AN ABSTRACT OF THE THESIS OF

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Title: Perceptions of Senior Cohousing by Older Adults in China

Abstract approved:

Seunghae Lee

Purpose of the Study:

The researcher investigated Chinese older adults' (defined here as 50 and over) housing needs and evaluated their perceptions on senior cohousing. The main purposes of the project were to understand the basic and long term housing and elderly care demands of older adults; to identify desirable amenities and services in the community; and to identify various services and design features that help to support the physical and social well-being of older adults. Based on the findings of this study, the researcher offers insight into the services and design features needed to sustain the well-being of older adults in China.

Methods:

The participants were recruited through either email or social network. Then, the survey URL was distributed through the recruitment email. Chinese older adults (N = 397), ages 50 or over, completed a structured, self-administrated online survey in Chinese. Data were collected as a cross-sectional study. Statistical analyses were conducted to

examine demographic data, evaluate participants' general preference for retirement housing and services, and assess participants' perceptions of senior cohousing formation and their desirable design features. In addition, inferential statistical analyses were performed to evaluate differences, associations, and relationships among variables.

Major Findings:

In this study, the participants consist of 75% females and 35% males. The age composition of the survey participants are predominantly represented (75%) by older adults ages between 50 and 59. The vast majority of the survey participants (89%) are married. The survey participants' educational attainment is much higher than the national average education level in China, with 61% participants who had completed higher education. In this study, the average household size is 3.14 (SD = 0.74).

Fifty-eight percent of the participants indicated that they would prefer aging in place, while a quarter of the participants indicted that they would like senior cohousing community. Factors such as gender, household size, and education level were most likely to influence the kind of facility that the older adults would seek for retirement. More males preferred aging in place, while more females liked senior cohousing. The desire for aging in place increased with household size, while the desire for senior cohousing decreased with household size. One or two-person households were more likely to consider senior cohousing. The desire for senior cohousing progressively increased with educational attainment, while the desire for aging in place decreased with educational attainment overall.

The majority of survey participants preferred to live in cities regardless of age, gender, and educational attainment. Yet, the desire for living in suburban areas gradually increased with educational attainment, while desire for rural areas decreased with educational attainment. For participants' preference on type of housing, apartments and townhouses were more popular than single family houses among participants.

Not surprisingly, household size influenced the number of bedrooms preferred by participants. In general, participants preferred a number of bedrooms that was generally equal to or greater than their household size. Overall, two bedroom units were most desirable among participants.

For retirement housing, survey participants selected full bathroom, full kitchen, living room, elevator, and washing machine in unit as the five most important amenities beside bedrooms. When considering the most important community amenities, participants selected hospital, walking paths/outdoor space, and public transportation. Light housekeeping, transportation, and outside maintenance were selected as the top three services they would prefer.

Participants were asked their preferred method for recruiting community members. Ninety-two percent of the participants indicated that they would like to form a group of interested community members with friends or acquaintances, rather than recruit people by signing up on a list published on newspaper or social media. Seventy-one percent of the participants indicated that they would consider government programs for land requisition, while thirty-six percent indicated that they would find support from real

estate developers. The majority of the participants (61%) indicated that they would prefer to live in a senior cohousing community with fewer than twenty households.

The majority of the participants selected walking paths/outdoor space (89%) and flower/vegetable gardens (67%) as the most critical amenities for senior cohousing complexes. Central kitchens and dining rooms (78%) and TV lounge/reading rooms (67%) were chosen as the most important features that the common house should offer. For important private unit features in senior cohousing, a private patio or balcony was selected by 74% of the participants. High speed internet, security system, and washing machine in the unit were chosen by 57%-64% of the participants. A non-slip floor (79%) and personal emergency response system (78%) were the two most selected safety features. In addition, the majority of the participants selected no-step entry, sliding clothes drying hangers, grab bars in the shower and around the toilet, a roll-in shower with a seat, extra-wide hallways and doors, and level-style handles on doors and faucets as important accessibility features. In general, females were more concerned about safety and accessibility features.

Conclusions:

Aging in place was the preference of majority of the participants. Findings in this study also revealed that senior cohousing was an attractive option for the participants who want to live independently as long as possible. Through investigating the perceptions of senior cohousing by older adults in China, a conclusion is that senior cohousing in urban or suburban would be attractive to Chinese older adults. Moreover, apartment or townhouse style housing containing private units with one and two

bedrooms were considered to be desirable by Chinese older adults who are interested in living in a senior cohousing facility. Furthermore, gender was an important factor that influenced choices on living region, type of aging facility, type of housing, and design features. Thus, the differences by gender should be considered when gender composition is an issue in a particular retirement community.

Based on the desirable community amenities and features identified in this study, neighborhood walkability should be incorporated into senior community planning in China. In addition, future retirement housing development in China should consider incorporating housing amenities, community services, and safety and accessibility features that were selected as important by the participants. The findings of this study can be an asset in the evaluation of new senior housing developments in China.

Perceptions of Senior Cohousing by Older Adults in China

by

Yujuan Song

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In understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Yujuan Song, Author

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Chapter 1

Introduction

China's older population has unprecedented growth as the result of rising life expectancy and a sharp decline in fertility rates. By 2050, the population of adults aged 60 and over will increase from 178 million in 2010 to 480 million; the proportion of adults aged 60 and over is projected to reach 34.6%, 21% higher than in 2010 (Chen & Liu, 2009; Zhai, 2015). How to deal with the significant challenge of a rapid aging population has become a major issue for the Chinese in the twenty-first century.

For thousands of years, family had provided basic care and companionship for Chinese elderly. However, due to rapid industrialization and the one child policy, the structure of the conventional support system is quickly changing. The industrialization in China has provided many opportunities for its people, especially young adults. Many young adults have left home to pursue economic prosperity in the highly industrialized urban areas. Thus, the traditional intergenerational family support system has weakened substantially in the last three decades. Moreover, China has experienced rapid fertility decline since the implementation of one-child policy in the 1970s. Consequently, the low birth rate further leads to a reduction of family size over time. Care for the elderly provided by family is increasingly less feasible (Banister, Bloom, & Rosenberg, 2011;

Chen & Liu, 2009). Li and Chen (2011) showed that the vast majority of the elderly population currently live alone and are in need of the physical and social support formerly provided by family. As the elderly population continues to grow and the availability of family caregivers decreases, more elderly will need to seek alternative living and care.

Subsequently most current housing does not accommodate for the physical and cognitive challenges that arise with aging (Cheng, Rosenberg, Wang, Yang, & Li, 2011). It has been estimated that much of the China's housing inventory is designed for functionally independent persons and lacks basic accessibility features (Ikels, 1991). This prevents older adults with disabilities from living safely and comfortably in their own homes and communities. Researchers have confirmed that satisfaction with aging depends on the type of local neighborhood environment and housing environment (Burton, Mitchell, & Stride, 2011; Gilroy, 2008; Lui, Everingham, Warburton, Cuthill, & Bartlett, 2009). Accessibility is essential to older adults' health and safety as physical and cognitive limitations increase. Therefore, the country is facing the problem of having to provide buildings and dwellings that will be suitable for use by older adults in the near future. Ensuring that these older adults have the housing they can enjoy independence and high-quality living has thus taken on new urgency not only for individuals and their families, but also for the nation as a whole (Cheng et al., 2010; Feng, Liu, Guan, & Mor, 2012).

Along with housing challenges, aging in modern society brings an even greater risk for isolation. A number of researchers confirmed the benefits of close social

relationships (Binstock, George, Cutler, Hendricks, & Schulz, 2011; Glass, De Leon, Bassuk, & Berkman, 2006; Street, Burge, Quadagno, & Barrett, 2007). Social networks can help people achieve what they could not achieve on their own such as better mental health and higher levels of physical activity (Christakis & Fowler, 2009). Yet social contacts tend to decrease as people age for a variety of reasons, including retirement, the death of friends and family, or lack of mobility.

There is a consensus that cohousing constitutes a pragmatic response to the challenges of living in contemporary society because the cohousing concept reestablishes many of the advantages of a traditional community but within the context of twenty-first century life. The Cohousing Association (n.d.) defines:

> Cohousing is an intentional community of private homes clustered around shared space. Each attached or single family home has traditional amenities, including a private kitchen. Shared spaces typically feature a common house, which may include a large kitchen and dining area, laundry, and recreational spaces. (para. 1)

As intentional, collaborative neighborhoods, cohousing communities are designed to encourage the development of a feeling of neighborhood and community. Therefore, this model affords friendly cooperation, socialization, mutual support, and a sense of belonging to the residents (McCamant & Durrett, 2011). In addition, cohousing cultivates a culture of sharing tasks and co-care. Thus, the environmental stress for each individual can be controlled at manageable level.

Furthermore, cohousing can be urban, suburban, or rural and designed to accommodate the various needs of different socioeconomic classes. Regardless its location, cohousing is designed by, or with considerable input from, its future residents. This resident participatory design process emphasizes consciously fostering social relationships among its future residents. Because each cohousing community is planned in its context, a key feature of this model is its flexibility to the needs and values of its residents and the characteristics of the site. Common facilities are based on the actual needs of the residents, rather than on what a developer thinks will help sell units (McCamant & Durrett, 2011). One of the goals of cohousing is to empower this community to create physical and social environments that allow people to flourish as they get older ("Aging in Cohousing" n.d.).

Senior cohousing takes the concepts of cohousing and modifies them according to the specific needs of seniors. A study by Brenton (2001) showed that senior cohousing addresses the challenge of aging in promoting continued independence, an active life, and mutual support by means of a self-help formula which should reduce demands made on caregiving and other local services. In addition to the advantages of community living, senior cohousing is also designed with basic accessibility features that help older adults live safely and comfortably in their own homes (Durrett, 2009). Evidently, senior cohousing is an attractive option for older adults who want to live independently as long as possible. While cohousing is not a solution for those suffering from serious medical conditions, it can be a very useful solution for people who merely need the occasional helping hand.

Problem Statement and Research Objectives

Since the 1970s when the first cohousing was developed in Denmark, senior cohousing has also flourished in Europe and North America for more than two decades. However, it is new to China. Despite the widely awareness of the potential benefits of senior cohousing in China, limited research on this subject has been pursued. As mentioned above, a shortage of caregivers and lack of accessible housing cause a senior care and housing crisis in China as the elderly population is projected to increase more than 20% by 2050. Thus, it is critical to investigate perceptions of senior cohousing among Chinese older adults in order to develop a more effectual design that would better serve to boost the comfort and welfare of older adults. With the aim of identifying the interests and needs for senior cohousing in China, this study was conducted with the following specific objectives: 1) to understand the basic and long term housing needs of older adults, 2) to identify desirable community or private amenities and services, 3) to explore the factors that may affect organizing and building a senior cohousing, 4) to identify various design features that help to support the physical and social well-being of older adults in cohousing, and 5) to examine relationships between participants' perceptions of housing and demographic factors.

Theoretical Approach

Environmental gerontologists state that as people age, they increasingly become attached to the place where they live as they age, but concurrently become more sensitive and vulnerable to their social and physical environment (Lawton, 1977; Lawton & Nahemow, 1973). In 1973, Lawton and Nahemow conceptualized that old age as a

critical phase in the life course which is profoundly influenced by the physical environment. As applied to the planning of services and housing for the changing needs of older adults, the ecological theory of aging indicates that a person would operate at his/her best when the environmental pressures are moderately challenging. When the environment is too demanding, individuals are unable to use their environment. When the environment is not demanding enough, there is boredom and deconditioning. In addition, the level of individual competence is expected to increase through training, service program, and a beneficial environment (Lawton, 1977). For example, accessibility and safety features, new housing solutions, and new technologies are able to support declining competences. A major goal of the ecological theory of aging is to explain and predict more effectively why some residential environments more than others better fit the needs and abilities of their residents and contribute to their better quality of life (Lawton, 1991). Therefore, the ecological theory of aging has been chosen as the conceptual basis to guide the design of this study. The researcher can balance the effects of individual capability, social factors, and environmental elements to meet the needs of older adults and enhance their well-being. On selecting the critical home and community amenities and important services, the ecological theory of aging offered a theoretical strategy to evaluate person-environment linkages, including: 1) linkage between residents' mental/physical competences and design features; 2) linkage between projected residents' health and design features for changing needs; 3) linkage between residents' mental/physical status and services.

Significance of the Study

The entire senior housing industry in China is still at a preliminary stage facing challenges such as a mismatch between supply, unclear macro and micro policies, and limited financial channels (Feng et al., 2012). The evolution of this market is unclear at this point. Using data collected from the senior cohousing perception survey in China, the findings of this study may provide useful suggestions to several key issues: 1) senior community planning; 2) assistance with senior-friendly developments and neighborhood improvements; 3) aid to design effective senior housing with close social relationship and accessibility accommodations.

Chapter 2

Review of Literature

Globally, population aged 60 or over is the fastest growing sector ("United Nations. World Population Prospects," 2015). With populations aging in nearly all countries, there has been widespread concern about the ability of countries to provide support for their elderly populations. As the world's most populous country, China has found resonance on this concern. Population aging generates many challenges to future economic growth, the operation and integrity of health care and pension systems, and the well-being of older adults. The ability to connect with social networks and access to proper local and housing environments are critical to the overall well-being of older adults. In this chapter, the researcher will examine population aging in China, traditional elder care and family support in China, changes in family structure and family roles in China, benefits of social networks, effects of built environment, current available housing for older adults in China, the ecological theory of aging, cohousing and senior cohousing, and senior cohousing design criteria.

Population Aging in China

Low birth rate and increasing life expectancy, combined with a series of family planning regulations, have influenced population aging in China. China experienced two birth peaks in the second half of twentieth century. The first peak started in 1949 after the Chinese Civil War. The second peak was after the Great Famine from 1959 to 1961. In 1979, China enacted the one-child policy to control the rapidly rising fertility rate. Since

then, the country has experienced rapid fertility decline. The one-child policy advocated that every couple gives birth to only one child to control the population increase as quickly as possible. As one exception, minorities who account for about 10% of the total population were exempted from this policy. In the ensuing three decades, one-child policy had reduced 400 million births (W. Feng, Cai, & Gu, 2013; Liu et al., 2015). In fighting against a rapidly aging population, China abolished the one-child policy in 2015. There were 17.86 million births in 2016, a 7.9% increase, according to National Health and Family Planning Commission (NHFPC). Nevertheless, the birth rate has not risen as expected since the launch of the two-child policy. The current fertility rate per Chinese women is 1.6 and about 75% of families are unwilling to have a second child because of financial reasons (Zhang, 2017).

At the same time, the country's life expectancy has increased dramatically. In 1949, the life expectancy in China was only 36 years. In 2015, it has increase to 76 years according to the World Health Organization ("Life Expectancy in China," n.d.). In conclusion, the rapid fertility decline combined with the increase in life expectancy has influenced China's fast population aging process. The population of China aged 60 and over is projected to climb from 178 million in 2010 to 243 million in 2020 and then to 480 million in 2050. In the meantime, greater longevity has already helped to expand the population aged 70 and over. A very large jump in the population of this age range is expected in 2010-2030. The number in this age range will rise by 57.5 million from 2010 to 2030 (a 68.5 percent increase), while that of individuals aged 80 and over will jump nearly 24 million (a 112 percent increase). Because older age groups will be growing more rapidly than younger age groups, their share of the overall population will also

increase sharply (Figure 1). In 2010, one in eight persons was at least age 60; by 2020, that share will be one in six; by 2050, the share will be one in three. The proportion of the elderly aged 60 or over will reach 34.6% in 2050 (Chen & Liu, 2009; Zhai, 2015; Zhang, Guo, & Zheng, 2012).

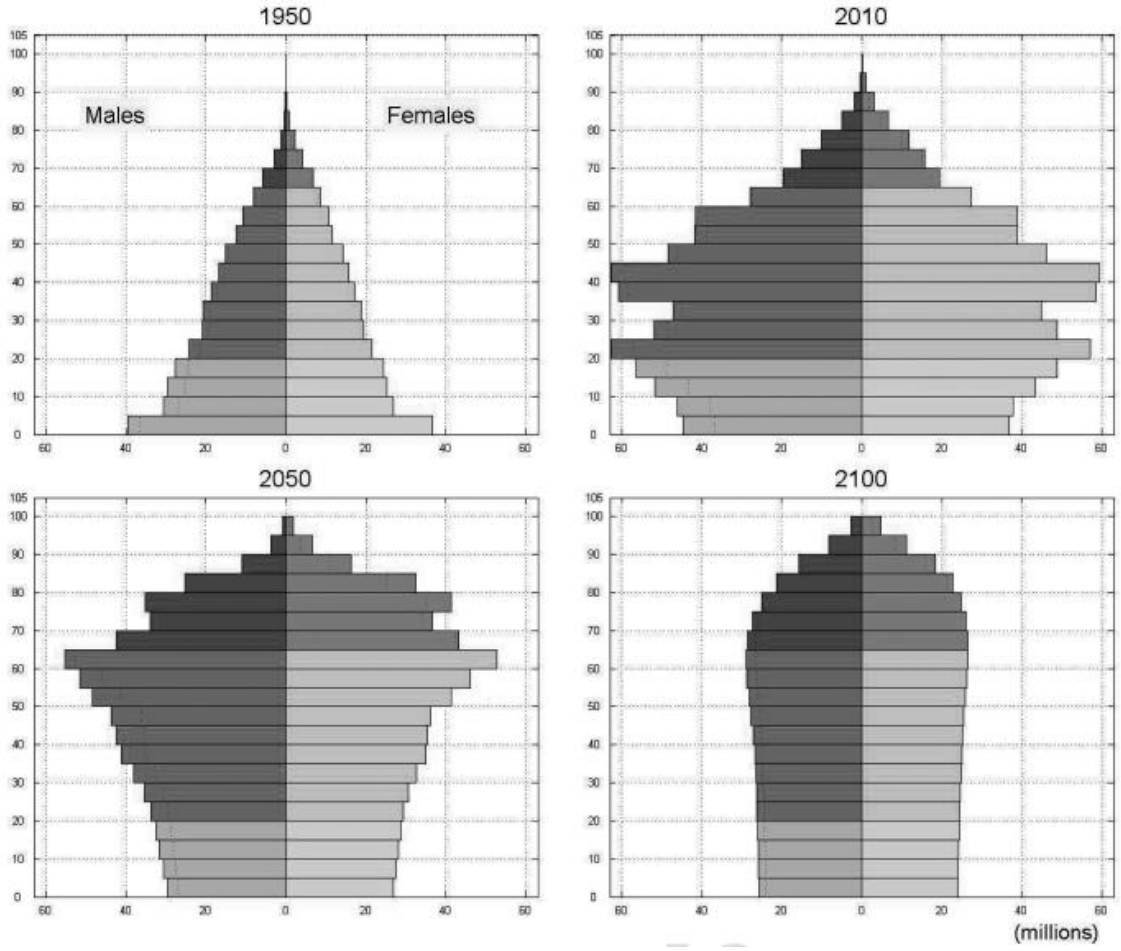

Figure1. Age structure of China's population (Zhang et al., 2012). *Source*: United Nations. World Population Prospects (2010).

The growth of the aging Chinese population - in terms of both number and share - is well on its way. However, the largest impacts of this demographic shift are still a decade or more off as millions more households reach the ages when physical, financial,

and social challenges increase sharply. There is still time for the nation to prepare for the evolving needs of older adults by expanding the supply of housing that is affordable, safe, and accessible; providing opportunities for older adults to connect socially yet live independently; and integrating housing and long-term care services to support those older adults in private homes. These changes will improve not only quality of life for older adults, but also the livability of communities for people of all ages.

Traditional Elderly Care and Family Support in China

Traditionally, elder care had been provided by adult children at home under the cultural norm of filial piety. The family in China was not only the most important social institution, but it also represented a whole codified ideology that pervaded the country and the society for thousands of years. The pillar of the Chinese family structure was the concept of filial piety. Filial piety, a primary virtue cultivated by Confucianism teaching, was a central value in tradition Chinese culture (Fei, Hamilton, & Wang, 1992). Filial piety means to reverence, completely obey, and care for parents and elderly family members during one's lifetime. Under filial piety value, adult children have traditionally been expected to provide caregiving for their parents. Furthermore, support for older adults was considered to be the foremost responsibility of the immediate family in China. Family members were the main source of physical, emotional, psychological, social, and financial support for older Chinese (Fei et al., 1992).

Many aspects of Chinese life can be tied to honoring one's parents or ancestors. Due to this focus on the family, it was common for Chinese, even when fully grown with their own children, to remain in their multigenerational family. Extended families

generally lived under the same roof or in the same compound and worked together on the family farm or in the family business. Moreover, in traditional Chinese culture, more children meant more prosperity, so the traditional household would hope for more children. Multigenerational households were a social norm in Chinese history. Usually, there were enough caregivers within the family to provide basic care and companionship for older adults (Fei et al., 1992; "Jordan: Traditional Chinese Family and Lineage," n.d.).

Nonetheless, family support and caregiving for older Chinese is being challenged due to social and value changes that occurred in recent decades. For instances, multigenerational families have been replaced by nuclear families; more married women are participating in the labor force; Western lifestyles have been adopted and honored widely. The way in which the elderly are regarded is changing in China, as witnessed elsewhere around the world. Traditional Chinese family structure and values do not hold a prominent position as seen in the past. Much research has been conducted on the impacts of modernization as well as policy influences on the tradition of filial piety and family structure (Cheng et al., 2011; Li & Chen, 2011; Wan et al., 2008).

Changes in Family Structure and Family Roles in China

The industrialization and rapid urbanization of China have created enormous opportunities for young adults who want to improve their living standards. Many young adults have left their parents to pursue freedom and economic prosperity, which leads to the increasing amounts of older adults living alone. About 68% of older adults' households were "empty nest", which means the majority of older Chinese were not living with their adult children (Li & Chen, 2011; Wan et al., 2008). The geographic

separation of adult children from their parents also limited the children's capacity to fulfill their filial duties. Although the living away children were able to provide more financial support to their parents; physical care, which was mostly needed for frail elderly, has simply been diminished (Chen & Powell, 2012). Thus, the substantial urbanization has weakened the traditional intergenerational family support system. The traditional pattern of family support as a way of caring for older Chinese is diminishing and will not meet the needs of booming older population in the upcoming decades.

The implementation of one-child policy has leaded to the prevalence of "4-2-1" family structure in China. The "4-2-1" family structure refers to the pyramid of four grandparents, two parents, and one child in a family. While most of China's working-age adults would be willing to honor the Confucian doctrine of filial piety towards their elderly, it is extremely difficult for an adult couple to provide supports for their combined four aging parents while taking care of their own child and maintaining successful careers in an increasingly fast-paced Chinese society (Wan et al., 2008). Meanwhile, the fertility rate has dropped precipitously in last three decades because of the one-child policy. Rapid decline of fertility leads to a reduction of family size and availability of family caregivers over time. Consequently, care and social support for older adults provided by family is increasingly less feasible (Banister et al., 2010; Chen & Liu, 2009; Wan et al., 2008).

Modern Chinese society is also undergoing a transformation of the traditional family roles. With the gradual change of culture, families have been liberated from the influence of Confucianism teaching, which has also transformed older adults'

relationship with the younger generations. Consequently, older adults' expectation and practice of co-residency with their children has declined significantly. To support this situation, Li and Chen (2011) showed that the vast majority of the elderly population currently lives alone and lacks the physical and social support formerly provided by family. As the elderly population continues to grow and the availability of family caregivers decreases, more elderly will need to seek alternative care and living. The aging Chinese population will pose great challenges on the nation's caregiving and housing systems in the coming decades. How to adapt to the needs of aging population and overcome the challenge of progressive aging are critical for the well-being of older adults. Many researchers showed both social and physical environment play important role on the well-being of older adults and their successful aging (Binstock et al., 2011; Glass et al., 2006; Street et al., 2007; Burton et al., 2011; Gilroy, 2008; Lui et al., 2009) .

Benefits of Social Networks

A number of researchers confirmed that social interaction is important because it has been shown to have a strong influence on life satisfaction (Binstock et al., 2011; Glass et al., 2006; Street et al., 2007). There is a strong connection between social networks and improved health outcomes, that is, social networks can help people to achieve what they could not achieve on their own (Christakis & Fowler, 2009).

However, social contacts tend to decrease as people age for a variety of reasons, including retirement, the death of friends and family, or lack of mobility. Moreover, the family structure transformation in China in the last several decades further shrinks social networks of older adults. Consequently, aging in modern society brings a greater risk for

isolation. Social isolation is a major and prevalent health problem among older adults in China. Social isolation relates to the number of ties and the quality of relationships that people have: religious ties, community ties, and kinship ties (Christakis & Fowler, 2009). These ties have been weakened dramatically due to the rapid modernization of Chinese society. Researchers confirmed that people who are very isolated, who are disconnected, have a mortality rate that's about three times as high (Cattan, White, Bond, & Learmouth, 2005). Thus, community living has the potential to reduce social isolation and the detrimental health effects associated with it.

In addition, older adults are likely to spend far more time at their home and community as they age. Declining health and functional status can make them more susceptible to barriers at home and community. Having a home and local environment that supports social connection and independent living for older adults could be keys to helping them stay healthy. Access to social networks and to religious or other institutions helps to lower the risk of isolation, while access to amenities and supportive services enhances older adults' ability to remain independent. Satisfaction with aging may depend on the type of local neighborhood environment and housing environment (Burton et al., 2011; Kerr, Rosenberg, & Frank, 2012).

Effects of Built Environment

Recently, a number of researchers confirmed that the overall well-being in later life is closely related to the built environment. The physical characteristics of the neighborhood in particular seems to have a significant impact on the mobility, independence, and quality of life of older adults living in the local community (Burton et

al., 2011; Gilroy, 2008; Lui et al., 2009). Moreover, two groups of researchers verified that the living environment is an important determinant of older adults' well-being (Gu, Dupre, & Liu, 2007; Phillips, Siu, Yeh, & Cheng, 2005). According to Gu et al. (2007), the institutionalized oldest-old in China exhibited poorer health compared to those living in the community. The results by Phillips et al. (2005) indicted that environmental dwelling conditions mainly affected the older adults' psychological well-being. Moreover, the interior environment had a greater impact on residential satisfaction than the exterior environment.

In recent years, the impact of built environment on older adults' level of physical activity became an intense concern to a number of researchers. These researchers showed the level of physical activity of older adults is associated with the social and built environment where they live (Kerr et al., 2012). Focus groups study conducted by Michael et al. (2006) revealed that having access to nearby services in safe areas was important for older adults so they could walk and take care of daily activities. In addition, three groups of researchers indicated that walking among older adults was higher in urban environments (Kemperman & Timmerman, 2009; Lee, Ewing, & Sesso, 2009; Patterson & Chapman, 2004). Two other groups of researchers found that proximity to physical activity resources, such as parks and trails, the ability to make utilitarian walking trips from home, and the perception of having favorable neighborhood surroundings for walking were associated with increased physical activity levels in older adults (King et al., 2003; Michael et al., 2010). Older adults are often retired and spend more time in their home and community. Thus, designing communities in ways that supports the ability to

walk to destinations and provides access to recreational amenities can play a strong role in influencing physical activity for older adults.

A physical environment that meet the changing needs of aging population can promote the well-being of older adults. Consequently, the idea of age-friendly communities was developed by the World Health Organization in 2005. As the world's most populous country, China's most current housing has not been able to accommodate for the physical challenges that arise with aging,

Available Housing for Older Adults in China

Historically, institutional care for older adults has been rare due to the influence of traditional filial piety and its expectations of family care. In the 1950s, the Chinese government started to establish elder care homes in both rural and urban areas, primarily accommodating the older adults who had no living children, no income, and no relatives (Chen & Powell, 2012). Between the 1950s and 1980s, the government established more institutional care facilities to care for the older adults without family, but the total number was minimal. Most of these facilities were social welfare institutions sponsored by public funding. Senior housing and care was considered to be the sole responsibility of the government and provided through a small network of retirement homes and medical facilities (Chen & Powell, 2012). In the 1990s, senior housing and the care system underwent a dramatic shift under the principles of decentralization and a market economy. Since then, the number of private owned elder care facilities increased rapidly due to the recent surging economy (Wan et al., 2008).

Privately funded senior housing and services such as nursing homes and continuing care retirement communities (CCRCs) have grown rapidly since the mid-1990s (Wan et al., 2008). These private senior care facilities compensate for the shortage of housing and support for older Chinese, but are only affordable for the wealthy people because of the high enrollment costs. However, the greatest need for senior care is among the mid- to low-income families. In general, senior care facilities are still insufficient and have lagged behind the economic development in China. On the other hand, increasing the number of these types of facilities might not be the best solution to meet the needs of older adults because many older adults still choose to age in place (Wan et al., 2008). The Centers for Disease Control and Prevention (CDC) defines aging in place as "the ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level" (para. 3). Li and Chen (2011) also showed that the vast majority of older adults in China preferred to live at home while only 4% of them wanted to stay at institutional care facilities.

The commonly understood meaning of aging in community and aging in place is that older adults can remain in the homes where they live, and can be connected to elder care agencies in their local community if contacted by them (Marek & Rantz, 2000). Aging in place is not only preferred by older adults but also believed to be more cost-effective than intuitional care (Chappell, Dlitt, Hollander, Miller, & McWilliam, 2004; Stuart & Weinrich, 2001). Lawton (1998) provides evidence of the benefits of aging in place - it allows older adults to enjoy all the comforts their familiar home and community have to offer. However, there are several challenges to aging in place. For example, the lack of accessibility amenities can limit the ability of older adults to age in place. Since

older adults spend far more time at home than working-age adults, having a home and local environment that supports independent mobility for older adults could be a key to helping them age in place healthfully. In order to age in place, it is necessary that the immediate as well as the near environment will be free of barriers that can hinder independent functionality (Masotti, Fick, Johnson-Masotti, & MacLeod, 2006).

Nonetheless, there is a "mismatch" between the design of common Chinese communities and the needs of older people. Rather than focusing on senior-friendly design, both the physical and the social environment are designed for functionally independent person. Most housing, transportation, services for health and home care, and public spaces are organized to accommodate people who are healthy. The need to have residential and commercial spaces with accessibility features is rarely considered in most urban planning (Ikels, 1991; Wan et al., 2008). The effect of this design is to keep elders isolated in their homes and underserved. It's estimated that millions of older adults who develop disabilities live in homes that lack basic accessibility features such as a no-step entry, single-floor living, extra-wide doorways and halls, accessible electrical controls and switches, and lever-style door and faucet handles. This further prevents elderly with disabilities from living safely and comfortably in their homes (Gilroy, 2008). Taken collectively, China's current buildings and dwellings are not suitable for use by the rapidly increasing aging population. The aging Chinese population will pose great challenges on the current housing system in the coming decades.

The Ecological Theory of Aging

Aging represents a complex blends of physiological, behavioral, social, and environmental changes that occur at both the individual and wider community level (Satariano, 2006). Environmental gerontologists assert that as people age, they increasingly become attached to the place where they live, but concurrently become more sensitive and vulnerable to their social and physical environment (Lawton, 1977; Lawton & Nahemow, 1973). This ecology of aging perspective posits old age as a critical phase in the life course which is profoundly influenced by the physical environment. Lawton (1977) conceptualized aging well as involving a personal competence and environment interchange dynamic. He stated that human behavior and function result from the "competences" of the individual, the demands or "press" of the environment, and the adaptation of the person to the environment (p. 8). Individual competence is the enduring ability that enables an individual to function. Environmental press is the total magnitude of the environment's effect on the individual. There is a need for a fit between the personal competences and environmental press that can result in positive outcomes, while a mismatch can result in poor adaptation. Both the press of environment and the levels of individual competency change as part of the aging process (Lawton, 1977).

According the ecological theory of aging, the environment places a certain degree of press on individuals. This interaction is summarized in terms of the "competence/press" model (Figure 2). Competence changes on a continuum from low to high along the vertical axis, while environmental press goes from weak to strong along the horizontal axis. The diagonal line through the middle of the shaded area is called the "adaptive

level." It represents a theoretical mean adaptation level for individuals of different competence interacting with their environments. With aging there is a general reduction in individual competence. If environmental press remains constant, individual behavior and function is adversely affected. To the immediate right of the adaptive level line is the "zone of maximum performance potential," which is characterized by high environmental press, such as challenges and stimulation. This zone encourages active behavior by eliciting motivating responses. To the right of this zone is the "tolerable affect marginally adaptive behavior" zone, where individuals continue to function, but with some difficulties. The furthest right is the zone of "negative affect maladaptive behavior," where the individual cannot maintain an acceptable degree of functioning any more. On the other hand, to the immediate left of the adaptive level line is the "zone of maximum comfort," which is characterized by weak environmental press and a general relaxation from environmental demands. To the left of zone of maximum comfort is another "tolerable affect marginally adaptive behavior" zone, in which the absence of environmental press begins to lead to lethargy. Finally, the furthest left is another zone of "negative affect maladaptive behavior." In this case, the environment is so unchallenging that it contributes to functional passivity and limitation (Lawton, 1977, p. 8).

The ecological theory of aging provides a broad overarching framework that includes different types and levels of personal competence (such as intelligence, motor and perceptual ability, and social tact) and characteristics of the objective environment (such as housing standards, neighborhood conditions, and public transportations). Although the physical environment has the potential to impose significant constraints in later life, it can also enhance opportunities for aging well, as new housing solutions and

new technologies support declining competencies (Lawton, 1982; Lawton, 1983). In fact, adaptation in older age reflects the interaction between personal and environmental characteristics.

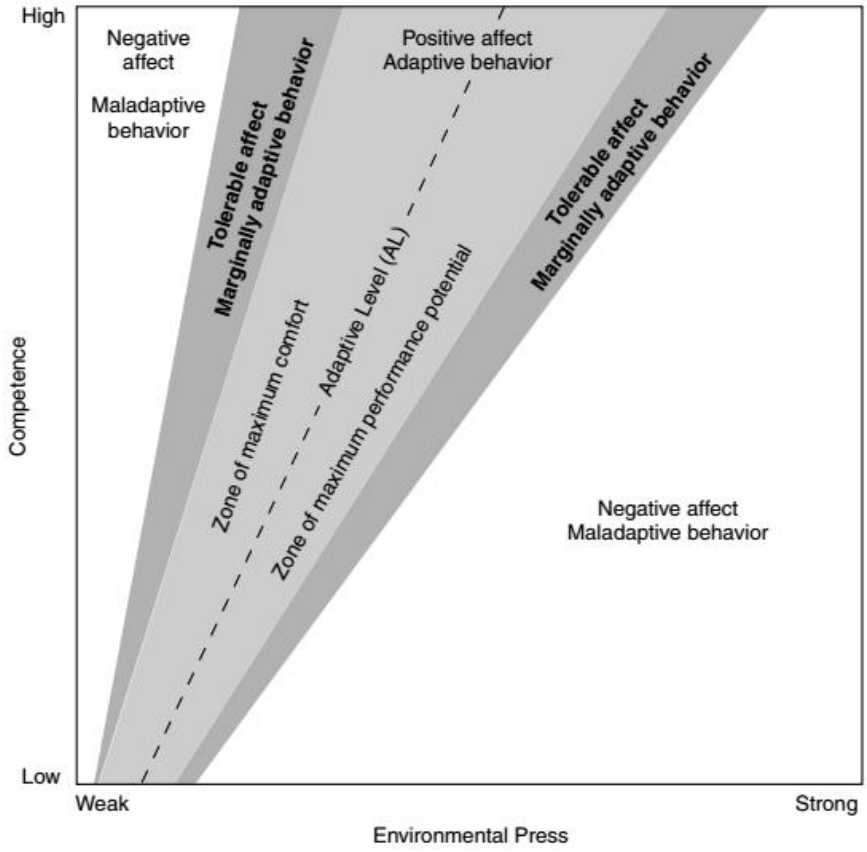

Figure 2. Lawton's competence- press model (1977, p. 9).

According to the ecological theory of aging, older adults' independence and engagement depend upon the communities where they live - including the supportive programs and services the communities offer their older populations, their retail, health, and recreational amenities, and their transportation networks (Lawton, 1977; Lawton 1983). This theory includes a strategy for measuring person-environment linkages when planning of services and housing for the changing needs of older adults. The ecological

theory of aging has been used to guide the design of questions that address the problems related to shortage of caregivers, disability-equipped housing, and enhance social connections of Chinese older adults.

There is consensus that cohousing constitutes a pragmatic response to the challenges of living in contemporary society. As a new solution, cohousing tries to adjust the merits of the traditional extended family to modern society through the increase of cooperation and socialization among residents, sense of belonging, mutual support, and community security. Through cooperation and mutual support, residents of cohousing can choose tasks that match their capacity. Consequently, the environment press for each individual can be controlled at moderately level; the residents of cohousing have the potential to operate at their best.

Cohousing and Senior Cohousing

As a form of intentional community, cohousing typically includes the clustering of smaller than average private residences to maximize shared spaces for social interaction. Shared spaces usually feature a common house for shared meal and other daily use. Households have independent incomes and private lives, but residents collaboratively plan and manage community activities and shared spaces (McCamant & Durrett, 2011). Compare to conventional communities, cohousing facilitates more interaction and mutual support among residents. Rather than depending on the family to meet all emotional and physical needs, cohousing residents have a wide range of people to talk to and get help from (Tummers, 2016). Thus, cohousing has the potential to reduce social isolation and the detrimental health effects associated with it.

Along with the advantages of community living, senior cohousing is also designed with basic accessibility features that help older adults live safely and comfortably in their own homes and community (Durrett, 2009). Most importantly, cohousing is culturally acceptable in China because older adults normally live close to others and enjoy community activities rather than being alone (Wan et al., 2008).

History of Cohousing

As a type of collective housing, cohousing has deep roots in European history (McCamant & Durrett, 2011; Vestbro, 1997; Vestbro & Horelli, 2012). From the early 1940s to 1980s, various models for neighborly housing with shared services have been launched in Europe and North America. These models have been motivated sometimes as social or political visions, and sometimes as practical solutions to the needs of daily life. The most important goals have been to collaborate with neighbors, to share common facilities, and to distribute responsibilities fairly between men and women (Tummers, 2016; Vestbro, 2000; Vestbro & Horelli, 2012).

The cohousing concept originated in Denmark, although similar communities can also be found in Sweden and the Netherlands (Meltzer, 2005). Early cohousing was developed in the1940s by the feminist and modernist movements that aimed to share responsibilities fairly between men and women hence lessen daily chores for married working women so that they could rest the same as men after labor hours. This early cohousing was a service-model that had paid staff to care for house management, daily chores and child rearing. However, the early cohousing had too many and too complicated service facilities. This made the buildings expensive and difficult to run.

Living space of early cohousing was relatively small and rent was expensive. Eventually people began to criticize that the service-model cohousing as housing only for the rich (Vestbro 1997; Vestbro, 2000; Vestbro & Horelli, 2012). In the 1970s, a self-work model evolved as an alternative to the service-model of cohousing. The first self-work model cohousing community was developed among a group of Danish families who were dissatisfied with existing housing and communities that they felt did not meet their needs. These families created a new housing type that redefined the concept of neighborhood by combining the autonomy of private dwellings with the advantages of community living. Self-work model cohousing is designed to save resource and cost as well as empower social connection among members. It has both practical and social merit. Residents in self-work model cohousing share daily chores and provide co-care to each other (Vestbro 1997; Vestbro, 2000). In many aspects, cohousing is not a new concept - it harkens back to the village-like communities that used to occur naturally.

Since the development of the first self-work model cohousing, a large number of projects were completed in Denmark, Sweden, Netherlands, and Germany during the 1970s and 1980s. By 2010, more than 700 of these communities had been built in Denmark, with many more planned. It is estimated that cohousing compose 5% of the housing stock in Denmark (Jarvis, 2011).

In Denmark, cohousing communities are private initiatives, whereas in Sweden most of the properties are state-owned. In the 1960s, the Swedish feminist movement played a key role to promote cohousing as a way to share common chores more equally between the genders. Cohousing in Sweden was part of a large societal project of an

active welfare state. Intergenerational cohousing units were put up in the 1980s and the early 1990s. It was hoped that intergenerational cohousing would encourage social contacts and avoid age-segregation, but the model did not work well in practice due to many of the elderly being too infirm to participate in activities for families with children. In the early 1990s, a "+40 cohousing", which is for people over 40 years old without any cohabitant children, was developed. The idea of +40 cohousing is to mix the residents with different conditions and promote mutual support that had been shown to be beneficial. Swedish people believe the +40 cohousing might be more sustainable than ordinary ages 55 and over senior cohousing (Tummers, 2016; Vestbro, 1997; Vestbro, 2000).

The cohousing phenomenon is now extending to the rest of Europe, namely France, Spain, Belgium, the UK and Italy. According to Peters and Stengel (2005), there were 430 cohousing communities in 24 countries. One interesting observation that can be extrapolated from the European experience is that across the variety of country-specific approaches to cohousing, cohousing for the elderly is booming across Europe.

In the 1980s, the Danish term *bofællesskab* (directly translated as "living community") was introduced to North America as *cohousing* by two American architects, Kathryn McCamant and Charles Durrett after they experienced living in a Danish cohousing community (McCamant & Durrett, 2011). The North American model of purpose-built cohousing typically includes the clustering of smaller than average private residences to maximize shared open spaces for social interaction, common facilities for shared daily use, and consensus-based collective self-governance (McCamant & Durrett,

2011; Tummers, 2016). The first community in the United States to be designed, constructed, and occupied specifically for cohousing is Muir Commons in Davis, California. Since then, intergenerational cohousing communities have developed rapidly in the United States and Canada (McCamant & Durrett, 2011). In recent years, senior cohousing focused on older adults' needs have grown as well. The Cohousing Association of America estimates more than 160 communities have been established in 25 states plus the District of Columbia, with more than 125 in process. Americans' interest in cohousing is growing.

The cohousing trend continues throughout Europe, the United States, and Canada with new projects being planned and built in ever-increasing numbers. More and more people are finding that cohousing addresses their needs better than other housing choices (McCamant & Durrett, 2011, Tummers, 2016).

In term of location, cohousing can be urban, suburban, or rural. But the key common characteristics of cohousing community identified by Fromm (1991) are similar, including shared common facilities, private dwellings, resident-structured routines, resident management, design for social contact, resident participation in the development process, and pragmatic social objectives. Households in cohousing community have independent incomes and private lives, but neighbors collaboratively plan and manage community activities and shared spaces. Community activities feature regularly-scheduled shared meals, meetings, and workdays. Residents share in tasks such as childcare, elder care, cooking, and carpool. Neighbors gather for parties, games, movies, or other events (McCamant & Durrett, 2011).

Apparently, the cohousing concept reestablishes many of the advantages of a traditional community but within the context of twenty-first century life. The goal of cohousing project is to recreate an old-fashioned neighborhood that supports friendly cooperation, socialization, and mutual support. In addition, cohousing aims to address the obstacles to aging gracefully, including isolating environments that instill loneliness and fear, impersonal environments of nursing homes and long term care facilities. Among the six defining characteristics of cohousing, the foremost important characteristics of cohousing is the resident participatory process (McCamant & Durrett, 2011).

Participatory Design Process

Cohousing is designed by, or with considerable input from, its future residents. The resident participatory design process emphasizes consciously fostering social relationships among its future residents. Because each cohousing community is planned in its context, a key feature of this model is its flexibility to the needs and values of its residents and the characteristics of the site. Both common facilities and private houses are based on the actual needs of the residents. The design process and the management process are things that actually bring the community together, so that residents have to get to know each other in order to make decisions about the community and private features. Through making key decisions with the architect who leads the design process, the future residents create cohesive design criteria that define the group's goals, priorities, activities, and design requirements for the project. The design requirements cover site design, common house design, and private house design (McCamant & Durrett, 2011).

Resident Management

Cohousing communities are managed by their residents. Self-management empowers residents, builds community, and saves money. In addition, residents do most of the work required to maintain the property, participate in the preparation of common meals, meet regularly to develop policies, and do problem-solving for the community. Most cohousing groups make decisions by consensus. Each resident takes on one or more roles consistent with his/her skills, abilities or interests (McCamant & Durrett, 2011).

Design Characteristics

The physical form of cohousing is typically compact but varies from low-rise apartments to townhouses to clustered detached houses. Clustered housing fosters a sense of community, shared responsibility, and mutual support (Jarvis, 2011). Cohousing communities tend to keep cars to the periphery which promotes walking through the community and interacting with neighbors, as well as increasing safety for children at play within the community. Shared green space is another characteristic, whether for gardening, play, or places to gather. In addition to the shared outdoor spaces, shared facilities typically feature a common house which usually includes a dining area with a large kitchen, sitting area, and laundry and may also have guest rooms, library, workshop, and recreational spaces (McCamant & Durrett, 2011). A common house not only bridges the gap between private home and neighborhood but also supplements the needs of individual houses and help to conserve energy. The common house is the heart of the cohousing community and usually located at the entrance of the community. The location of the common house greatly affects the frequency of its use. If the common house is

along the path home, visiting it becomes part of residents' daily routine. Obviously, the physical layout and orientation of the buildings of cohousing encourages a sense of community (Jarvis, 2011; McCamant & Durrett, 2011) .

Private houses in cohousing are fully-equipped dwellings and typically have open floor plan, which saves space by create areas that can have multiple uses. Private houses can be smaller than typical houses because features such as workshops, guest rooms and laundry are located in common houses (McCamant & Durrett, 2011).

All of these design characteristics are based on human experience and a balance of privacy and connectivity. Cohousing community designs encourage social interaction and at the same time allow residents to choose their own level of engagement (Jarvis, 2011).

Senior Cohousing

Multigenerational cohousing developments tend to focus on families and children. Seniors only communities modify the intergenerational cohousing model to create physical and social environments that allow people to flourish as they get older. Aging in community allows for a boost in interaction among seniors and offers an important safety net of social inclusion. In addition to the common characteristics of cohousing, senior cohousing has three more principles: shared vision and values, designed for aging in place, and spirit of harmony (Abraham & Delagrange, 2006; Glass, 2012; Glass & Vander Plaats, 2013). First, shared vision and values such as living a healthy lifestyle and lifelong learning are crafted by the group of future residents. These operating agreements

guide community members through the development process and become the foundation for living together. Second, aging in place designs of private units and shared common facilities allow the residents to live independently for as long as possible (Abraham & Delagrange, 2006). The function of accessibility designs is fully supported by the ecological theory of aging because the theory stated that an interaction between personal competences and social and physical environmental conditions determine the extent to which a person will be able to age in place (Lawton, 1998). Third, spirit of harmony means the process of conscious aging and increased acceptance of aging fostered by elders living in close proximity to one another in a self-managed and empowering environment (Abraham & Delagrange, 2006).

Senior cohousing is an *innovative* solution to meet the unique needs of an aging population. Aligning co-care practices to address emotional and physical needs through a supportive community environment fosters stimulating environments for proactive seniors (Glass & Vander Plaats, 2013). According to the ecological theory of aging, stimulating environment encourages active behavior by eliciting motivating responses, which can facilitate their ability to remain in the community longer (Lawton, 1977). Thus, senior cohousing residents can remain independent in their own housing and be part of the large community, yet still have the support and comfort provided by interdependence among a group of peers. This living arrangement supports individual's well-being physically, socially, and emotionally, and offers aging adults a way to live among people with whom they share a common bond of age and experience (Durrett, 2009; Glass &

Vander Plaats, 2013). It is an entirely new way to house older adults with dignity, independence, safety, and mutual concern.

Senior Cohousing Design Criteria

While people are staying healthier and living longer than ever before, most older adults and their families must ultimately confront many of the same challenges of aging. In particular, disability rates increase over time. A major challenge to aging in place is ensuring that homes are safe and accessible. Fortunately, this can be accomplished through forward-thinking plan and design. According to Masotti et al. (2006), a neighborhood environment can be made healthier for older adults by changing characteristics to increase activity, create a sense of community, and hence benefit wellbeing.

Particularly, the ecological theory of aging stated that neighborhood stressors (i.e., problems within a neighborhood) affect overall well-being of residents. Subsequently, psychological stress resulting from such problems may influence a person's decision to lead an active or sedentary lifestyle (Lawton, 1983). Thus, accessible design is essential for senior cohousing in both private and common spaces. By using the ecological theory of aging as a strategy for measuring person-environment linkages, the specific focus here are five features that make homes accessible to those with impaired functions: no-step entries and single-floor living, which eliminate the need to navigate stairs; easily accessible switches and outlets; extra-wide hallways and doors to accommodate those in wheelchairs; and lever-style door and faucet handles to help those who have difficulty grabbing and turning knobs.

In addition, safety features also promote active aging and independent living by minimizing the probability of preventable, unintended harm. Falls are the leading cause of unintended injuries (Deandrea et al., 2010). The presence of certain home hazards (e.g., storage problems, clutter, and hall rug) and lighting problem are important in predicting falls at home among older adults (Northridge, Nevitt, Kelsey, & Link, 1995; Addae-Dapaah & Wong, 2001). In order to reduce the common home hazards, the following features are often considered for senior cohousing: 1) sensor light at entry; 2) non-slip floor surface; 3) two-way switches; 4) grab bars in bathroom; 5) additional storage.

Furthermore, communities and individual lives evolve. In order to accommodate future changes, buildings, houses, and environments in cohousing should be designed to allow these processes to unfold. For instance, a variety of dwelling sizes allows residents to move within a cohousing community as their needs change. As a very practical solution, many cohousing communities use rental units or supplementary rooms in the common house to offer flexible spaces for short period time or future live-in caregiver (Durrett, 2009). Taken collectively, the design of home and neighborhood in which older adults live is vitally important.

As an alternative housing opportunity, senior cohousing equipped with accessibility features, safety elements, and new technologies may support older adults' declining competencies to counterbalance the significant constraints imposed by physical environment in later life. Combining with the social benefits, senior cohousing has the potential to reduce or delay older adults' needs for health and care services and allows them living independently as long as possible.

Summary

China's rapidly aging population generates many challenges on the well-being of older adults. For thousands of years, extended family had provided basic care and social support for Chinese elderly, but this extended family support system has weakened substantially in the last three decades. Along with that, China's current buildings and housing lack basic accessibility features for older adults to live independently. However, a number of researchers suggest that the ability to connect with social networks and access to proper local and housing environments are critical to the overall well-being of older adults.

As a possible solution, the cohousing concept reestablishes many of the advantages of a traditional community by supporting friendly cooperation, socialization, and mutual support. Along with the advantages of community living, senior cohousing is also designed with basic accessibility features that help older adults live safely and comfortably in their own homes and community. The ecological theory of aging has been applied as a framework to guide the research of this study. The purpose of this study is to investigate perceptions of senior cohousing among Chinese older adults in order to develop a more effectual design that would better serve to boost the comfort and welfare of older adults.

Chapter 3

Research Methods

The main purpose of this study was to investigate Chinese older adults' perceptions on senior cohousing. The researcher examined the demographic characteristics of the participants and identified the important community and housing amenities, community services, and senior cohousing design features that the participants desire.

Below are descriptions of the sample, data collection methods, the survey tool, and the data analysis process. Before collecting data, all study procedures were approved by Institutional Review Board at Oregon State University (see Appendix A).

Sample

The participants of this study were older adults in multiple provinces of China. Recruitment was conducted via friends, personal acquaintances, and social network chain referrals. The potential survey participants received an invitation (see Appendix B) to complete the questionnaire and information about the research.

The inclusion criteria for this study were 1) living in China and 2) ages 50 or above. The age threshold of 50 years was used because it is the earliest eligible retirement age for women working in manual labor in China. Among the 590 survey respondents, there was a total of 397 participants who completed the questionnaire. Survey

participants were geographically dispersed throughout of China, but mainly in urban areas, such as Beijing, Changchun, Shenyang, Taiyuan, Lanzhou, Xi'an, and Guangzhou.

Data Collection

A structured, self-administrated online questionnaire (see Appendix D) was developed for this study. Data were collected via Qualtrics.com as a cross-sectional study of Chinese older adults. The participants were recruited through either email or social network (QQ and WeChat). The survey URL was distributed through the recruitment email (see Appendix B). Data were collected from September 10 through 17, 2017. Once prospective respondents clicked on the provided URL, They were directed to a self-administrated online survey in Chinese. Before the questionnaire began, the informed consent form (see Appendix C) was displayed. The purpose of the study along with the rights as a participant was explained in the informed consent form. After each respondent reading the informed consent, he/she was continue to access to the questionnaire. When the data collection finished, the collected data-set was downloaded from the survey website in spreadsheet format for data analysis.

Questionnaire

The questionnaire contained questions about demographic characteristics, participants' general preference for housing, and senior cohousing community and design features. The first set of questions included questions on basic demographic information such as gender (male = 1, female = 2), age (50-59 = 1, 60-69 = 2, 70-79 = 3, 80+ = 4), marital status (single = 1, married = 2, separated = 3, divorced = 4, widowed = 5),

educational attainment (no education = 1, elementary school = 2, middle school = 3, high school = 4, college = 5, graduate school = 6), and household income levels (less than ¥20,000 = 1, ¥20,001 – ¥40,000 = 2, ¥40,001 – ¥60,000 = 3, ¥60,001 – ¥80,000 = 4, ¥80,001 – ¥100,000 = 5, more than ¥100,000 = 6. Currently, one US dollar ($) approximately equals 6.5 Chinese yuan (¥). For the complete list of demographic questions, please see Appendix D. For collecting basic demography information, multiple choice questions were used due to the advantages of easy handling, simple to answer, and producing unbiased results.

The second set of questions asked about participants' general preference for retirement housing such as housing location and housing type, important community amenities, important housing amenities, and important services. Participant were asked to check one place where they would prefer to age:1) aging in place without moving; 2) living with children; 3) continuing care retirement community; 4) assistant living/nursing home; 5) senior cohousing. The researcher asked several questions related to housing location and housing type as well. These questions concerned about the regions they prefer to live, the type of housing they prefer, and the number of bedrooms they prefer, et cetera (see Appendix D). Moreover, participants were asked to select the three most important community amenities including: 1) hospital; 2) public transportation; 3) walking paths and outdoor space; 4) clubs and activities; 5) library (no = 0, yes = 1). Furthermore, the question about important private housing amenities was asked based on Lampkin (2012). Participants were asked to select the five most important private housing amenities besides bedrooms and three most important services (see Appendix D).

The third set of questions focused on the development, organization, and design features of senior cohousing. The questions about cohousing development and organization were formulated based on the Senior Cohousing Handbook (Durrett, 2009), but were modified according to the Chinese culture. Participants were asked to choose which topics should be discussed among the interested members. In addition, the researcher asked participants which method they prefer to initiate an interested and where they would find support for requisition of land (see Appendix D). These were multiple choice questions with additional space for indicating other strategies. According to previous study, the age range of senior cohousing residents and household number of senior cohousing community are important factors for successful community building (Durrett, 2009). Therefore, the participants were asked about their preferred age range in senior cohousing and number of units in a senior cohousing complex. Knowing the type of assistant caregiving preferred by older adults would be helpful for choosing design features in cohousing community. Therefore, the researcher asked the participants to select the type of caregiving they would prefer in case they need assisted care from other people. The next set of questions asked about design features and were formulated based on both the Senior Cohousing Handbook (Durrett, 2009) and Housing and the Elderly in Singapore (Addae-Dapaah & Wong, 2001). The questions were modified in order to align with the purpose of this study. The ecological theory of aging was used as the conceptual basis for measuring person-environment linkages when design this set of questions. A major goal of the ecological theory of aging is to explain and predict more effectively why some residential environments more than others better fit the needs and abilities of their residents and contribute to their better quality of life (Lawton, 1991). New housing

solutions and new technologies support declining competencies thus may enhance opportunities for aging well. For example, pulley operated clothes drying racks have been designed for easy way of drying clothes. The researcher strived to include the design features that can help to meet the needs of older adults and enhance their well-being in these questions. Participants were asked to select the most critical amenities, the most important private unit features, and the important safety and accessibility features that a cohousing complex should offer. The questionnaire contains questions that asked which safety and accessibility features are necessary (see Appendix D).

A trial version of the questionnaire was distributed to a small sample of older adults (10 people) to pretest the questionnaire. The pretest participants were the researcher's friends with different level of education, from middle school to graduate school. The pretest participants ranged in age from 52 to 67 years old. Along with the questionnaire an additional sheet was included to ask about the amount of time required to complete the questionnaire, assessments of the clarity of instructions and questions, the format of the questions used, the sequencing of questions, the list of design features, and any other comments that the respondents might care to make. The average time required for this group to complete the questionnaire was 15 minutes. Instructions and questions were rated as very clear, and there were a few comments requiring minor modifications to the questionnaire. Three participants suggested adding clothes drying device because the vast majority of Chinese still air dry their clothes. Five participants said they were unfamiliar with several terminologies of accessibility features. Pictures of all accessibility features were added to the final questionnaire.

Data Analysis

The quantitative survey data were analyzed by SAS statistical software. Participants' demographic characteristics and their preferences were analyzed first through descriptive analysis. Inferential statistics were used to examine data for differences, associations, and relationships. The differences in interval and ordinal variables were calculated by *t*-test and ANOVA, while the associations between categorical variables were examined by chi-square test. The statistical relationships among variables were conducted through correlation analysis.

Descriptive Analysis

The following descriptive statistics about the survey participants were determined: gender proportion, age composition, rate of ownership in housing, structure of marital and self-rated health status, and configuration of living arrangement. In addition, the mean, median and proportion of survey respondents' household size, preferred number of bedrooms, educational level, and household income were analyzed. Furthermore, the participants' preference on housing type and location, type of aging facility, housing and community amenities, retirement services, assisted care services, and financing options were evaluated. Lastly, the participants' preferred methods on senior cohousing formation, cohousing land requisition support, age range for senior cohousing, number of units in a senior cohousing complex, types of additional care, cohousing amenities, private unit features, and safety and accessibility features were examined as well.

Depending on the type of variable being analyzed, various descriptive statistics were performed. Frequencies and percentages were calculated for categorical variables. Frequencies, percentages, and medians were calculated for ordinal variables. Frequencies, percentages, means, median, and standard deviations were calculated for interval variables.

Inferential Statistical Analysis

In order to analyze the likelihood that the influences found in the dataset were genuine, *t*-test, ANOVA, and chi-square test were used to identify differences and associations among affecting variables. The *t*-test was used to examine differences between genders. ANOVA was used to test for differences between categorical, ordinal, or interval independent variables and interval dependent variable. Chi-square test was used to see if there is a relationship between two categorical variables.

In addition, cross tabulation analyses were performed to examine relationships between variables. By presenting both results of the entire group of survey participants and results from sub-groups of participants, cross tabulations allow to examine relationships within the data that might not be readily apparent when analyzing total survey responses.

Correlation Analysis

After examining the descriptive and inferential information, correlation analysis among multiple variables were performed to determine whether any regression model can be fit for estimating the relationships among variables.

Chapter 4

Results and Discussion

The researcher assessed Chinese older adults' housing needs and evaluated their perceptions on senior cohousing. The objectives of this study were: 1) to understand the basic and long term housing needs of older adults, 2) to identify desirable community or private amenities and services, 3) to explore the factors that may affect organizing and building a senior cohousing, 4) to identify various design features that help to support the physical and social well-being of older adults in cohousing, and 5) to examine relationships between participants' perceptions of housing and demographic factors. The detailed procedures for meeting the study objectives were outlined in Chapter 3 Research Methods. In this chapter, the researcher presents and discusses the data collected and the results, according to the categories of collected information and study objectives.

Participant Characteristics

The questionnaire included several questions relative to the survey participants' demographics and their current housing situation. The data analysis with descriptive statistics revealed rich information about the participants. The following section summarizes the participants' responses and identifies any trends associated with the current living arrangement of survey participants.

There were more female respondents compared to the general population in China; female consisted 48.5 % of China's population in 2015 (Zhai, 2015). But it is common

that survey respondent are more likely to be female. The final sample for this study is 397, consisting sixty-five percent females and thirty-five percent males.

The age composition of the survey participants is predominantly represented by older adults ages between 50 and 59. Older seniors ages 70 and over are under-represented in the study, possibly due to lack of basic computer skills to participate in an online survey (Figure 3).

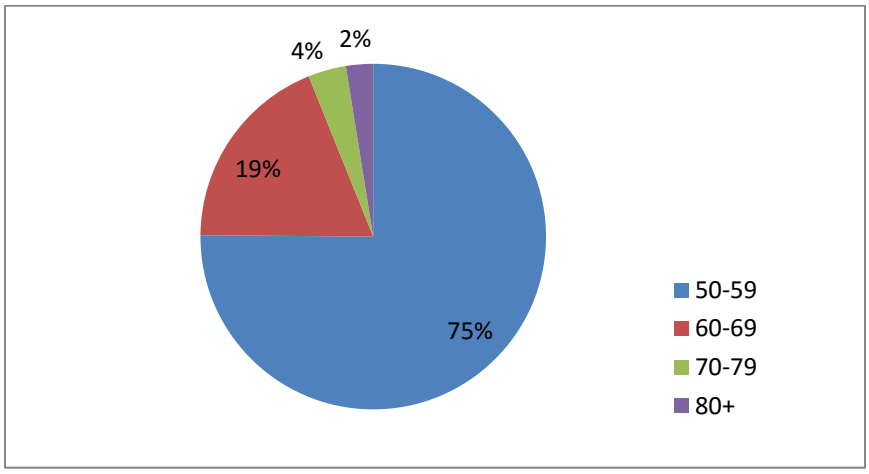

Figure 3. Age composition of survey participants.

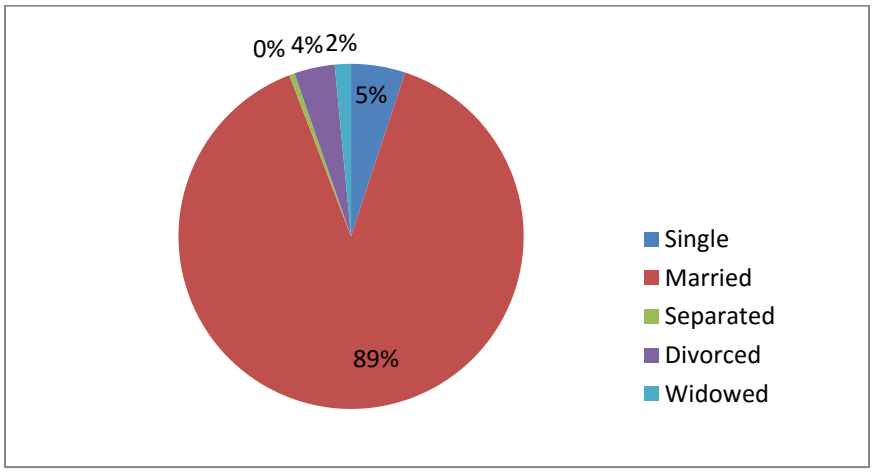

Figure 4. Marital status of survey participants.

The vast majority of the survey participants are married. Only about ten percent participants are either single, separated, divorced, or widowed (Figure 4).

The survey participants' educational attainment is much higher than the national average education level in China. The majority of participants (61 percent) had completed higher education. About a quarter of participants had completed high school education. Participants with lower than middle school education are far less common (Figure 5). The median of participants' educational attainment is college level.

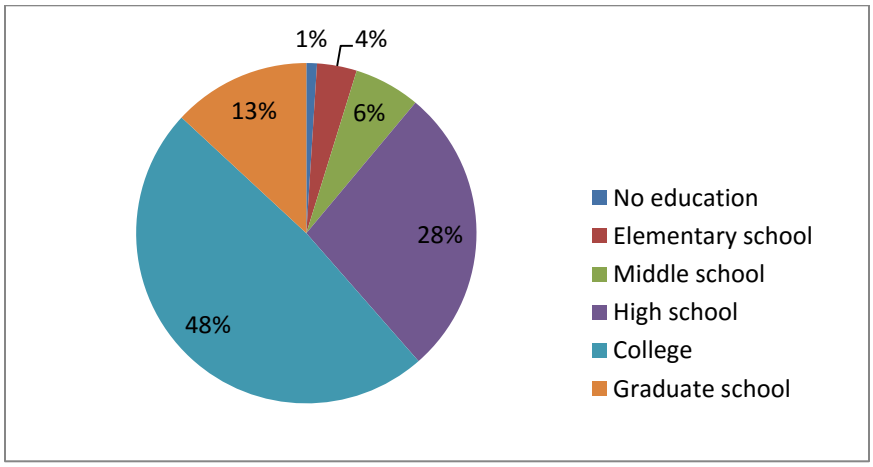

Figure 5. Highest level of educational attainment of survey participants.

The survey participants' households predominately have three or more persons residing in them. While the majority of households have three persons, four or more person households account for one third of all participating older adults' households. Households with two or few people are far less common (Figure 6). In this study, the average household size is 3.14 (*SD* = 0.74). In China, unmarried children usually live with their parents regardless of age. Because the majority of participants are between ages 50 and 59, they are more likely have unmarried children who are living at home.

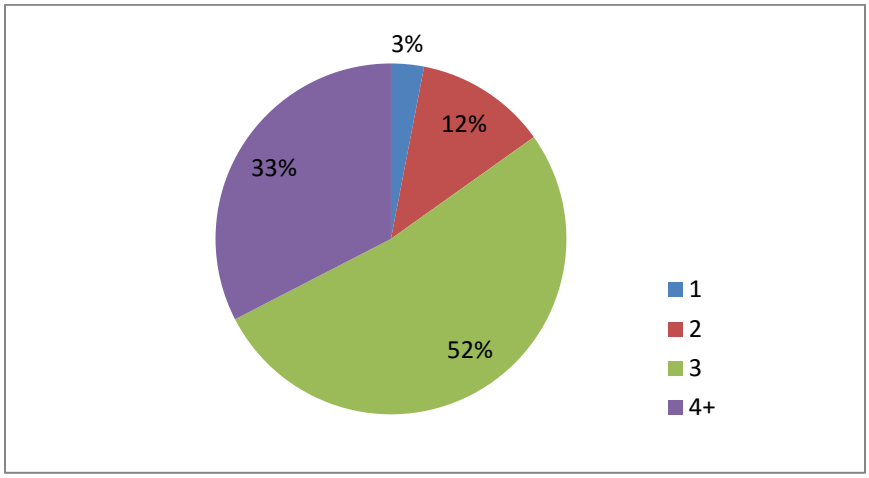

Figure 6. Household size of survey participants.

The large majority of the survey participants (61 percent) have children. Almost one third of them have both children and grandchildren. Far less common is participating older adults who have no children (6 percent) at all or only grandchildren (1 percent).

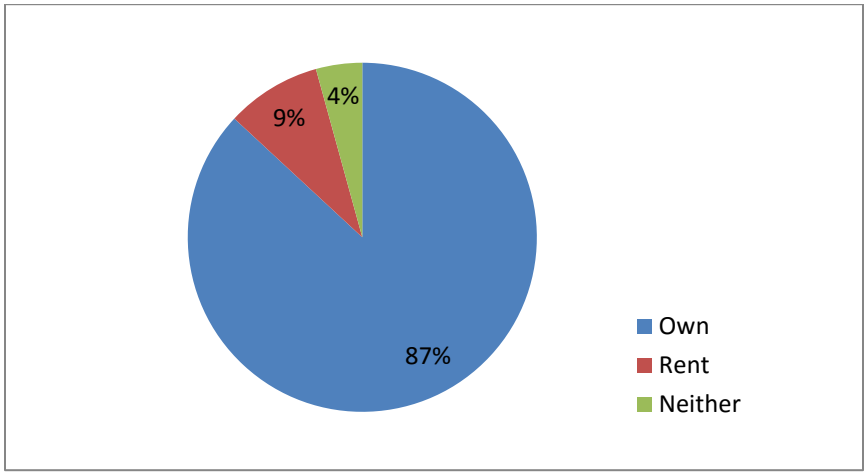

Figure 7. Housing ownership of survey participants.

A high rate of housing ownership is prevalent among the survey participants, consistent with the home ownership rate in China (Figure 7). China has one of the highest home ownership rates (90 percent) in the world. This high rate of housing ownership is

partly the result of housing reform in urban China, which has helped to achieve a high rate of homeownership by Chinese seniors. The majority of Chinese older adults ages 50 or over purchased welfare housing from the state with extremely favorable price during the first housing reform in the1990s (Yang & Chen, 2014).

Twenty-nine percent of participants indicated that their annual household incomes are over 100, 000 yuan, which is above the country's average annual household income of 67,000 yuan (Figure 8). This is quite consistent with the educational attainment data for the survey participants. Moreover, the median of participants' annual household income falls in the range of 40,000 to 60,000 yuan. The average annual household income of the survey participants is likely higher than of the average annual household income of older adult population as a whole. There are a few reasons why the lower-income cohort is underrepresented in the study. Lower income groups are less likely to have access to computers and smart phones, which means that they were less likely to end up in the sample. In addition, lower income groups are more likely to live in rural areas, which make them harder to recruit for online survey purposes due to less access to internet services.

The self-rated health status revealed that the majority of participants perceived they have good or excellent health. In addition, over one third of the participants rated their health status as fair. Participants with bad health condition are far less common. Only one participant indicated his health condition is very bad. These results are consistent with participants' age information and their household income data.

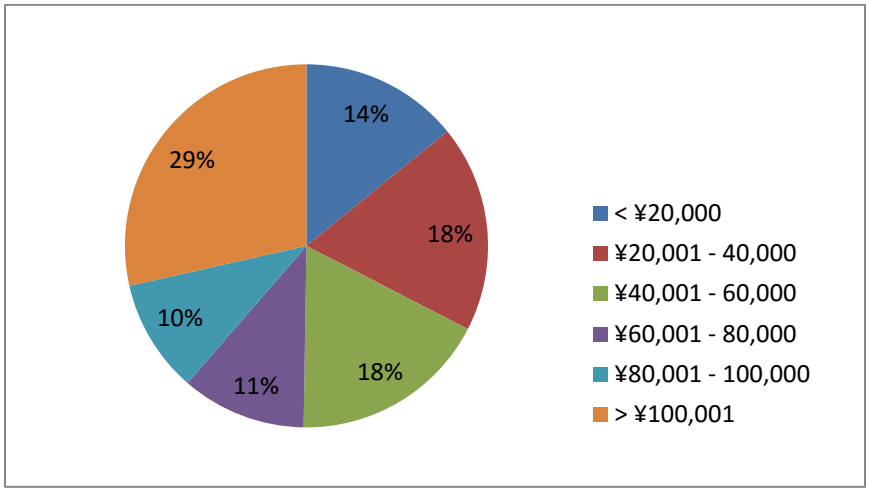

Figure 8. Annual household income of survey participants.

Living arrangements of the participants are diverse, but the majority are living without children; sixty percent of the participants are living with only their spouse (Figure 9).

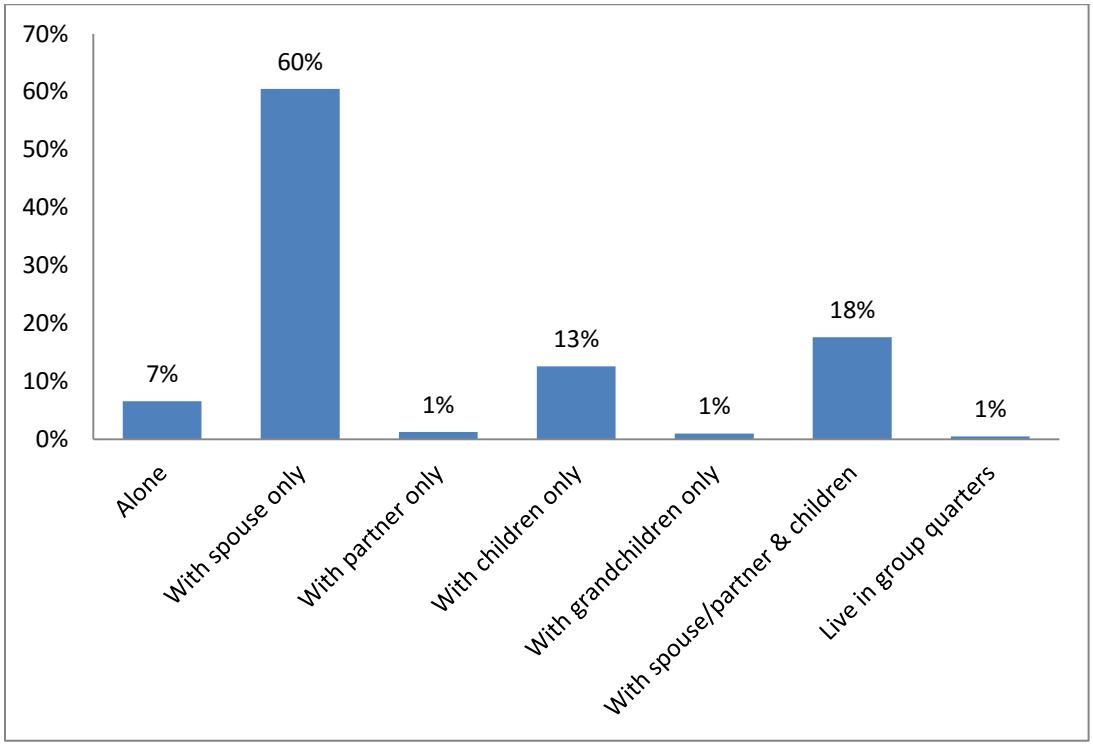

Figure 9. Configuration of current living arrangement of survey participants.

However, the results of current living arrangement are conflicting with participants' household size data (see figure 6). Only twelve percent participants indicated that they have two people living at home. Through reexamining the answer selection for this question, the confusion is probably caused by how the answers were arranged. The order of answer selection is 1) alone; 2) with spouse only; 3) with partner only; 4) with children; 5) with grandchildren; 6) with spouse/partner and children; 7) live in group quarters. It is likely that some participants who were living with spouse and children also selected living with spouse only instead because these two answer choices are not placed next to each other.

Participant's Preference for Retirement Housing and Services

Survey participants were asked a number of questions about their opinions on general retirement housing and services. The following is a summary of the participants' preferences. The primary purpose of this section is to understand the basic and long term housing and elderly care needs of Chinese older adults. Therefore, their desirable amenities, services, and design features can be identified. This information will be useful for senior-friendly housing development and existing neighborhood improvements.

When the participants were asked where they would prefer to age, over fifty-eight percent of them selected aging in place, while twenty-five percent of them were considering senior cohousing. Only three percent of participants would choose assistant living or nursing home (Figure 10). However, many participants were unaware the difficulties of aging in place, such as housing and community accessibility, long-term

care, and social isolation (based on the conversations with many potential participants when the researcher was recruiting).

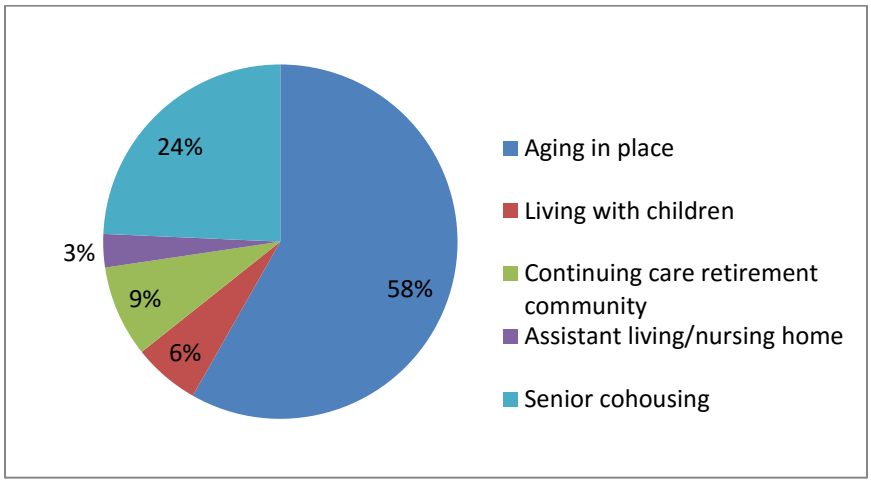

Figure 10. Participants' preference for place to age.

Participants are more likely to choose urban and suburban than rural areas for retirement. Fifty-eight percent participants would prefer to live in urban areas, while twenty-eight percent of them would like to live in suburban areas. Only fourteen percent of them would prefer to live in rural areas.

For future dwelling type, thirty-one percent participants indicated that they prefer living in apartments. Thirty-three percent indicated that they prefer living in townhouses. About a quarter indicted that they prefer living in single family houses. Twelve percent indicated that they prefer housing other than above three types, but didn't provide additional information.

Participants were asked how many bedrooms would be preferred in their residence. Forty-two percent indicated they would like to live in a dwelling with two bedrooms followed by thirty-six percent indicating they would prefer three bedrooms.

About twenty-two percent participants indicted that they would prefer a dwelling with only one bedroom. In this study, the average number of bedrooms preferred by participants was 3.14 (*SD* = 0.75). Not surprisingly, the average number of bedrooms preferred by participants is consistent with the average household size in this study.

When considering type of intergenerational housing, seventy percent participants indicated that they prefer housing with multiple age residents. Twenty-two percent indicated that they would prefer senior only housing (Figure 11). This is generally in line with the number of participants who would consider senor cohousing (see Figure 10).

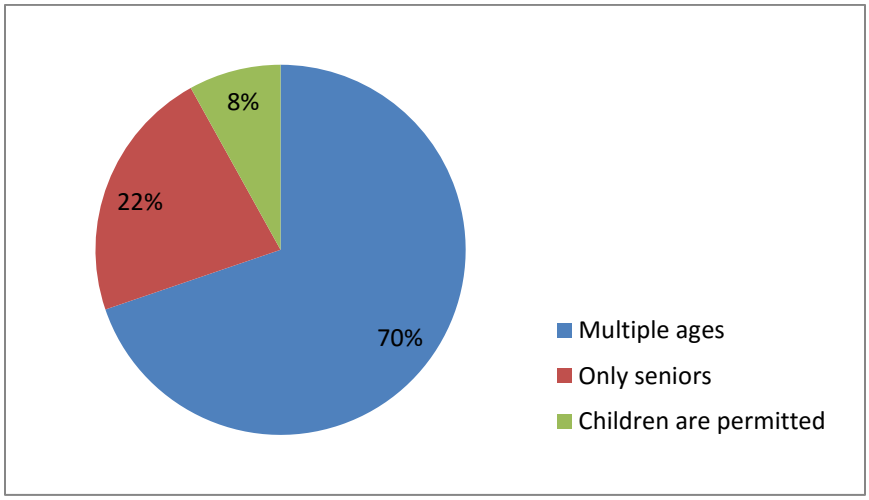

Figure 11. Participants' preference for intergenerational housing.

Survey participants selected full bathroom, full kitchen, living room, elevator, and washing machine in unit as the five most important amenities beside bedrooms (Table 1). Sufficient closet/storage space was considered as an important amenity by the majority participants as well. When considering the most important community amenities, participants selected hospital, walking paths/outdoor space, and public transportation (Table 2).

Table 1

Summary of Responses for the Most Important Amenities beside Bedrooms

Feature	Percentage	Number of Responses
Full bathroom	92	366
Full kitchen	89	352
Living room	74	295
Elevator	66	263
Washing machine in unit	64	256
Sufficient closet/storage space	59	233
Roll-in shower	26	102
Handicapped accessible feature	13	53

Table 2

Summary of Responses for the Most Important Community Amenities

Feature	Percentage	Number of Responses
Hospital	87	346
Walking paths/outdoor space	85	336
Public transportation	75	299
Clubs and activities	31	125
Library	18	71

Table 3

Summary of Responses for the Most Important Services

Service	Percentage	Number of Responses
Light housekeeping	85	338
Transportation	76	300
Outside maintenance	48	190
Laundry service	44	173
Shopping assistance	24	96
Medication monitoring	24	94

Survey participants were asked to identify the three most important services. Light housekeeping, transportation, and outside maintenance were selected as the top three services they would prefer (Table 3).

In conclusion, over 70% of the participants selected full bath, full kitchen, living room, hospital, walking paths/outdoor space, public transportation, light housekeeping, and transportation as important amenities and services. The responses suggested that future senior housing developments should incorporate these amenities and services.

Participant's Perceptions of Senior Cohousing Formation

Survey participants were asked a number of questions about their views on creating senior cohousing. The following is a summary of the participants' opinions on establishing a senior cohousing community. The primary purpose of this section is to identify various factors that may affect building and organizing a potential senior cohousing project.

Participants were asked their preferred method for recruiting community members. Ninety-two percent participants indicated that they would like to form a group interested of community members with friends or acquaintances. Fewer than five percent would consider recruiting people by signing up on a list published on newspaper or social media. The responses to this question suggested that potential senior cohousing community members should be recruited among friends or acquaintances in China. Recruiting through newspaper and social media most likely would not be an effective method.

In order to establish an effective cohousing community, participants were asked to identify topics that should be discussed among the interested member. Aging in place/aging in community is the only topic selected by more than 50% participants (Table 4). Table 4 represents that the majority discussion topics are not meeting the concerns of the participants very well. Although this is a multiple choice question with additional space for indicating other strategies, the participants did not provide information about what kind of topics they are interested to discuss.

Chinese cultural preference for family care shows up in the survey responses. Thirty-two percent participants indicated that they would prefer family care in case assisted care from other people is needed. However, participants' preferences for assisted caregiving were diverse. Community based care was selected by 30% of the participants. Both private care and co-care were chosen by about 20% of the participants. The responses may provide direction for government and community when developing appropriate assisted care services for seniors.

Table 4

Summary of Responses for Topics that should be discussed among the Interested Members of Senior Cohousing

Topic	Percentage	Number of Responses
Aging in place/aging in community	62	247
Co-care or outside care	45	180
What do we have to offer the world	43	172
The realities of getting older	38	150
Working together communication skills	38	149
Co-develop and co-design	37	147
The economics of getting older	32	129
Fears and mortality	10	40
Other	6	23

The participants were asked where they would find support for requisition of land. Seventy-one percent of the participants indicated that they would consider government programs for land requisition. Thirty-six percent indicated that they would find support from real estate developers. According to the Chinese Constitution, land in cities is owned by the State; land in the rural and suburban areas is owned by the State or by collectives. Individuals cannot privately own land in China but may obtain transferrable land-use rights for a number of years. This explains why the majority of participants would seek support from government for land requisition. Twelve percent participants indicated that they would consider some other land requisition programs, but did not provide detail information.

Forty-six percent of the participants indicated that personal savings are their preferred financing option. This result is consistent with the high saving rate in China. According to data from the World Bank, China has one of the highest household saving rates. Forty-four percent of the participants indicated that they would choose a mortgage as preferred financing option. Only eleven percent of the participants indicated that financial support from family members is their preferred financing option.

Fifty percent of the participants indicated that they would prefer to live in a senior cohousing community with residents' ages between 50 and 60. Thirty-two percent indicated that they would prefer resident's ages between 50 and 70. Only eighteen percent selected a senior cohousing community having residents ages from 50 to 80. Not surprisingly, these results are consistent with age composition data.

Majority participants indicated that they would prefer to live in a senior cohousing community with fewer than twenty households (61 percent). Twenty-three percent indicated that they would prefer to live in a cohousing complex with thirty or more units, while sixteen percent would like a cohousing complex containing 20-29 households.

Participants' Perceptions of Senior Cohousing Design Features

Survey participants were asked a number of questions about their views on senior cohousing design features. This section summarizes participants' preferences on critical amenities, important features of the common house, important features of the private unit, and important safety and accessibility features in a senior cohousing complex. The primary purpose of this section is to identify design features that help to support the physical and social well-being of older adults. This information will be valuable for designing effective senior housing with close social relationship and accessibility accommodations.

Community amenities are features that are located within or on the same property as a senior cohousing complex, outside of the individual living unit. These amenities are intended for communal use by all residents of the facility, generally improve the quality of life for residents, and commonly enhance social interactions among residents. Participants were asked to identify critical community amenities that should be offered in senior cohousing. Walking paths/outdoor space was selected by 89% of the participants. Flower and vegetable gardens were also a very popular choice by 67% of the participants. Forty-four percent of the participants selected common house as a critical community amenity (Table 5). Nevertheless, the common house is considered as one of the most

important feature in cohousing facility by the cohousing residents because it is the heart of every cohousing community and the link between home and neighborhood. This result could indicate that Chinese older adults do not have extensive understanding about the importance of common house in senior cohousing community.

Table 5

Summary of Responses for the Most Critical Amenities in a Senior Cohousing Complex

Feature	Percentage	Number of Responses
Walking paths/outdoor space	86	343
Flower/vegetable garden	67	267
Common house	44	175
Parking lot	34	135
Common laundry facility	24	96

Furthermore, participants were asked to identify important features inside the common house. A central kitchen and dining room were selected by 78% of the participants, followed by 67% of the participants selecting a TV lounge/reading room. About 40% of the participants chose craft room/workshop and guest room/care provider room as being desirable (Table 6).

Table 6

Summary of Responses for the Most Important Common House Features

Feature	Percentage	Number of Responses
Central kitchen/dining room	78	310
TV lounge/reading room	67	266
Guest room/care provider room	41	161
Craft room/workshop	37	146

Because older adults generally spend more time at home, features offered in a particular private unit affects older adults' physical well-being. Participants were asked to identify important features that a private unit should offer in senior cohousing. A private patio or balcony was selected by 74% of the participants. High speed internet, security system, and washing machine in the unit were chosen by 57%-64% of the participants. However, dishwasher was selected as an important feature by only 24% of the participants (Table 7). It is possible because dishwasher is not a common household appliance in China. The in-unit washing machine is preferred by more participants than common laundry facility (Table 5, Table 7).

Table 7

Summary of Responses for the Most Important Private Unit Features

Feature	Percentage	Number of Responses
Private patio or balcony	74	293
High speed internet	64	255
Security system	61	244
Washing machine in unit	57	227
Additional storage space	43	171
Dishwasher	24	95

Safety and accessibility features tremendously affect the physical and social well-being of older adults. Therefore, participants were asked to identify important safety and accessibility features that should be offered in senior cohousing.

Non-slip floor and personal emergency response system were the two most selected safety features. Two-way switch was also a popular choice. Smoke/fire detectors and gas sensors were selected by more than 40% participants.

The majority participants selected no-step entry, sliding clothes drying hangers, grab bars in the shower and around the toilet, a roll-in shower with a seat, extra-wide hallways and doors, and level-style handles on doors and faucets as important accessible features in senior cohousing complexes. However, a bathtub with a door to assist stepping in was not considered as an essential accessibility feature by the large majority of survey participants.

Although the level of accessibility related to public areas has been improved in China, accessibility features are mainly available in new constructions in urban areas. The general public in China are not familiar with accessibility standards and not aware that lack of accessibility features can cause serious problems for people with a disability. This is why safety features are more desirable than accessibility features among participants. However, the demand among participants was over 50% for almost all listed safety and accessibility features. This suggests that new senior housing facilities should incorporate these safety and accessibility features except for bathtubs with doors. This information is very valuable for developing senior housing that would be able to support the physical, mental, and social well-being of older adults.

Factors Influencing Participants' Perceptions

Rich information about the associations within the dataset was revealed via inferential statistics. Through examining the relationships between participants' perceptions and demographic factors, the results of the entire group of survey participants and results from sub-groups of participants are compared side by side. This section summarizes the observations by categories.

Preferred Place to Age Cross Tabulations

Notable differences in the preferred place to age by demographic characteristics are demonstrated by cross tabulation analysis. One sample *t*-test was significant with gender having an influence on the preferred place to age, $t(385) = -3.13$, $p = .002$. More males preferred aging in place while more females liked senior cohousing. In addition, more females preferred living with children than males (Figure 12).

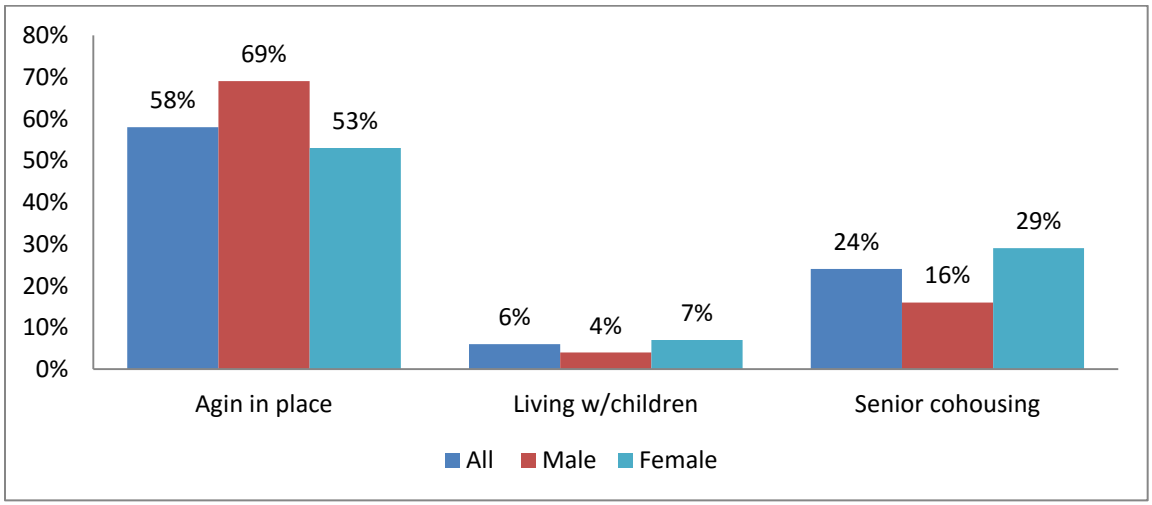

Figure 12. Preferred place to age by gender cross tabulation.

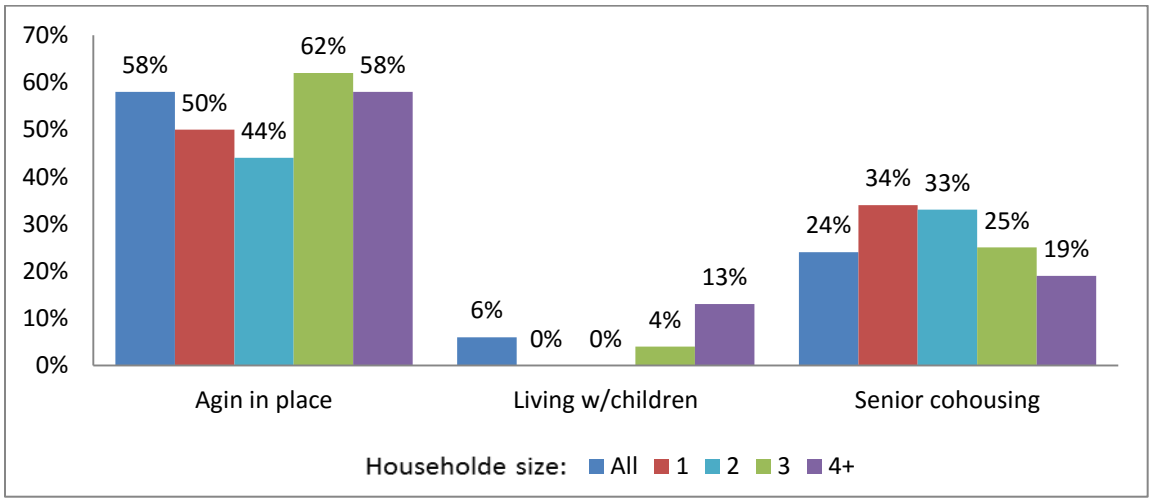

Figure 13. Preferred place to age by household size cross tabulation.

A chi-square test was performed to determine whether the preference for a place to age was affected by household size. The chi-square test was significant with household size having a large influence on the preferred place to age, $\chi^2(12, N = 393) = 71.28$, $p < .0001$. The desire for aging in place increased with household size, while the desire for senior cohousing decreased with household size. The desire for living with children increased with household size as well (Figure 13).

Another chi-square test was conducted to determine whether the preference for place to age was influenced by educational attainment. There was a statistically significant difference between the preferred place to age and educational attainment, $\chi^2(20, N = 395) = 43.88$, $p = .002$. The desire for senior cohousing progressively increased with educational attainment, while desire for aging in place decreased with education level overall. Participants who achieved higher education were less likely to consider living with children (Figure 14).

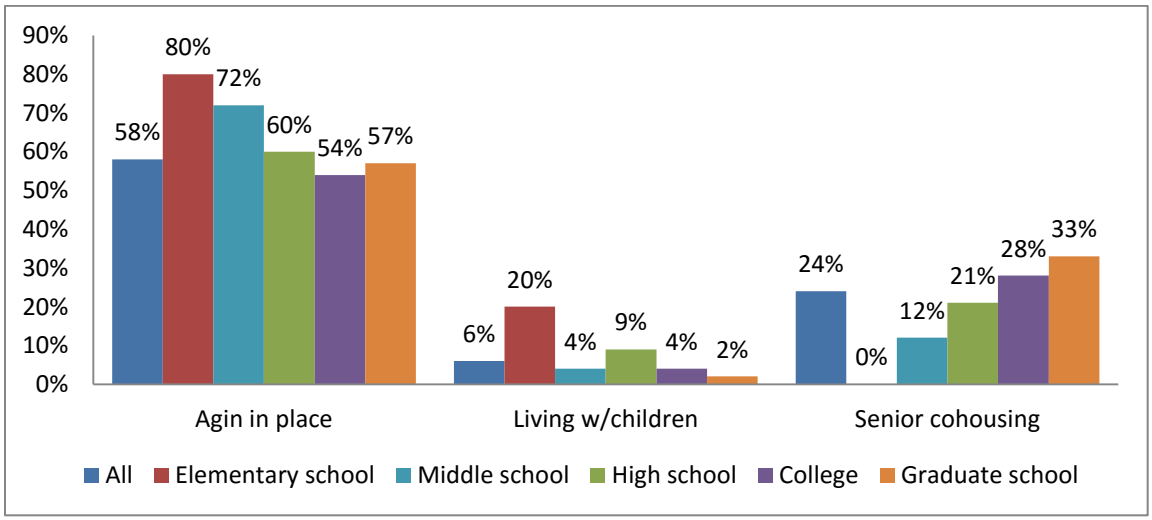

Figure 14. Preferred place to age by educational attainment cross tabulation.

Living Region Preference Cross Tabulations

Important differences in the preferred place to age by demographic characteristics are demonstrated by cross tabulation analysis. An independent samples *t*-test was conducted to compare living region preference by gender. There were statistically significant relationships between the living region preference and gender, $t(385) = 2.96$, $p = .003$. More females preferred living in the cities while more males liked living in rural areas (Figure 15).

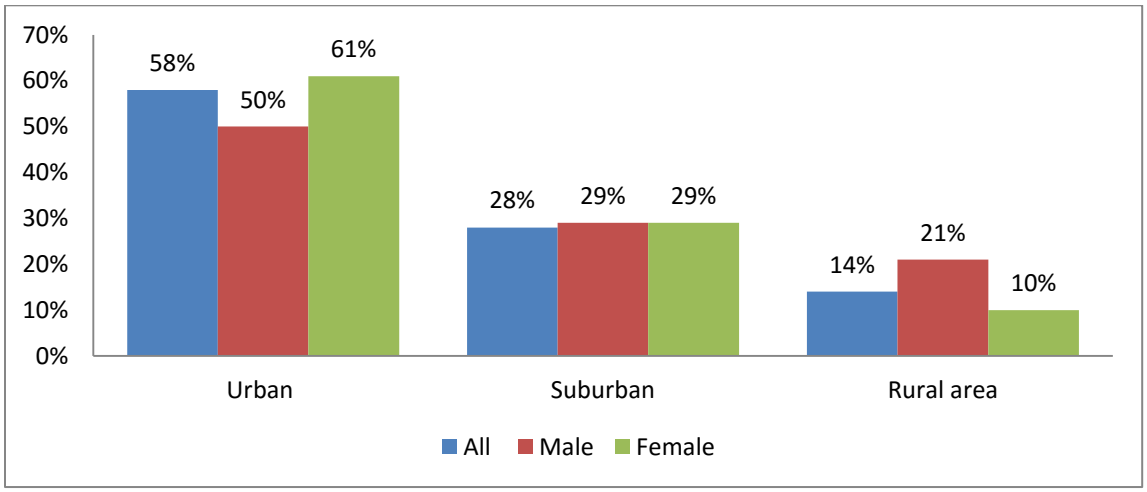

Figure 15. Living region preference by gender cross tabulation.

A chi-square test was conducted to determine whether the preference for living region was influenced by education level. The chi-square test was significant with educational attainment having a significant influence on the preferred region to live, $\chi^2(10, N = 397) = 20.93$, $p = .02$. Urban areas were preferred by majority of respondents overall at every education level. The desire for living in suburban areas gradually increased with educational attainment, while desire for rural areas decreased with educational attainment at large (Figure 16).

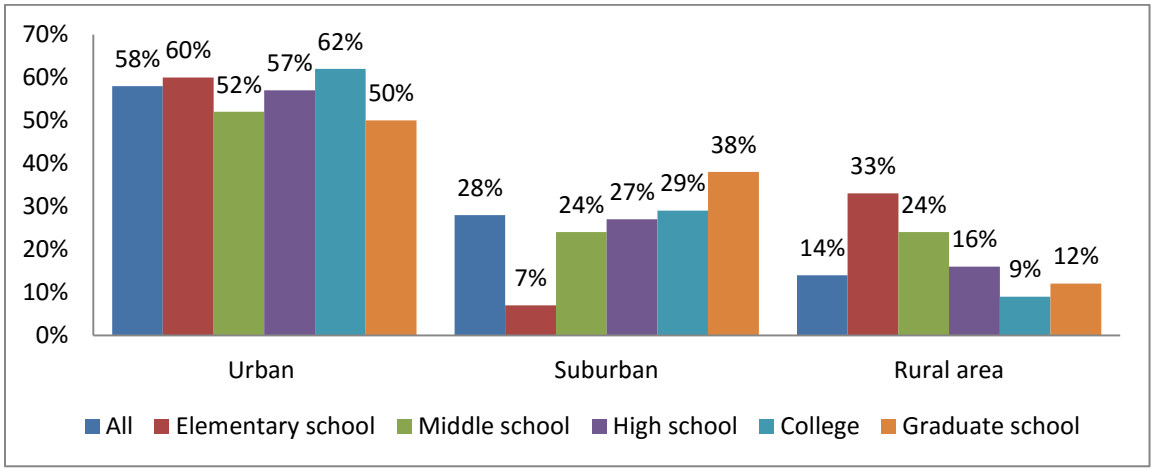

Figure 16. Living region preference by educational attainment cross tabulation.

Another chi-square test was conducted to determine whether the preference for living region was influenced by housing ownership. There was a statistically significant difference between the preferred region to live and housing ownership, $\chi^2(4, N = 397) = 16.79$, $p = .002$. Those who own their homes were more likely to consider living in urban and suburban areas, while renters were much more likely to consider living in rural areas (Figure 17). This makes sense because the costs of both housing and rent are likely lower in rural areas.

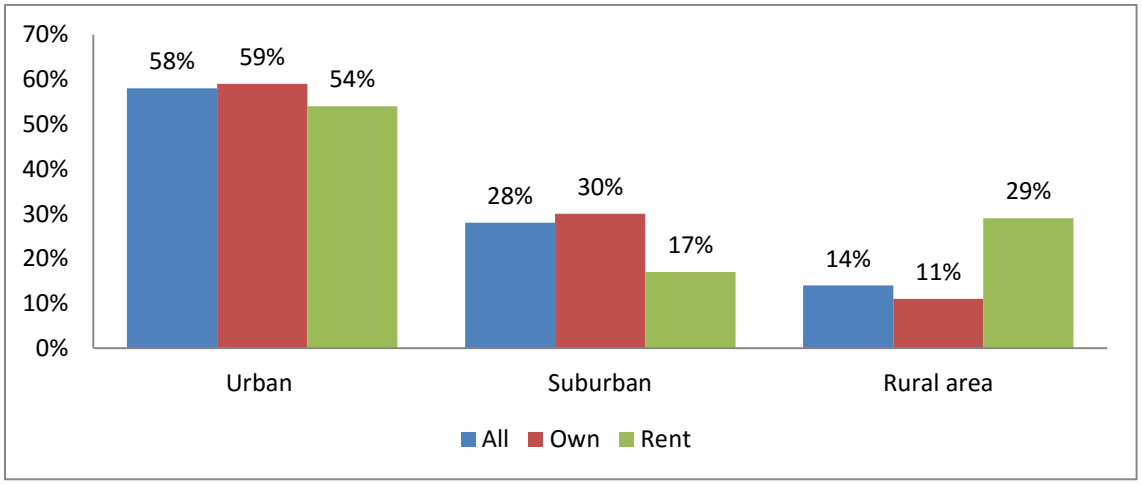

Figure 17. Living region preference by housing ownership cross tabulation.

Type of Housing Preference Cross Tabulations

An independent samples t-test was conducted to compare type of housing preference by gender. There was a statistically significant relationships between the type of housing preferred and gender, $t(385) = 2.14$, $p = .03$. Males preferred single family residences, while females were more likely to consider apartment and townhouse style housing, especially townhouses. Apartments and townhouses are more popular than single family houses among the participants (Figure 18).

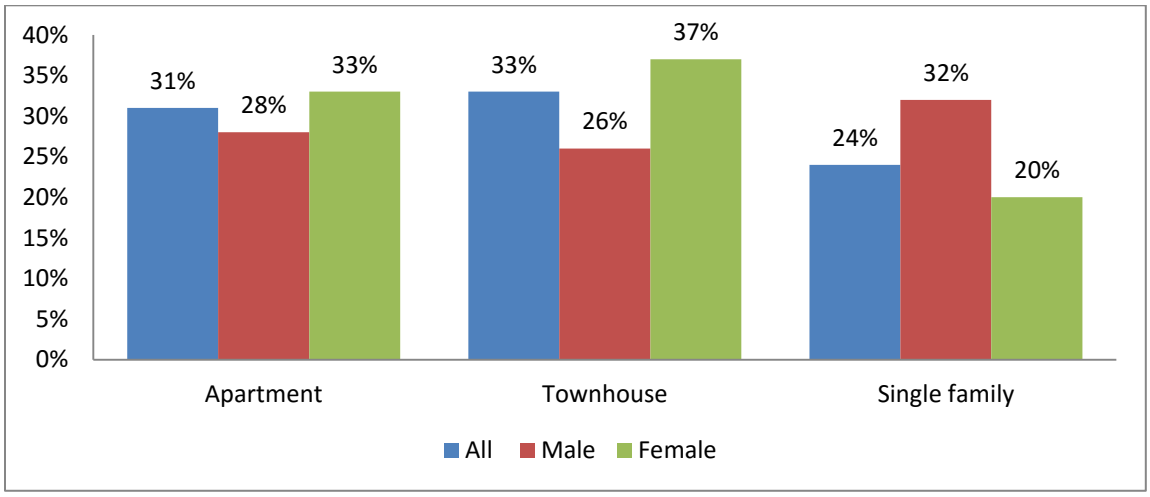

Figure 18. Type of housing preference by gender cross tabulation.

In addition, results of a chi-square test comparing the differences of type of housing preference among various household sizes were significant, $\chi^2(9, N = 396) = 22.39$, $p = .008$. Two-person households were more likely to consider apartments, while three-person households were more likely to consider single family homes. Townhouses were more desirable by one-person, two-person and four or more person households (Figure 19). Again, these results showed a townhouse is desirable by almost every

demographic group in this survey population. The popularity of townhouse as a preferred type of retirement housing has implication for senior housing planning in China.

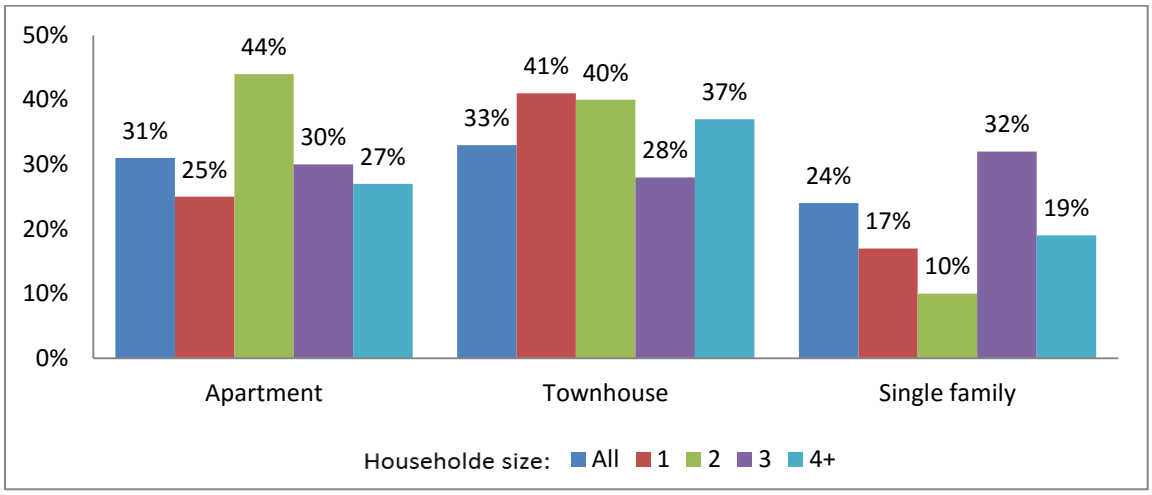

Figure 19. Type of housing preference by household size cross tabulation.

Bedroom Preference Cross Tabulation

As expected, there is a statistically significant association between household size and the number of bedrooms preferred. A one-way ANOVA was conducted to investigate the impacts of household sizes on the number of bedrooms preferred. The independent variable was the household size with four categories (1, 2, 3, and 4 or more). The dependent variable was the number of bedrooms preferred (0, 1, 2, and 3). The ANOVA was significant with household size having a significant influence on the number of bedrooms preferred, $F(3, 391) = 3.77$, $p = .01$. In general, households preferred a number of bedrooms that were generally equal to or greater than their household size. Among the different household sizes, one bedroom units were most desirable to one-person households. Yet the majority of one-person households preferred a two or three bedroom unit. Two bedroom units were most desirable to two-person households. However, almost

30% of two-person households preferred one bedroom units. Three or more person households were split, with about 40% preferring a two bedroom unit and another 40% preferring a three bedroom units. Overall, two bedroom units were most desirable among the participants (Figure 20).

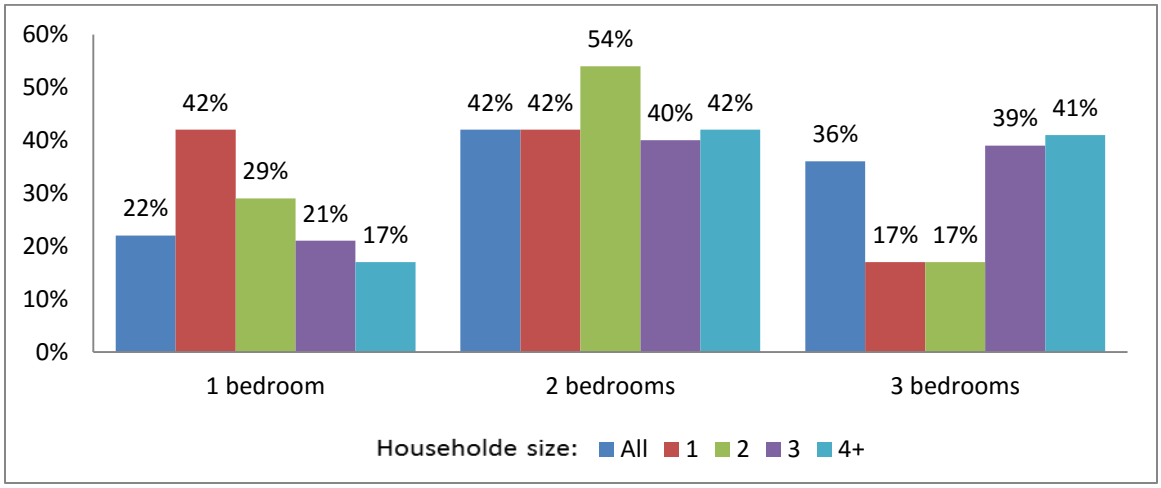

Figure 20. Bedroom preference by household size cross tabulation.

Financing Option Preference Cross Tabulation

A chi-square test was conducted to determine whether the preference for financing option was influenced by age. The chi-square test was significant with age having a large influence on preferred financing option, $\chi^2(4, N = 391) = 19.76$, $p = .0006$. Older adults ages 70 and over are underrepresented in this study, and there was no significant difference among financing options in this group. Therefore, this cross tabulation analysis only compared differences between age group 50-59 and age group 60-69. Older adults ages 50-59 were more likely to consider mortgage, while older adults ages 60-69 were more likely to use personal saving. Moreover, older adults ages 60-69 were more likely to seek family support than older adults ages 50-59 (Figure 21).

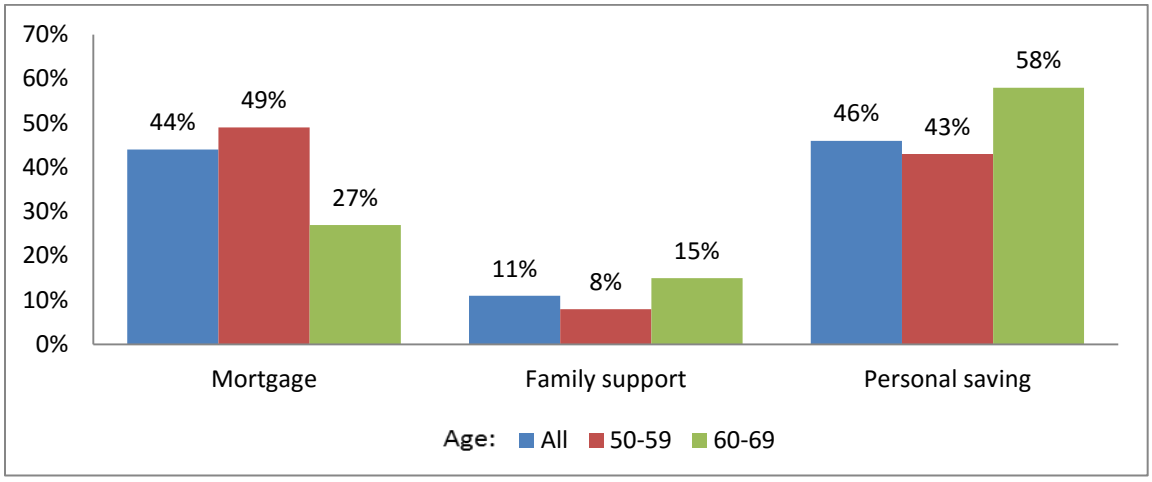

Figure 21. Financing option preference by age cross tabulation.

Age Range of Senior Cohousing Preference Cross Tabulation

A one-way ANOVA was performed to examine the impacts of age on the preferred age range of senior cohousing. The independent variable was age with three categories (50-59, 60-69, and 70+). The dependent variable was the preferred age range of senior cohousing (50-60, 50-70, and 50-80). The ANOVA was significant with age having a large influence on the preferred age range in senior cohousing, $F(2, 389) = 9.87$, $p < .001$. This make intuitive sense as the preference for older age range increased with age. The preference for older age range declined with increasing age (Figure 22).

Desirable Private Unit Features in Senior Cohousing Cross Tabulation

There were three private unit features that showed a significant relationship between respondent's gender and preference. Security system, washing machine in unit, and additional storage were all more desirable by females than males (Figure 23).

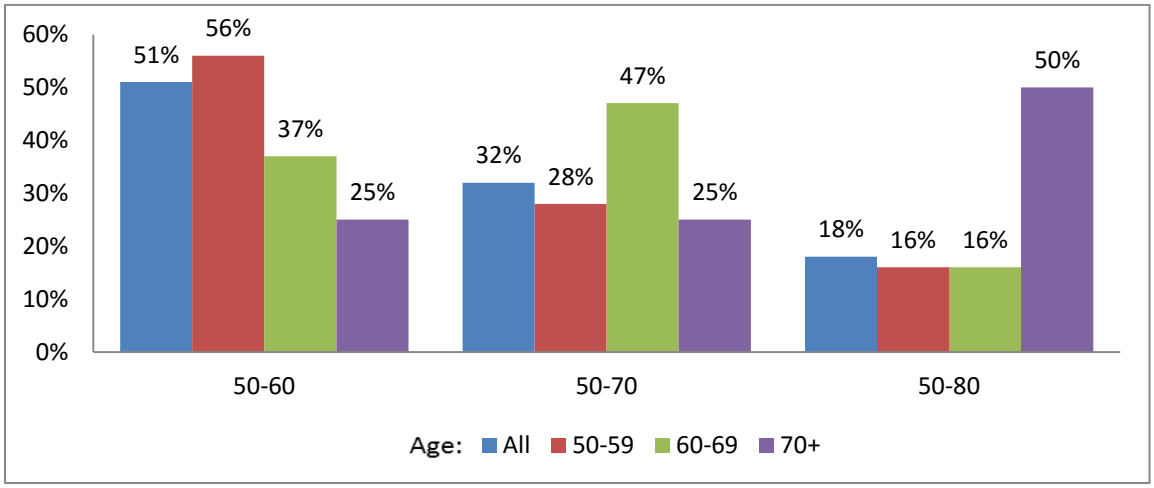

Figure 22. Preferred age range of senior cohousing by age cross tabulation.

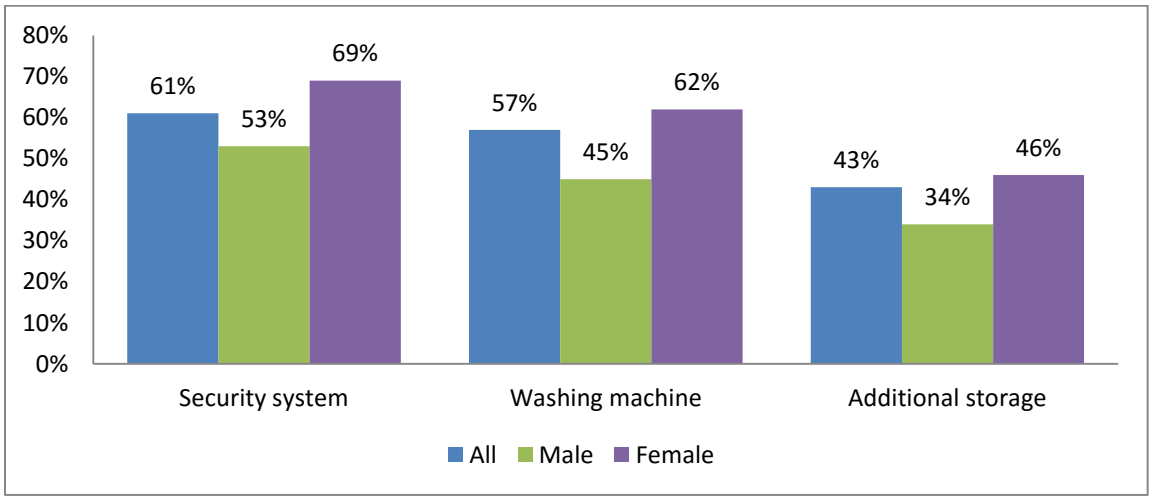

Figure 23. Private unit features in senior cohousing by gender cross tabulation.

Safety and Accessibility Cross Tabulation

The importance of safety and accessibility features is remarkably consistent across almost all demographic groups. The only cross tabulation with safety and accessibility features that showed a significant relationship was gender. Gas sensors, grab bars in the bathroom, and sliding cloth drying hangers were desired by more females than males (Figure 24).

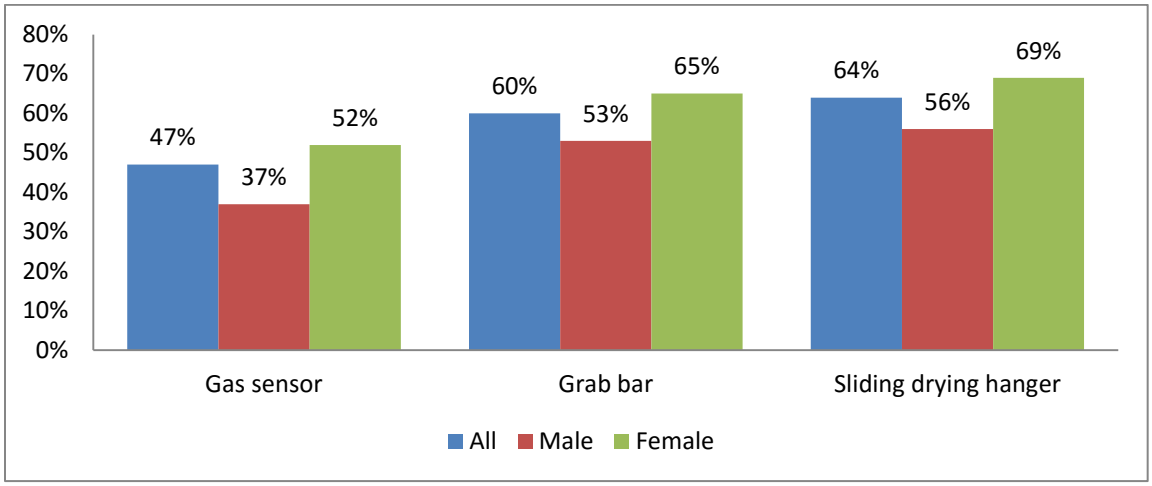

Figure 24. Safety and accessibility features by gender cross tabulation.

Correlation Relationship

Correlation analyses were conducted among all variables and Pearson correlation coefficients were calculated and examined. No medium and strong correlations were found between any two variables. This is due to the vast majority variables in this study are categorical variables. Therefore, chi-square test and cross tabulation analysis were used to examine the relationship between those variables instead of correlation and regression analyses.

Summary

Fifty-eight percent of participants indicated that they would prefer aging in place, while a quarter of the participants indicted that they would like senior cohousing community. The majority of survey participants preferred to live in cities. For participants' preference on type of housing, apartments and townhouses were more popular than single family houses among participants.

For retirement housing, survey participants selected full bathroom, full kitchen, living room, elevator, and washing machine in unit as the five most important amenities beside bedrooms. When considering the most important community amenities, participants selected hospital, walking paths/outdoor space, and public transportation. Light housekeeping, transportation, and outside maintenance were selected as the top three services they would prefer.

Ninety-two percent of the participants indicated that they would like to form a group of interested community members with friends or acquaintances, rather than recruit people by signing up on a list published on newspaper or social media. Seventy-one percent of the participants indicated that they would consider government programs for land requisition, while thirty-six percent indicated that they would find support from real estate developers. The majority of the participants (61%) indicated that they would prefer to live in a senior cohousing community with fewer than twenty households.

The majority of the participants selected walking paths/outdoor space (89%) and flower/vegetable gardens (67%) as the most critical amenities for senior cohousing complexes. Central kitchens and dining rooms (78%) and TV lounge/reading rooms (67%) were chosen as the most important features that the common house should offer. For important private unit features in senior cohousing, a private patio or balcony was selected by 74% of participants. A non-slip floor (79%) and personal emergency response system (78%) were the two most selected safety features. In addition, the majority of the participants selected no-step entry, sliding clothes drying hangers, grab bars in the shower

and around the toilet, a roll-in shower with a seat, extra-wide hallways and doors, and level-style handles on doors and faucets as important accessibility features.

The aim of examining relationships between participants' perceptions and demographic factors was accomplished through cross tabulation analyses. Gender influenced participants' preference on multiple categories of housing characters. Household size, educational attainment, age, and housing ownership were also influential factors in this study. Factors such as gender, household size, and education level were most likely to influence the kind of facility that the older adults would seek for retirement. Females were more likely to choose senior cohousing. One or two-person households were more likely to consider senior cohousing. Older adults with college or graduate degrees were more likely to consider senior cohousing. Factors such as gender, educational attainment, and housing ownership were most likely to influence the living region that the older adults would look for retirement. Participants with higher educational degrees were more likely to choose suburban rather than rural area. Both gender and household size influenced participants' preference for housing type. The townhouse was a popular choice among participants. Moreover, two bedroom units were most desirable among all participants. Lastly, females were more concerned about safety and accessibility features than males.

Chapter 5

Conclusion

The population of the elderly is rapidly increasing in China. The 60 years and older population is projected to reach 34.6% by 2050, upward to 480 million (Zhai, 2015). Ensuring that these older adults have the optional housing and community they need to enjoy high-quality, independent lives has thus become a major issue for the Chinese in the twenty-first century (Chen & Powell, 2012).

Traditionally, the extended family was primarily responsible for taking care of the elderly in China. However, due to rapid urbanization and the one child policy, the structure of the conventional family and elderly care system is quickly changing. As a result, elderly care provided by extended family is barely available in Chinese society. The researcher of this study found that small nuclear family accounted for vast majority of the survey participants' families. This is generally in line with previous research findings, which showed majority of older Chinese were not living with their adult children (Li & Chen, 2011; Wan et al., 2008). In addition, the researcher confirmed that today's Chinese older adults are interested in various elderly care options other than family care. Older adults in China are adapting to the change of traditional family support system by considering elderly cares such as community based care, private care, and co-care. Subsequently, most current housing is not designed to accommodate for the physical and cognitive challenges that arise with aging (Cheng et al., 2011); accessibility features are mainly available in new public constructions, which further prevents elderly

with disabilities from living safely and comfortably in their homes. Indeed, the results showed that basic safety and accessibility features were desired by the majority of participants.

Along with housing challenges, aging brings an even greater risk for isolation. The cohousing concept reestablishes many of the advantages of a traditional community but within the context of twenty-first century life. This model affords mutual support and a sense of belonging to the residents (Durrett, 2009). Most importantly, cohousing is culturally acceptable in China because older adults normally live close to others and enjoy community activities (Wan et al., 2008). As well as the advantages of community living, senior cohousing is also designed with basic accessibility features that help older adults live safely and comfortably in their homes. Despite enthusiasm for the potential benefits of senior cohousing, there has been very little research on how Chinese older adults view senior cohousing. The researcher aimed to address these critical gaps through this comprehensive study on the perceptions of senior cohousing by older adults in China. Chinese older adults ages 50 or over were invited to participate in a structured, self-administrated online survey in Chinese. The researcher examined older adults' demographic characteristics, evaluated their general preference on retirement housing and services, and assessed their perceptions of senior cohousing.

The ecological theory of aging (Lawton, 1977) has been applied as a conceptual basis to guide the design of questions that address the problems related to additional assisted cares, disability-equipped housing, and design features that can enhance social connections of older adults. Building on the previous research, the researcher aimed to

explore from older adults' perspectives what their housing and elderly care needs are, to identify desirable amenities and services in community, to recognize elderly care needs in cohousing, and to identify various services and design features that help to support the physical and social well-being of older adults in cohousing.

The researcher found that aging in place was the preference of the majority participants. On the other hand, senior cohousing was an attractive option for Chinese older adults who want to live independently as long as possible because participants who preferred to age in senior cohousing were not likely to choose living with children. Moreover, a vast majority of the participants preferred an age range from 50 to 70 in senior cohousing communities. Furthermore, the majority of the participants indicated that they would prefer to live in a small senior cohousing community with fewer than twenty households.

It was revealed by the analysis of the data that educational attainment was a critical factor that influenced an older adult's decision on where to age. In general, the majority of the survey respondents preferred to live in the cities regardless of age, gender, and educational attainment. Nevertheless, the desire for living in suburban areas gradually increased with educational attainment. Additionally, the desire for senior cohousing progressively increased with educational attainment, while desire for aging in place decreased with educational attainment overall. Collectively, the researcher found that senior cohousing in urban or suburban area would be more attractive to older adults in China rather than rural area.

Household size was another critical factor that influenced older adults' preference for where to age and what kind of housing they will seek. Participants in larger households with three or more persons were more likely to select aging in place, while participants in smaller households with one and two-person(s) were more likely to choose senior cohousing. Moreover, participants in smaller households were more likely to consider apartments and townhouses. Lastly, one and two bedroom housing units were most desirable by participants in small households. Taken together, the apartment or townhouse style housing containing private units with one and two bedroom(s) would be desirable by Chinese older adults who are interested in senior cohousing facility.

Gender was an important factor that influenced living region, type of aging facility, type of housing, and design features. Since women live longer than men, the gender gap among older adults increases with age in China (Zhai, 2015). Therefore, the differences by gender should be considered when gender composition is an issue in a particular retirement community.

In conclusion, the findings about preferences as to living region and type of housing where older adults prefer to age may provide government and senior housing developers with insight about the location of senior housing facility and the type of housing inside the facility. The findings about gender differences may also assist senior community planning in China.

The findings of this study have implications for senior cohousing, as well as other retirement facilities in general. Based on the desirable community amenities and features identified in this study, neighborhood walkability should be incorporated into senior

community planning in China. Researchers have showed that neighborhood walkability was closely associated with the physical well-being of older adults (Kerr et al., 2012).

One of the more significant results of this study is participants' preference for safety and accessibility features. Non-slip floor and personal emergency response system were the two most selected safety features. In addition, no-step entry, sliding clothes drying hangers, grab bars in the shower and around the toilet, a roll-in shower with a seat, extra-wide hallways and doors, and level-style handles on doors and faucets were chosen as important accessibility features. According to the ecological theory of aging, accessibility and safety features, new housing solutions, and new technologies are able to support declining competences associated with old age. That means the availability of features that improve a housing facility's safety and accessibility plays an important role in supporting the physical and social well-being of older adults. Certainly, the researcher of this study found that the importance of safety and accessibility features across all demographic groups is remarkably consistent, with just a few notable differences between genders. Additionally, Chinese people are living longer and are therefore more prone to encounter issues associated with old age (Zhai, 2015). These findings and facts suggest that new retirement housing development in China should consider incorporating these safety and accessibility features.

To conclude, the findings of this study can be an asset in evaluation of new senior housing development in China. In general, the findings of this study may be used to help senor community planning, assist senior-friendly community developments and existing senior community improvement, and aid to design effective senior housing with safety

and accessibility accommodations that would better serve to boost the comfort and welfare of older adults in China.

Limitations of the Study

There are several limitations which may have influenced the results. The majority of the limitations of this study are related to some unevenly distributed demographic groups.

1. Older adults ages 70 or over were underrepresented in this study most likely because the percentage of non-internet users generally increases with age. Moreover, the results of this study showed that older respondents were less likely to complete the survey than younger respondents possibly due to the lack of basic computer skills in finishing an online survey. This further shrank the demographic group that contains older adults ages 70 and over.
2. Older adults with elementary school or middle school education were also underrepresented in this study possibly due to the same reasons as above.
3. The goal of clarifying the current living arrangement of older adults in China was not fully accomplished due to the design flaw of the survey question that asked what the participants' living arrangement was.
4. The results in this study showed that the listed discussion topics about establishing an effective cohousing community on the questionnaire did not meet the concerns of Chinese older adults very well. The proper topics need to be identified for more effective discussions.

5. Participants living in rural areas were most likely underrepresented. China's rural residents are less likely to have access to the internet than urban residents, which means that they were less likely to end up in the sample.

Recommendations for Future Work

This study involved a sample that has underrepresented demographic groups. In order to apply the study results to a broader population of older adults in China, future research would be beneficial in several areas of this study. First, more works are needed to investigate the perceptions of senior cohousing by older adults ages 70 or over because their needs of housing and community amenities may differ from the young old. Second, additional works are needed to clarify the current living arrangement of older adults in China. Researchers have showed that living arrangement is closely associated with the availability of social and physical support to older adults and their overall life satisfaction. Living arrangement also has impact on residential needs of older adults, such as safety, accessibility, and leisure aspects of housing (Li & Chen, 2011; Yu, Yan, & Li, 2016). Third, future research is necessary to figure out the discussion topics that would be more related to the concerns of Chinese older adults who are interested in senior cohousing. In order to establish an effective cohousing community, it is important that potential residences meet and work closely with each other to discuss their concerns. Through discussion, older adults explore how they want to age together and identify the best practices that could provide the foundation for building cohousing community (Durrett, 2009). Lastly, for the underrepresented groups, such as older adults ages 70 or over and

older adults with elementary or middle school education levels, mail survey, telephone survey, or in person survey should be considered to ensure a higher response rate.

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Appendices

Appendix A IRB Approval Letter

Human Research Protection Program
Institutional Review Board
Office of Research Integrity
B308 Kerr Administration Building, Corvallis, Oregon 97331-2140
(541) 737-8008
IRB@oregonstate.edu | http://research.oregonstate.edu/irb

APPROVAL NOTICE

Date of Notification	06/30/2017	Date Approved	06/30/2017
Principal Investigator	Seunghae Lee	Study ID	8091
Study Title	Perceptions of senior cohousing by older adults in China		
Study Team Members	Yujuan Song		
Review Level	Expedited	Category(ies)	7
Submission Type	Initial Application		
Waiver(s)	Documentation of Informed Consent		
Risk Level for Children	N/A		
Number of Participants	1000 Do not exceed this number without prior approval		
Funding Source	None	PI on Funding	N/A
Proposal #	N/A	Cayuse #	N/A

The above referenced study was reviewed and approved by the OSU Institutional Review Board (IRB).

EXPIRATION DATE: 06/29/2020
Continuing review applications are due at least 30 days prior to expiration date

Comments:

Please note when applicable, if the PI has not already done so, the HRPP staff will update the version date on the protocol and consent document(s).

This study has been determined to meet the **FLEX** criteria and the following apply:

☒ Approval period has been extended beyond one year, but not greater than three years
☐ Reasonable safeguard standard regarding the requirement for parental permission
☐ Reasonable safeguard standard regarding the enrollment of pregnant women

Adding any of the following elements will invalidate the FLEX determination and require the submission of a project revision:

- Increase in risk
- Federal funding or a plan for future federal sponsorship (e.g., proof of concept studies for federal RFPs, pilot studies intended to support a federal grant application, training and program project grants, no-cost extensions)
- Research funded or otherwise regulated by a federal agency that has signed on to the Common Rule, including all agencies within the Department of Health and Human Services
- FDA-regulated research
- NIH-issued or pending Certificate of Confidentiality
- Prisoners or parolees as subjects
- Contractual obligations or restrictions that require the application of the Common Rule or which require annual review by an IRB
- Classified research

- Clinical interventions

Principal Investigator responsibilities for fulfilling the requirements of approval:

- All study team members should be kept informed of the status of the research.
- Any changes to the research must be submitted for review and approval prior to the activation of the changes. **This includes, but is not limited to, increasing the number of subjects to be enrolled.** Failure to adhere to the approved protocol can result in study suspension or termination and data stemming from protocol deviations cannot be represented as having IRB Approval.
- Reports of unanticipated problems involving risks to participants or others must be submitted to the HRPP office within three calendar days.
- Only consent forms with a valid approval stamp may be presented to participants.
- Submit a continuing review application or final report to the HRPP office for review at least four weeks prior to the expiration date. Failure to submit a continuing review application prior to the expiration date will result in termination of the research and discontinuation of enrolled participants.

Appendix B Recruitment Email

Dear Potential Participant,

The Oregon State University College of Business is actively seeking Chinese individuals, age 50 or above, to participate in a survey. The purpose of this research is to examine the perceptions of senior cohousing by older adults in China and look for ways to improve this fluctuating situation.

Studies show that the population of the elderly is rapidly increasing in China. The country's ability to meet the needs of the aging population is quickly becoming an issue of national concern. Traditionally, families have provided basic care and companionship for their elderly family members. However, due to major economic shifts, the structure of the conventional support system is quickly changing and elder care provided by family is increasingly becoming less feasible. Still, the majority of the elder population prefers to age at home and not in institutions.

Due to advances in health care, western civilizations have historically encountered the logistics of managing aging societies earlier than China. Senior cohousing that combines the autonomy of private dwellings with the advantages of community living have seemed to prove successful in Europe and America. Through participation in this survey, you will have the opportunity to study ways senior co-housing communities are developed, as well as to explore the common components among the most successful senior cohousing environs.

This is a short survey and should take no more than about 20 minutes to complete. Click on the following link to go directly to the survey http://oregonstate.qualtrics.com/jfe/form/SV_bOynzTHw6hrb6El, or simply copy and paste the URL to your internet browser.

Participation in this survey is voluntary and your response will be confidential. No IP addresses will be collected or saved, nor will any personal identifiable information be tracked from the data received. Should you have any further questions or comments, please feel free to contact us at songyuj@oregonstate.edu.

We appreciate your time and consideration in completing the survey. Thank you for participating in this study. Your participation will help us to better understand and improve the current housing situation of older adults.

Many thanks,

Yujuan Song

Master's Degree Candidate

Dr. Seunghae Lee

Principal Investigator

Study Title: Perceptions of Senior Cohousing by Older Adults in China

Appendix C Consent Form

This form contains information that should help you decide whether to be a participant in this study. Please read the form carefully.

You need to be 50 or older Chinese to participate in this study.

You have been chosen to take part in a self-administered online questionnaire regarding perceptions of senior cohousing by older adults in China. This research study is being conducted by Yujuan Song, a Master's Degree Candidate with College of Business at Oregon State University. We estimate it should take approximately 20 minutes to complete.

Any information collected from this study will be used in a master's thesis. Up to 500 adults may be invited to take part in this survey. It is our hope that this study will help us to better understand the current housing situation for seniors. We are also hoping the results can provide an indication of personal preferences when it comes to the types and characteristics of prospective housing accommodations.

You are being invited to take part in this study because you have been identified as a potential future occupant for senior cohousing. Your opinion is valued.

Any participation in this survey is considered voluntary. There will be no direct benefit by your involvement; however, by choosing to take part you will have an opportunity to look at the processes by which these communities are developed and to explore common components among the most effective senior co-housing environs.

We anticipate no foreseeable risk by participating in this study. Responses will be forwarded to Qualtric.com, and information will be kept confidential. Any digital data will be securely stored. Qualtric does not collect identifying information such as name, IP address, or other personal records. Therefore, all response will remain anonymous.

If you have any questions about this study, you may contact my research Supervisor, Assoc. Prof. Seunghae Lee at 541 737 5952. You may also email me at songyuj@oregonstate.edu if you have any further questions or concerns. If you have enquiries about your rights or welfare as a participant, please contact the Oregon State University Institutional Review Board (IRB) Office, at (541) 737-8008 or email IRB@oregonstate.edu

Please continue to begin the survey.

Appendix D Questionnaire

Instructions: Please provide a response for each of the following questions.

Demographic Information

1. What is you gender?
   - O Male
   - O Female

2. What is your age?
   - O 50-59
   - O 60-69
   - O 70-79
   - O 80+

3. What is your marital status?
   - O Single
   - O Married
   - O Separated
   - O Divorced
   - O Widowed

4. What is the highest level of education you completed?
   - O No education
   - O Elementary school
   - O Middle school
   - O High school
   - O College
   - O Graduate school

5. What is your household size including you?
   - O 1
   - O 2
   - O 3
   - O 4 or more

6. Do you have any children or grandchildren?
   - O None
   - O Children only
   - O Grandchildren only
   - O Both children and grandchildren

7. What is your current living arrangement?
   - O Alone

- O With spouse only
- O With partner only
- O With children only
- O With grandchildren only
- O With spouse/partner and children
- O Live in group quarters (nursing homes, assisted living)

8. Do you own or rent the accommodation?
   - O Own
   - O Rent
   - O Neither own or rent (live with family)

9. What is the annual income of your household?
   - O Less than ¥20,000
   - O ¥20,000 – ¥40,000
   - O ¥40,001 – ¥60,000
   - O ¥60,001 – ¥80,000
   - O ¥80,001 – ¥100,000
   - O Above ¥100,000

10. How is your health in general?
    - O Very good
    - O Good
    - O Fair
    - O Bad
    - O Very bad

General Preference for Retirement Housing

11. Where would you prefer to age?
    - O Aging in place without moving
    - O Living with children
    - O Continuing care retirement community
    - O Assistant living/nursing home
    - O Senior cohousing

12. What region would you prefer to live?
    - O Urban
    - O Suburban
    - O Rural area

13. What type of housing would you prefer?
    - O Apartment
    - O Townhouse
    - O Single family house

- ○ Other

14. What type of the intergenerational housing would you prefer?
    - ○ Multiple ages
    - ○ Only seniors (50+)
    - ○ Children are permitted

15. How many bedrooms would you prefer?
    - ○ 0 (studio)
    - ○ 1
    - ○ 2
    - ○ 3

16. Please check the five most important amenities beside bedroom
    - ☐ Full kitchen
    - ☐ Full bathroom
    - ☐ Living room
    - ☐ Sufficient closet/storage space
    - ☐ Roll-in showers
    - ☐ Washing machine in unit
    - ☐ Handicapped accessibility
    - ☐ Elevator

17. Please check the three most important services for you
    - ☐ Light housekeeping
    - ☐ Shopping assistance
    - ☐ Laundry service
    - ☐ Medication monitoring
    - ☐ Transportation
    - ☐ Outside maintenance

18. Please check the three most important community amenities
    - ☐ Hospital
    - ☐ Public transportation
    - ☐ Walking paths/outdoor space
    - ☐ Clubs & activities
    - ☐ Library

Cohousing Community and Design Features

19. To form a group interested community members, which methods would you prefer?
    - ○ A group of friends or acquaintances
    - ○ Sign up on a list publish on newspaper or social media
    - ○ Other

20. Where would you find support for requisition of land (You may choose more than one option)?
    - ☐ Government
    - ☐ Real estate developer
    - ☐ Other

21. Which of the following would be your preferred financing option?
    - ○ Mortgage
    - ○ Support from family
    - ○ Personal saving

22. In order to establish an effective cohousing community, which topics should be discussed among the interested members (You may choose more than one option)?
    - ☐ Aging in place/aging in community
    - ☐ Working together communication skills
    - ☐ The realities of getting older
    - ☐ Co-care or outside care
    - ☐ The economics of getting older
    - ☐ Fears and mortality
    - ☐ What do we have to offer the world?
    - ☐ Co-develop and co-design
    - ☐ Other

23. What age range do you prefer in senior cohousing community?
    - ○ 50-60
    - ○ 50-70
    - ○ 50-80

24. How many units do you prefer in a cohousing community?
    - ○ Less than 10
    - ○ 10-19
    - ○ 20-29
    - ○ 30 or more

25. What type of caregiving you would prefer in case you need assisted care from other people?
    - ○ Family care
    - ○ Private care
    - ○ Community based care
    - ○ Co-care

26. Please check the most critical amenities that a cohousing complex should offer (You may choose more than one option)
    - ☐ Walking paths/outdoor space
    - ☐ Flower/vegetable gardens

- ☐ Common house
- ☐ Common laundry facility
- ☐ Parking lot

27. Please check the most Important features that the common house should offer (You may choose more than one option)
    - ☐ Central kitchen/dining room
    - ☐ TV lounge/reading room
    - ☐ Craft room/workshop
    - ☐ Guest room/care provider room

28. Please check the most important features that the private unit should offer (You may choose more than one option)
    - ☐ Security system
    - ☐ High speed internet
    - ☐ Private patio or balcony
    - ☐ Washing machine in unit
    - ☐ Dishwasher
    - ☐ Additional storage

29. Please check the important safety features should offer in cohousing (You may choose more than one option)
    - ☐ Non-slip floor surfaces
    - ☐ Two-way switches (especially in bedroom)
    - ☐ Personal emergency response system
    - ☐ Smoke/fire detectors
    - ☐ Gas sensors

30. Please check the important accessibility features should offer in cohousing (You may choose more than one option)
    Images will be provided online for the following features.
    - ☐ No-step entry
    - ☐ Extra-wide hallways and doors
    - ☐ Lever-style handles on doors and faucets
    - ☐ Grab bars in shower/around toilet
    - ☐ Roll in shower with seat
    - ☐ Bathtub with a door to assist stepping in
    - ☐ Aluminum sliding clothes drying hanger