the proportion of two-generation living arrangements changed from 58.13% to 47.16%, and the proportion of three-generation (and over) changed from 13.49% to 11.67%. Meanwhile, the proportion of coresidence found in our study is similar to the previous empirical studies conducted after the 1990s (37.10% - 41.50%; [26] 61.30%; [27] 57.00% [28]), which indicates that, although the level of coresidence declined to some extent, coresidence continued to be an important and high proportion living arrangement pattern in contemporary China. The coresidence pattern is surprisingly stable over the last two decades throughout the social changes that have happened in China. In addition, we found that the proportion of coresidence with children as the preferred living arrangement was lower than the actual one (48.5% vs. 54.8%). This finding underlines the hypothesis that the ideological shifts could change individuals' thoughts on living arrangement. Some elderly would prefer live independently from their children for their hypothetical elder care as the ideal situation, even if the reality has constraints.

Previous research examining the correlates of living arrangement among Chinese elderly found that marital status [26,28,29], sex [29,30], number of children [10,31], socioeconomic status [32], and education [10,33] influence the pattern of living arrangement significantly. However, the findings were not completely consistent, and some of the research observed no socioeconomic status [30] or education [28] differentials. The discrepancies among the studies may be due to the adopted living arrangements, measurements of relative correlates, potential regional differences, and most importantly, the cohort effect. Moreover, limited research has ever discussed the concordance of older adults' actual and preferred living arrangement. Using CLHLS data setting, Sereny (2011) illustrated this point in depth, and found relatively high living arrangement concordance (coresidence with children concordance, 57.15%). Specifically, the older Chinese minority are more likely to prefer coresidence, while people with higher socioeconomic status and greater resources are more likely to prefer living independently. The present study showed that actual living arrangement was highly predictive of preferred one (above 60%), which was consistent with Sereny's findings. From the binary logistic regressions, it is interesting to note that in reality, compared to coresidence, older adults living separately from children were more likely to have healthy marital status, have better monthly income, and live in northern (Shenyang) or central (Wuhan) part of China. However, with respect to the preferred living arrangement for elder care, older adults with higher educational level and who live in the northern or central part of China were more likely to live separately from their children. The most notable discrepancy of correlates between actual living arrangement and preferred one was that economic status played an important role in reality, whereas in preference, education was a stronger predictor

than income. This result may be explained by the fact that older adults in China are not financially prepared to live by themselves, which can be described by a popular Chinese saying “old before getting rich or prepared.” That said, Chinese older adults’ actual living arrangement was not dictated fully by their desire, but in fact could be limited by practical constraints. In contrast, in their preference choice which could be partially eliminated by the limitation of reality, the education level played a dominant role; individuals with higher education level were more likely to live independently. This study also evidenced geographic differences in both the actual and preferred living arrangement, shown as older adults in Guangzhou having higher coresidence rates than the other two cities in the north and central part of China. A possible explanation is that Guangzhou is among the first group of cities that have benefitted from the reform and opening policies. As it has greater economic resources and privileges than the other regions of China, many small and medium size enterprises developed there during the last half century. Previous research indicates that both parents’ and children’s entrepreneurial status has been strongly correlated with coresidence, which was interpreted as an indication of the integration of resources [34,35].

Using the empirical process, we investigated people’s residential needs and their association with their living arrangement. With respect to preferred living arrangement, group differences were found in all the four dimensions of residential needs, even after controlling for the variables of education and monthly income. As discussed above, the practical constraints could be one confounding variable that limits respondents’ choices in reality. Since the living arrangement preference also reflects people’s needs to some extent, it should draw more attention when discussing the association with residential needs. The dynamic balance of person-environment-activity transitions (P-E-A) is of critical importance to older adults’ daily life in their homes [36]. Along with age-related declining of physical and cognitive function, the environment could cause pressures for older adults, mainly concerning the safety, accessibility, the circles of social connections, and their leisure activities. Therefore, in the present study we found that older adults, with different living arrangement preferences, all give great emphasis on these dimensions of housing (above 4 on a 5-point scale). Meanwhile, we also found that older adults who prefer to live independently from children have more concerns about both objective and subjective functions of their homes, compared with those coresiding with children. One possible explanation is that older adults preferring living independently could be challenged by the losing of children’s direct support obtained through traditional coresidence. As Cognitive Dissonance Theory proposed, at such a stage, people may try to change their beliefs, opinions, or behaviors involved in the dissonance to acquire new balance [37]. Therefore, the elderly without children’s support through coresidence may place more emphasis on both subjective and objective perceptions of housing to attain the comparable quality of living. This can be a self-protective strategy for coping with the traditional elder care transformation.

This study has several limitations. First, the categorical analyses of socio-structural variables such as age may compromise the statistical ability to a certain extent, therefore losing some potential information. In addition, the study was only conducted in urban communities, while rural-urban differences in economy and culture could affect local residents’ living arrangement and residential needs. Sampling stratified from more diverse regions, such as rural areas and old towns, is needed in the future studies.

## Conclusions

This study adds to the growing body of literature examining the patterns and correlates of living arrangement and its impact on residential needs of the pre-old and old in China. The results showed that throughout the tremendous social-economic changes happening in contemporary China, living with children was still the first choice for Chinese older adults in both actual and preferred situations. As for the correlates of living arrangement, it is interesting to find that the main impact factors for the actual situation were marital status and income, while for the preferred situation it was education level. Moreover, the results of the present study found that older adults’ living arrangement preferences had different association patterns with residential needs, in which elderly who prefer to live separately from children attached more importance to all the safety, accessibility, relatedness, and leisure aspects of housing.

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## Authors’ contributions

JY and JL conceived the study design. JY participated in the data collection, performed the statistical analysis, and drafted the manuscript. JL is the principal investigator of this project, and supervised the statistical analysis and the manuscript writing and revision. ZY had helped to draft the manuscript and made significant revision of it. All authors read and approved the final manuscript.

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