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Designing Urban Intergenerational Co-Living Environments: Enhancing Community Engagement and Psychological Well-Being for the Elderly Through Sports and Recreation

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Abstract
In the context of an aging society, family-based elder care has become the preferred choice, with intergenerational co-living models, where elderly individuals reside with their children and grandchildren, posing higher demands on urban residential environments. This study analyzes the factors, needs, and challenges associated with urban intergenerational co-living within the framework of family-based elder care. It aims to propose design strategies that cater to the specific living requirements of elderly individuals at various stages of aging while accommodating the needs of other family members, including children and grandchildren. The study also addresses the complexities introduced by family planning policy reforms, which influence intergenerational co-living environments. Strategies are suggested to create inclusive, livable spaces that balance the needs of all generations, fostering stronger familial bonds and harmonious development of intergenerational relationships. From a sports psychology perspective, this research emphasizes the role of recreational and sports activities in intergenerational co-living environments. By incorporating shared spaces for physical activities, sports, and recreation, the proposed design strategies promote psychological well-being, enhance social engagement, and improve overall quality of life for all family members. These insights provide a foundation for integrating physical and emotional health into urban residential planning, contributing to sustainable and harmonious living environments.
Keywords: Aging, City, Intergenerational Co-living, Residential Environment

1. Introduction

China's aging population is not only large in number, but also grows rapidly. At present, China is now undergoing rapid development of population aging, and this will be the basic national reality for China in a long time to come. In order to address the population aging, the report of the 19th National Congress of the Communist Party of China laid out a "family-based old age care" policy, and clarified the guidance of "actively addressing population aging and building a policy system and social environment that supports and respects the elderly". China's "Thirteenth Five-Year Plan" National Aging Course Development and Pension System Construction Plan further clarifies that "gradually establish a policy system to support family-based old age care, support adult children living together with their elderly parents, and fulfilling their obligations to support and take care of them." What's more, generally speaking, the per capita income of families in China is now still low, so it is difficult for most families to support the elderly to spend their twilight years in nursing institutions in the long run. This makes family-based old age care a necessity. Therefore, to solve the problem in family-based old age care, it is important for us to build a residential environment for the harmonious co-living of the elderly and their children and grandchildren.

2. The Main Factors that Promote Intergenerational Co-Living in Cities in China

Influenced by factors such as traditional Chinese values and real-life needs, the intergenerational co-living model is very common in urban areas where middle-aged and elderly people live together with their children in the same house. Relevant research shows that the influence of Chinese traditional values on urban intergenerational co-living model is becoming weaker (Li, Duan, & Chunyu, 2021), and real-life needs become the decisive factor. The intergenerational family relationship in China is essentially a functional relationship with the characteristics of "two-way feedback". When the elderly and their children live together inter-generationally, both parties can obtain mutual assistance, mutual benefit and mutual exchange financially and emotionally in daily lives. So it has important practical significance for most urban families in China. At the same time, the intergenerational co-living model also poses higher requirements on urban housing.

2.1 The Influence of Family Values

"Enjoy one's twilight years with a big extended family" is the ideal state of life for the elderly in China. In recent years, despite a comparatively lower proportion of intergenerational co-living in China, it is

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still the primary choice for the elderly in securing their twilight years. Relevant research shows that "more than half of the elderly still expect to live with their children" (Luo et al., 2018), and "the elderly who are willing to live with their children are still enjoy the majority of nearly 70%" . Under the influence of the traditional Chinese values of "raising children to secure one's old-age life", children have become the ones that the elderly can rely on at home and play a major role in elderly care, among which the only children account for the majority. China has implemented the family planning policy since 1980. From 2010 to 2030, the only child born in the "1980s" and "1990s" in cities reached the fertility age, and their parents began to enter their elderly life on a large scale, which means their demand for old age care became necessary (Chen, Zhou, & Lu, 2021). In addition, the proportion of co-living model is higher at one's oldest old age (Li, Jiang, & Zhang, 2019), especially among the single elderly. Intergenerational co-living can alleviate the loneliness of the elderly in their twilight years. With the increase of life expectancy, the phenomenon of intergenerational co-living between the elderly of different ages in urban areas has also increased significantly. Therefore, changes in the family structure present diverse demands on the residential environment, and it is particularly important to build an intergenerational co-living model suitable for the entire life cycle of the family to promote the sustainable development of the residential environment.

2.2 The Impact of Family Support

The intergenerational support of the adult children to their parents is "bidirectional". China's social security system needs to be improved. Most of the elderly maintain a family-based old age care model, and when the elderly are in poor physical and mental condition and need support from their children, the intergenerational co-living becomes more likely to happen. More and more elderly people live in cities with their children, and the children's own family management ability, energy and other practical needs are also important reasons for intergenerational co-living. On the one hand, it is manifested by children's economic dependence on parents, on the other hand, it is reflected by the need to ask their parents to help share housework and take care of grandchildren (Wang & Mesman, 2015). Taking care of grandchildren and sharing household chores by the elderly can alleviate the burden of their children, and it is also a reflection of the elderly's own value. Some studies have shown that "more than 40% of the elderly in China help take care of their grandchildren to varying degrees" (Chen, Liu, & Mair, 2011). When the elderly take care of their grandchildren, they usually live with their children for a short period of time. Influenced by the "second-child" policy, in recent years, the duration of intergenerational co-living of the elderly with their children is extended because of the need to take care of the grandchildren. Since 2016, China has begun to implement the "second-child" policy across the country, and since 2021, the "third-child" policy was adopted. The family structure will gradually develop from "421" model to "422" or "423" models. The policy reform has pushed changes in the family structure (Wang, 2023), extending the time of intergenerational co-living. Therefore, the growing bidirectional needs of the elderly and their children further increase the possibility of intergenerational co-living.

2.3 The Influence of Family Economic Conditions

In recent years, housing prices in China have continued to rise, especially in first- and second-tier cities. Affected by factors such as housing system, price, and family economic status etc., the phenomenon of intergenerational co-purchasing of houses has gradually increased (Jim & Chen, 2006). Among them, family economic status is an important factor in determining whether intergenerational co-living is needed, and it directly determines the quantity, quality and area of the houses. On the one hand, some young people cannot afford to buy a house independently for the time being because they have just started working and have insufficient financial savings to shoulder heavy living burdens. On the other hand, when the economic conditions of both the elderly and their children are at a relatively low level, it is difficult for them to afford two separate houses, so the portability of intergenerational co-living is higher. In addition, some urban housing systems have implemented purchase restrictions or increased loan down payment ratios, making some families unable to buy houses but to choose to live together inter-generationally. And there are also some families whose economic condition is not sufficient to support another separate house. Or the existing housing is well-equipped, so the elderly and their children prefer to continue to live in a familiar environment. Therefore, when the overall economic savings of the family is not high, intergenerational co-living is conducive to the intergenerational resource sharing between the elderly and their children, and improves family living conditions. It cannot be denied that when the elderly or their children are in better economic condition and have ample housing space, the possibility of intergenerational co-living is higher.

3. Main Demands of Intergenerational Co-Living Housing in Cities in China

Nowadays, the tradition of intergenerational co-living between the elderly and their children is fading, which affects family-based old age care for the elderly to a certain extent. Among them, living habits have a significant impact on the choice of intergenerational living patterns of families. Residential house is the main activity area of the elderly, who are usually more dependent on housing than the young. Therefore, there

is no doubt that more attention should be paid to the physical and psychological characteristics and living habits of the elderly in residential design. The residential environment should be able to make preparations for the special circumstances that the elderly may experience in family-based old age care, so as to reduce the difficulty of reconstruction in the later stage. In particular, the problems of the residential environment exposed by the intergenerational co-living model during the "Covid-19" pandemic are instructive. Of course, beyond considering the use needs of the elderly at home, we should also try our best to meet the needs of adult children, build a flexible residential environment so as to promote harmonious development of intergenerational relationships, and continuously improve the quality of life of the elderly and their children. This is what we call the "bi-directional design" that facilitates intergenerational co-living and mutual assistance (Yalu et al., 2024).

3.1 Safety in the Residential Environment

At present, China's aging population still shows the characteristics of young-olds. Because the young-olds are generally in better physical and psychological conditions and they are less worried about their lives. Their residential environment often lacks consideration of the risk of emergencies. However, the physical function of the elderly gradually declines as they age, which leads to inconvenience in mobility and even inability to take care of themselves. Relevant studies at home and abroad have shown that more than 90% of accidents such as slips, stumbles, and falls in the elderly, especially the oldest old, are related to the residential environment. A barrier-free residential environment can provide security for the home life of the elderly and other family members (Child & Lawton, 2019).

Therefore, in the design of the residential environment, we should fully consider the elderly-friendly facilities that meet the physiological and psychological changes of the elderly and reserve corresponding space to eliminate hidden safety hazards in the residential environment so as to fully meet the explicit and implicit needs for a barrier-free residential environments that accustom the living habits of the elderly, children and other family members. On the other hand, it is also necessary to enhance the visual and auditory connections of the residential environment and keep the flow line smooth (as shown in Figure 1), so as to accommodate the psychological changes of the elderly and enhance their sense of security (Fu & Wang, 2020).

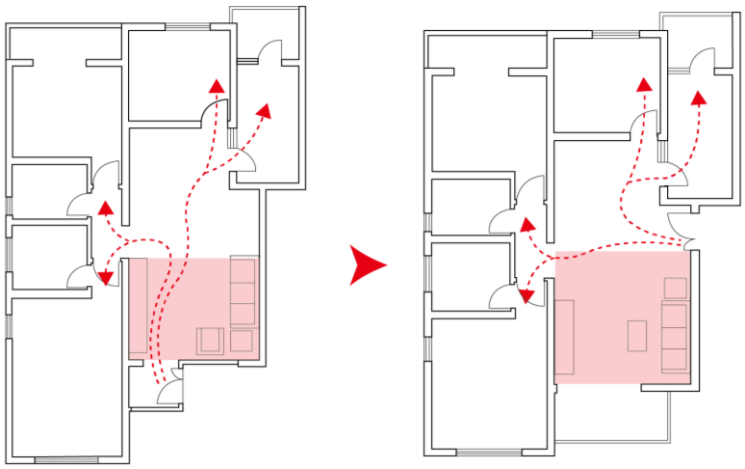


Figure 1: Residential Space Traffic Flow

3.2 Flexibility of the Residential Environment

In response to the "Covid-19" pandemic, "Internet +" made it possible to work and study at home. The resurgence of the pandemic across the country makes working and studying from home not only a new norm in Covid-19 response, but also a reliable way to deal with other emergencies. However, many families are clumsy in response as they are unable to meet the needs of all family members to have their independent work or study space, especially when the per capita residential area of intergenerational co-living families is relatively small. Therefore, some families will use the dining table in the dining room or living room as a place for temporary work and study, which will inevitably lead to mutual interference and reduced efficiency of work and study, and further affect their mood, and trigger conflicts. Furthermore, in recent years, as the central government has successively launched the "second-child" policy and the "third-child" policy, the original housing layout will face increasing problems (Li, Duan, & Chunyu, 2021). Therefore, there should be sufficient "flexibility" in the residential design of the intergenerational co-living model to address these problems in a targeted manner, flexibly accommodate changes in the needs and structure of family members, and better meet the needs of the elderly and children so as to create a harmonious intergenerational co-living environment.

3.3 Independence of the Residential Environment

Differences in concepts of life, habits, and experiences between generations also have an important impact on the living relationship between the elderly and their

children. When the concepts of life, habits, and experiences of the elderly and their children are same, the probability of intergenerational co-living will be higher, and vice versa. Due to different life backgrounds, the concepts of life, habits, and experiences, the elderly and their children are often difficult to change after decades of consolidation. Therefore, optimizing the residential environment can promote the beneficial integration of intergenerational co-living relationships. In reality, even if the elderly and their children live in the same house, both parties prefer to have their own independent space to maintain a certain sense of distance from each other, and have a private living environment and atmosphere, so as to reduce the risk of the mutual interference between the elderly and their children due to differences in living habits. In addition, although the "Covid-19" pandemic has been effectively controlled, it cannot be denied that the intergenerational co-living model is more likely to cause cross-infection among family members, resulting in a higher risk of virus transmission. So, an independent residential environment is particularly important for the elderly who have a weakened immunity, to ensure the normal life of family members, and reduce the impact on each other.

4 Main Methods of Intergenerational Co-Living Housing Design in Urban Areas in China

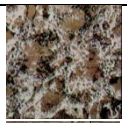
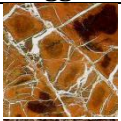
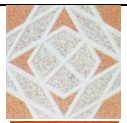
The intergenerational co-living model is an ideal choice for family-based old age care. Building a suitable intergenerational co-living housing environment can improve the quality of housing and is of great significance to improving the well-being of the elderly in their twilight years. The co-living model of the elderly and their children has brought new opportunities to the real estate market, and many cities have launched residential units for intergenerational co-living (Wang, 2022). In the design of intergenerational co-living housing environment, it is necessary to construct a suitable residential environment from spiritual, material and other aspects to provide family-based old age care for the elderly and create an atmosphere of intergenerational harmony (Scharlach & Lehning, 2013). From the perspective of versatility and applicability, we should design a residential environment that accommodates the living habits of both the elderly and their children to reduce potential conflicts, and focus on the obstacles brought about by changes in the physiology and psychology of the elderly. Of course, the design of the residential environment for intergenerational co-living should take into account the needs of each family member. This is not only to meet the living needs of the elderly, but also to be effectively transformed to meet the needs of the full life cycle of the family with the changes in the needs and structure of family members (Li & Cao, 2023).

4.1 Strategies for Building a Safe Residential Environment

(1) Eliminate potential hidden dangers to create a "convenient" residential environment: A safe, convenient and comfortable residential environment is the unanimous pursuit of family members. In a residential environment, the ground is an important aspect that affects the safety of home activities for the elderly and other family members (He & Jia, 2024). Considering that the elderly may use wheelchairs, the floor in the house should be kept as flat as possible to avoid height differences. When the indoor light is weak, the ground height difference will affect the mobility of the elderly and other family members such as children and grandchildren, and thus constitute a safety hazard. If different paving materials are used in the residential floor, we can adjust the thickness of the paving to eliminate the height difference. If the height difference is unavoidable, it can be reminded with contrasting colors. When conditions permit, a gentle slope can be adopted as a transition and the slope surface should be anti-skid. As shown in Table 1, in the selection of floor covering materials, try to consider matte floor tiles or floors with simple textures. The surface of polished floor tiles is smooth, and it is easy to produce glare under the light, which affects people's safety. In addition, try not to use carpets on the ground because it is difficult for the elderly to pass on the carpets when they are in wheelchairs, and the carpets are not easy to clean, and it is easy to breed bacteria such as mites, which affects the health of family members.

Table 1

Residential ground material selection

Type	Suggested			Not suggested		
Tile						
Floor						
Carpet	Not suggested					

In addition to the ground, furniture, kitchen utensils, sanitary ware, etc. are also important aspects that affect the home life of family members. When selecting furniture, kitchen utensils, sanitary ware, etc., try to consider the design of rounded corners instead of sharp corners, so as to prevent the elderly or grandchildren from being accidentally bumped. For example, furniture such as bedside tables should not be hard and sharp (Figure 2). The handrail can be replaced by a continuous interface such as furniture, kitchen utensils, sanitary ware, etc. to provide support for the elderly or grandchildren at a young age to move around. The selection of furniture, kitchen utensils, sanitary ware and other facilities needs to balance the needs of the elderly and children and seek the "optimal solution" to improve the quality of family life, which not only meets the needs of the elderly with compromising the beauty of the house, and does not sacrifice the interests of their children. In addition, the spacious and bright entrance hall is not only conducive to the mobility of the elderly, but also reduces the restrictions on the access of the elderly who use wheelchairs, and it can also save rescue time when the elderly have an accident. In order to facilitate the elderly to use wheelchairs or other people such as their children to assist the elderly in and out, the size of the door opening should not be too narrow.

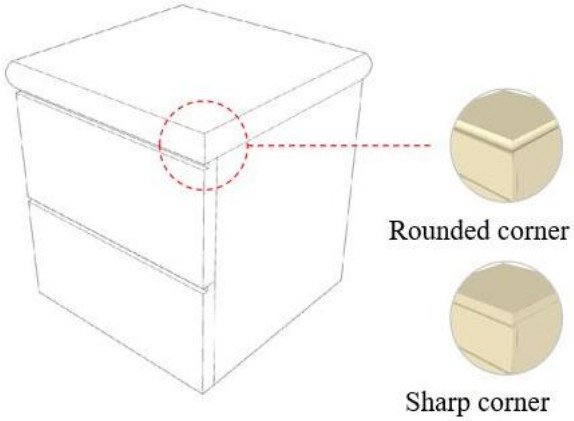


Figure 2: Rounded corner of bedside table

(2) Add auxiliary facilities to create a "senior-friendly" residential environment: The toilet is a place frequently used by the elderly, so it is of our major concern to make it barrier-free (Frontoni et al., 2017). The bathroom is suitable for a separation design of the dry and the wet. The shower room does not need to install a door, because when the elderly are in poor physical and mental condition, it is inconvenient for them to move around. The installation of a door in the bathroom also bring inconvenience to adult children or others who help the elderly to bathe, and the height of the threshold are also hidden risks. We can lay anti-slip floor tiles in the shower area and install rectangular side drains to solve problems such as water pooling and splashing (Figure 3). Even if we choose to install a door in the shower room, it is better to open it outwards, so that adult children or other people can lend rescue timely without barrier when the elderly in shower has some emergencies. In addition, the bathroom master in the shower room should be with dual functions of light heating and air heating, so that it can be selected according to the needs of family members. For example, the elderly are usually sensitive to wind, so the light heating mode is suitable for the elderly when they bath, while grandchildren are not suitable for strong light, so they can choose the air heating mode when bathing (Pynoos, 2018).

Beyond that, the elderly need to use wheelchairs when are physically inconvenient. However, instead of ensuring the sufficient area of the bathroom to get the wheelchair turn around smoothly, it is more worth considering whether the space is sufficient for children or others to help the elderly to do the washing and other activities. When the bathroom area is limited, it should be ensured that the elderly can use the handrail, which is suggested to be installed in the bearing wall (Laws, 1993). The non-bearing wall is often made of light materials, so the handrail is often not fixed firmly and cannot bear heavy weight. Thus, it constitutes major security hazards (Figure 4).

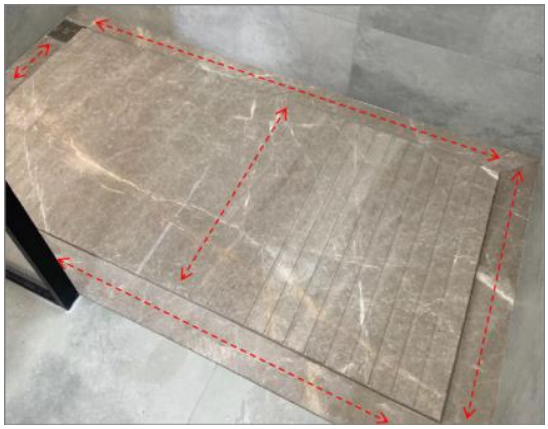


Figure 3: Bathroom gutters

Figure 4: Toilet Auxiliary Facilities

It should be noted that the addition of auxiliary facilities such as handrails in the residential environment can provide security for the elderly's home activities, but these facilities should not conflict with the placement of necessary furniture in the residential environment, and should balance the needs of the elderly and other family members to avoid inconvenience in home life. The handrail can be replaced by other stable and firm facilities such as furniture, which will be determined according to actual situation.

(3) Rely on advanced technology to create a "smart" residential environment: The popularity of smart equipment in home life is gradually increasing, and the appropriate configuration of smart equipment can provide convenience for the home life of the elderly (Fang et al., 2020).

At the same time, the smart equipment connected to the community safety prevention and control system in the residence can provide important support for the elderly in their home life and help their children ease their concerns over old-age parents. When the elderly are at home alone, they can request remote help from their children and other family members or the community through security equipment in case of unexpected emergencies, and seek help from the medical stations, fire stations and other institutions near the community for rescue in a timely manner. The operation interface and method of the smart equipment in the house should be simple and convenient, so as to cause no confusion to the elderly and affect their use.

We can install emergency call devices in the elderly bedrooms, bathrooms and other spaces that are frequently used and with hidden safety hazards, so that the elderly can call for help from other family members in time and immediate rescue can be obtained in the event of an accident. The emergency call device is suitable to be installed at the bedside in the bedroom, beside the toilet in the bathroom, etc., where it is easy to touch and operate for the elderly. In the house, based on actual needs of the elderly, we can add some infrared sensing devices to monitor the elderly. When they do not appear in the living room, bedroom and other frequently used spaces for a long time, the infrared sensing device will automatically give feedback to the children, so that they can timely check the home activities of the elderly.

In addition, a gas leak monitor can be installed in the kitchen. When a gas leak occurs, the monitor can automatically close the gas valve to ensure the safety of the elderly. In the installation of all smart equipment, what needs to be considered is that the equipment can send out visual signals, auditory signals, and request remote help from other family members such as children or medical stations, fire stations, etc (Ma, Siu, & Zou, 2020).

4.2 Flexible Residential Environment Construction Strategies

(1) Reserve sufficient space to create a "changeable" residential environment: Considering that the elderly may need children or others' care when they are in poor physical and mental condition, we should leave enough space as far as possible in the elderly's bedrooms and bathrooms to provide more possibilities for flexible layout adjustment.

On the one hand, it provides support for the elderly to take care of themselves, and on the other hand, it also provides sufficient space for children or other family members to assist in the care of the elderly. For example, for the young-olds, when their physical and mental conditions are good, we can leave space for leisure activities such as reading books and newspapers in the bedroom. But when they grew older and with poor physical and mental health, we can add a companion bed. As shown in Figure 5, reserving sufficient space can make it possible to adjust the bedroom layout according to the changing seasons for the elderly, and can also facilitate turning around when the elderly need to use a wheelchair in moving around.

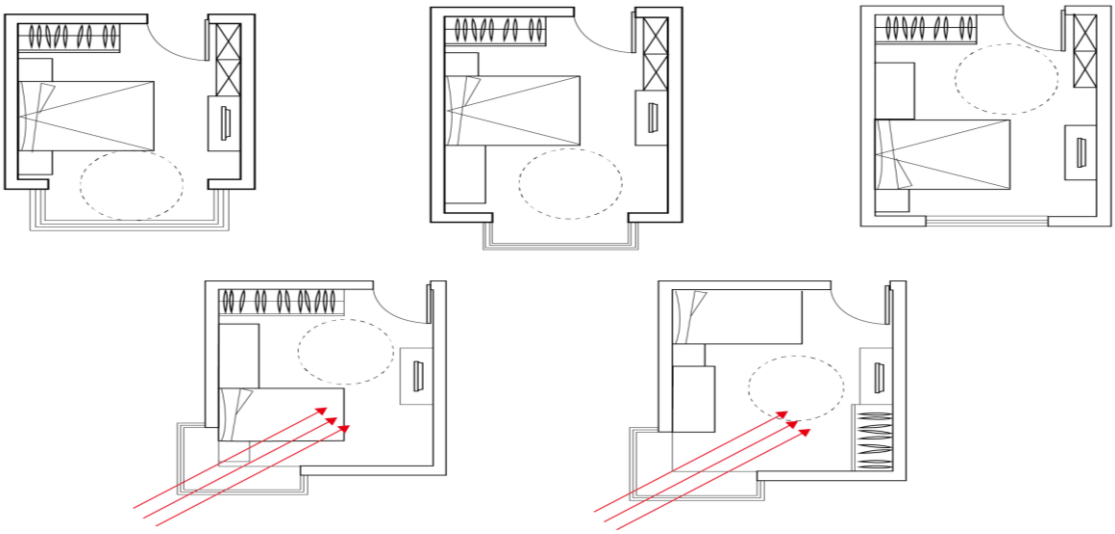


Figure 5: Layout for the elderly's bedroom

(2) Choose flexible furniture to create a "diversified" residential environment: In the face of the rapid growth of the elderly population in China and the implementation of the "second-child" and "third-child" policy, the structure of family members will undergo new changes, and the urban residential environment will face new challenges. In the residential environment, it is necessary to improve the adaptability of the layout form, and fully consider the changes in demand during the whole life cycle of the family. Among all the changes in family needs, the most significant is the needs of the elderly, so we need to fully consider the flexibility in the design of the residential environment. In the selection of furniture, flexible and lightweight small-volume furniture should be prioritized; preferably multi-functional furniture that can be freely combined according to different needs (Linggui, Ying, & Dian, 2019). The transformation of the house type structure is relatively complicated, but the change of the layout that constitutes mainly furniture and other furnishings is relatively flexible. The living room should avoid the use of tightly-enclosed modular sofas. On the one hand, it will cause inconvenience for the elderly to move around, and it is not convenient for changing it with special seats or wheelchairs for the elderly.

4.3 Independent Residential Environment Construction Strategy

(1) Define the area of ownership to create a "harmonious" residential environment: "Public-private division" is an important aspect of the layout of intergenerational co-living houses. There should be public spaces such as living rooms and dining rooms for the elderly and their children to enjoy family activities, as well as their own independent spaces. If conditions permit, the entrance and exit of the elderly and children can also be set separately. In order to reduce intergenerational conflicts, it is advisable to adopt a spatial layout that connects the living room and the dining room, which is compatible with the diverse functional needs of family activities. The living room can be designed in the center of the house as a connection to other spaces to replace long and narrow aisles, so as to improve space utilization (Aboagye, Agyemang, & Tjerbo, 2013). And this can ensure that the living room, dining room, kitchen and other

frequently used spaces have unobstructed sightlines. The bedrooms of the elderly and their children are independently set up on the east and west sides of the living room, and each is equipped with an independent bathroom as much as possible to ensure a certain degree of privacy so as to effectively reduce mutual interference, and promote the harmonious development of intergenerational relationships. It can also meet the needs of home quarantine during the pandemic. If the two separate bathrooms cannot be fulfilled, we need to ensure the bedroom of the elderly is as close to the bathroom as possible to shorten the distance for them to move and avoid that they affect other family members' rest when they wake up at night. (2) Optimize the layout of the apartment to create a "practical" residential environment: Residential layout can be configured according to needs. The frequently used spaces such as living room and bedroom can be located on the south side, and the dining room, kitchen, secondary bedroom, bathroom and other spaces that are less frequently used or have low requirement on lighting can be located on the north side. Since the elderly spend more time at home than their children, and spend more time in the living room than in the bedroom, if the residence cannot provide sufficient space for the living room, the bedrooms of the elderly and children (grandchildren) on the south side at the same time, the priority should be given to the living room and the bedroom of the elderly to ensure that the main space where the elderly live in the house can get sufficient light (Ortiz, Itard, & Bluyssen, 2020). In addition, considering that the elderly use the living room, dining room and kitchen more frequently, the kitchen should be arranged close to the living room and dining room to shorten the distance for the elderly to walk.

4. Conclusions

In summary, in order to better care for the elderly at home, we should fully consider the forward-looking design of the intergenerational co-living housing environment, so that the residential environment can not only meet the needs of the elderly at home, but also meet the living demands of other family members such as their children. In this way, we can ensure a high quality of intergenerational co-living life. Different from Germany, the United States and other countries, the current intergenerational co-living in China is mostly a family-based residential model based on blood relationship, rather than socially oriented intergenerational cohabitation (Shen, Zhou, & Zhang, 2022). With the development of the times and the improvement of the security system, China can also learn from the intergenerational co-living model of other countries, encourage the establishment of intergenerational co-living relationships under the condition of non-blood relationship, help more elderly and young people to share resources and achieve mutual assistance, mutual benefit and mutual exchange, and promote the harmony between the community and neighbors.

5. Funding

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Reference

Aboagye, E., Agyemang, O. S., & Tjerbo, T. (2013). Elderly demand for family-based care and support: Evidence from a social intervention strategy. *Global Journal of Health Science*, *6*(2), 94. https://doi.org/10.5539/gjhs.v6n2p94

Chen, F., Liu, G., & Mair, C. A. (2011). Intergenerational ties in context: Grandparents caring for grandchildren in China. *Social forces*, *90*(2), 571-594. https://doi.org/10.1093/sf/sor012

Chen, J., Zhou, X., & Lu, N. (2021). Providing instrumental support to older parents of multi-child families in China: are there different within-family patterns? *Ageing & Society*, *41*(8), 1770-1787. https://doi.org/10.1017/S0144686X21000283

Child, S. T., & Lawton, L. (2019). Loneliness and social isolation among young and late middle-age adults: Associations with personal networks and social participation. *Aging & mental health*, *23*(2), 196-204. https://doi.org/10.1080/13607863.2017.1399345

Fang, E. F., Xie, C., Schenkel, J. A., Wu, C., Long, Q., Cui, H., Aman, Y., Frank, J., Liao, J., & Zou, H. (2020). A research agenda for ageing in China in the 21st century: Focusing on basic and translational research, long-term care, policy and social networks. *Ageing research reviews*, *64*, 101174. https://doi.org/10.1016/j.arr.2020.101174

Frontoni, E., Pollini, R., Russo, P., Zingaretti, P., & Cerri, G. (2017). HDOMO: Smart sensor integration for an active and

independent longevity of the elderly. *Sensors*, *17*(11), 2610. https://doi.org/10.3390/s17112610
Fu, Z., & Wang, J. (2020). Study on improvement and risk assessment of marine logistics finance development model based on the background of free trade zone construction. *Journal of Coastal Research*, *111*(SI), 222-225. https://doi.org/10.2112/JCR-SI111-039.1
He, W., & Jia, S. (2024). Exploring multigenerational co-residence in the United States. *International Journal of Housing Markets and Analysis*, *17*(2), 517-538. https://doi.org/10.1108/IJHMA-06-2022-0089
Jim, C. Y., & Chen, W. Y. (2006). Impacts of urban environmental elements on residential housing prices in Guangzhou (China). *Landscape and urban planning*, *78*(4), 422-434. https://doi.org/10.1016/j.landurbplan.2005.12.003
Laws, G. (1993). "The land of old age": society's changing attitudes toward urban built environments for elderly people. *Annals of the Association of American Geographers*, *83*(4), 672-693. https://doi.org/10.1111/j.1467-8306.1993.tb01960.x
Li, C., Jiang, S., & Zhang, X. (2019). Intergenerational relationship, family social support, and depression among Chinese elderly: A structural equation modeling analysis. *Journal of affective disorders*, *248*, 73-80. https://doi.org/10.1016/j.jad.2019.01.032
Li, H., Duan, C., & Chunyu, M. D. (2021). A study of the factors influencing the residential preferences of the elderly in china. *Sustainability*, *13*(10), 5488. https://doi.org/10.3390/su13105488
Li, M., & Cao, J. (2023). Multi-generational educational mobility in China in the twentieth century. *China Economic Review*, *80*, 101990. https://doi.org/10.1016/j.chieco.2023.101990
Linggui, L., Ying, L., & Dian, Z. (2019). Key Elements of" Family" Life Style of Old-age Residential Facilities. *Journal of Landscape Research*, *11*(6). https://doi.org/10.16785/j.issn1943-989x.2019.6.009
Luo, M., Xue, Y., Zhang, S., Dong, Y., Mo, D., Dong, W., Qian, K., Fang, Y., Liang, H., & Zhang, Z. (2018). What factors influence older people's intention to enrol in nursing homes? A cross-sectional observational study in Shanghai, China. *BMJ open*, *8*(9), e021741. https://doi.org/10.1136/bmjopen-2018-021741
Ma, Y., Siu, K. W. M., & Zou, G. (2020). Contradictory and consistent views on designing an inclusive community-based centre for older people: A mixed-methods study of different age groups in China. *Ageing & Society*, *40*(9), 1867-1886. https://doi.org/10.1017/S0144686X19000254
Ortiz, M., Itard, L., & Bluyssen, P. M. (2020). Indoor environmental quality related risk factors with energy-efficient retrofitting of housing: A literature review. *Energy and Buildings*, *221*, 110102. https://doi.org/10.1016/j.enbuild.2020.110102
Pynoos, J. (2018). The future of housing for the elderly: Four strategies that can make a difference. *Public Policy & Aging Report*, *28*(1), 35-38. https://doi.org/10.1093/ppar/pry006
Scharlach, A. E., & Lehning, A. J. (2013). Ageing-friendly communities and social inclusion in the United States of America. *Ageing & Society*, *33*(1), 110-136. https://doi.org/10.1017/S0144686X12000578
Shen, X., Zhou, S., & Zhang, X. (2022). Services for Aging Persons in China. *Global Perspectives on Health Geography*. https://doi.org/10.1007/978-3-030-98032-0
Wang, L., & Mesman, J. (2015). Child development in the face of rural-to-urban migration in China: A meta-analytic review. *Perspectives on Psychological Science*, *10*(6), 813-831. https://doi.org/10.1177/1745691615600145
Wang, W. (2023). Exploration of Living Space from the Perspective of Intergenerational Symbiosis. *Journal of Sustainable Development and Green Buildings*, *1*(1), 14-24. https://doi.org/10.23977/jsdgb.2023.010103
Wang, Y. (2022). Looking after grandchildren: the motivation, pattern, and the impact of intergenerational engagements on grandparents in rural China. https://doi.org/10.7488/era/2760
Yalu, Z., Yan, T., Min, L., Xinzhe, W., Donghui, M., & Gong, C. (2024). Intergenerational Programmes for Integrated Care and Lifelong Education: Potential Pathways and Practical Challenges in Mainland China. *China: An International Journal*, *22*(2), 127-147. https://doi.org/10.56159/chn.2024.a929586