Routledge
Taylor & Francis Group

Journal of Aging and Environment

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/wjhe21

Housing Preference for Ageing-in-Place: Are There Differences among Emerging-Old, Young-Old and Old-Old Adults Living in Hong Kong's Private Housing Estates?

Kar Him Mo, Danyang Lei, Jean Woo & Rina Ko

To cite this article: Kar Him Mo, Danyang Lei, Jean Woo & Rina Ko (13 Dec 2023): Housing Preference for Ageing-in-Place: Are There Differences among Emerging-Old, Young-Old and Old-Old Adults Living in Hong Kong's Private Housing Estates?, Journal of Aging and Environment, DOI: 10.1080/26892618.2023.2291762

To link to this article: https://doi.org/10.1080/26892618.2023.2291762

Published online: 13 Dec 2023.

JOURNAL OF AGING AND ENVIRONMENT
https://doi.org/10.1080/26892618.2023.2291762

Housing Preference for Ageing-in-Place: Are There Differences among Emerging-Old, Young-Old and Old-Old Adults Living in Hong Kong's Private Housing Estates?

Kar Him Mo[a], Danyang Lei[a], Jean Woo[b], and Rina Ko[b]

[a]School of Architecture, The Chinese University of Hong Kong, New Territories, Hong Kong, China; [b]Jockey Club Institute of Ageing, The Chinese University of Hong Kong, New Territories, Hong Kong, China

ABSTRACT

This study investigates housing preference among older adults in Hong Kong's private housing estates across three age groups: emerging-old (50–65 years), young-old (65–75 years), and old-old (75 or above years). Findings highlight significantly increasing preferences for safety, thermal comfort, and physical periodicals for property services and health-related information with age. Respondents generally preferred proximity to facilities, on-site support, and social media for property information but were less attentive to home assessment. This study provides recommendations for improving housing design standards, property management practices, and public education programs for older adults.

KEYWORDS

Age group difference; Hong Kong; housing preference; population aging; private housing

Introduction

The concept of aging-in-place is widely discussed as a preferred living arrangement for older adults internationally (Abramsson & Andersson, 2016; Costa-Font et al., 2009; Hui et al., 2014; Mulliner et al., 2020). It is defined as aging in one's home and community for as long as possible and delaying relocation to a long-term care facility (Bigonnesse & Chaudhury, 2020). It emphasizes the older adults' ability to live in their own homes and community safely, independently, and comfortably, regardless of age, income, or ability (Centers for Disease Control & Prevention, 2019). In short, the concept suggests minimal life disruption, with appropriate support for older adults and their families (Horner & Boldy, 2008; Hui et al., 2014).

CONTACT Mo Kar Him khmo@cuhk.edu.hk School of Architecture, The Chinese University of Hong Kong, New Territories, Hong Kong, China.

The physical and social environment of the housing units (i.e., apartments, flats, and houses) and the surrounding neighborhoods would influence older adults' well-being by affecting their individual functional status, according to the theory of the Ecological Model of Aging (EMA) (Lawton & Simon, 1968; Mesthrige & Cheung, 2020) and other related studies (Oswald & Wahl, 2013; Ralston, 2018). Thus, a well-designed living environment can support aging-in-place and alleviate the financial burden associated with institutional care and medical support (Mesthrige & Cheung, 2020). However, inappropriate design can lead to severe health issues (Sixsmith & Sixsmith, 2008). The accelerated population aging process poses challenges for providing suitable housing, especially in Hong Kong with its housing scarcity (Abramsson & Andersson, 2016),

As life expectancy increases, the variation in housing preferences among older adults has garnered significant research attention. Older adults could vary significantly in terms of physical abilities, cognitive level and lifestyle. Most importantly, studies reveal age-related variations in both internal and external housing preferences (Andersson et al., 2019; Jong et al., 2012; Mulliner et al., 2020). For instance, Mulliner et al. (2020) categorized seniors into three age groups and found that those aged 65–74 and 75+ prioritize 'single-floor homes without stairs' and 'bathroom adaptations' potentially due to increased chances of living alone and declining mobility. Additionally, those aged 75+ emphasize 'nature views,' 'walkability,' and 'proximity to family and friends,' likely influenced by spending more time indoors, fall concerns, and solitary living (Mulliner et al., 2020). Understanding the commonalities and differences in housing preferences among these age groups is crucial, not only for acknowledging the heterogeneity within the aging population, but also for facilitating intergenerational living among older adults if such needs arise and providing evidence-based suggestions for optimizing housing design and practice.

While cultural factors influence older adults' acceptance of different housing options (Mulliner et al., 2020; Filipovič Hrast et al., 2019), limited studies have attempted to distinguish preferences across different older age groups in high-density East Asian contexts (Yuen et al., 2019; Ke et al., 2023). A study in Singapore, sharing similar cultural and urban characteristics with Hong Kong, identified differences in housing satisfaction, aspirations, and needs among older age groups, albeit without statistical significance (Yuen et al., 2019). Preferences among older age groups in Hong Kong remain inadequately studied, highlighting the need for further research to address this gap.

Another research gap lies in the aging-in-place environment in Hong Kong's private housing context. Housing studies in Hong Kong primarily focus on public housing (Jayantha et al., 2018; Mesthrige & Cheung, 2020),

overlooking private housing estates. In fact, 38.7% (1,494,345) of Hong Kong people aged 50 or above live in private permanent housing (Census & Statistics Department, 2022), but there is minimal availability of purposefully designed housing for older adults in the private housing market (Chiu & Ho, 2006). Studies showed that older adults in public housing in Hong Kong have a higher satisfaction level than those living in private housing due to universal design principles and nearby facilities (Hui et al., 2014, Sun et al., 2018). In contrast, private housing residents have lower ratings in the housing domain due to limited resources, insufficient information on housing maintenance, and fewer opportunities for social participation (Jockey Club Age-friendly City, 2019).

Furthermore, a market gap exists between the services provided and elderly residents' demands (Huang & Lee, 2020), posing challenges and opportunities for housing suppliers (e.g., private, public and quasi-public developers), built environment practitioners (e.g., architectural firms, consultancy firms, property management companies), service providers (e.g., non-governmental/non-profit-making organizations, social enterprises) and other stakeholders to innovate and deliver new housing models addressing specific needs of the aging population.

This study addresses research and practical gaps by investigating housing preferences of older adults residing in Hong Kong's private housing estates among three age groups: emerging-old (50–65 years), young-old (65–75 years) and old-old (75 or above years). The study explored the following research questions: (1) Are there significant differences in housing preferences among the three older age groups? (2) What hard (i.e., hardware and design features) and soft (i.e., services and management) features should be prioritized to support aging-in-place in private housing estates? The paper includes a literature review on housing preferences, property management service provision, home modification and accessibility to information. The methodology, results, and insights are discussed, along with study limitations and recommendations for future research.

Existing literature

Housing preference

Research on the housing preferences of older adults has gained prominence due to the increasing life expectancy and diverse needs of this demographic. Several studies have shed light on key factors influencing older adults' housing preferences in Hong Kong. For example, Cheng (2003) highlighted the significance of high accessibility and supportive communities in the exterior housing environment for middle-class elderly. However, Phillips et al. (2005) found that the interior environment of dwelling

conditions had a more substantial impact on residential satisfaction. Chiu and Ho (2006) emphasized older adults' preference in Hong Kong for owner-occupied housing units with adaptable designs to meet their physical needs, although specific design features remain under-researched. More recently, Mulliner et al. (2020) proposed a comprehensive framework of key housing and environment characteristics that are linked to older adults' health and well-being, encompassing thermal comfort, ventilation systems, bathroom adaptations, cleanliness, and access to local amenities and health care services. As the research on housing preference continues to evolve, further investigation is warranted to explore specific design attributes that align with the preferences and needs of older adults in Hong Kong and beyond.

Property management and service provision

Supporting aging-in-place often involves community-based services and property management interventions (Ahn et al., 2020; Jayantha et al., 2018). In East Asian contexts, where traditional family caregiving is evolving due to changing family structures and mobility patterns, property management in housing estates is assuming a more prominent role (Keeling, 1999; Pickard et al., 2012). Therefore, it is important to investigate what elderly services, formal and informal, the property management sector should provide. Huang and Lee (2020) conducted a questionnaire survey with 257 older adults in Taiwan and developed a framework of older adults' service demands offered by property management covering areas such as recreation and community participation, home modification, health and medical services, information service, accompaniment and consultation. Huang and Lee's research primarily focused on property management in retirement village settings and suggested more research on the service needs in supporting older adults' aging-in-place is required.

Home modification

Home modification is another important factor determining the feasibility of aging-in-place (Mulliner et al., 2020). Some studies suggested home modification can defer institutionalization by up to 10 years, as the conversion of the most immediate living environment into an elderly-friendly design could help address and adapt to the needs of those who undergo physical functional impairment and make it easier for them to continue living in their homes (Lawlor & Thomas, 2008). Kim et al. (2014) highlighted that home modification plays a significant role in multidisciplinary care, emphasizing the need for thorough assessments, multidisciplinary

decision-making, and meticulous planning for personalized interventions. Older adults living in owner-occupied housing units are responsible for the upkeep and maintenance of their dwellings. Therefore, their knowledge, ability and affordability to appropriate home modification are important. By considering the abovementioned factors, this study investigated older adults' views on home modification as one of the key determining factors of aging-in-place.

Accessibility to information

Accessibility to service information in the community plays a pivotal role in facilitating older adults' utilization of social and healthcare-related services, a fundamental aspect of aging-in-place (Huang & Lee, 2020). Previous studies indicated that information sharing among neighbors can strengthen community attachment (Kochera et al., 2005), integrate social resources and enhance the degree of older adults' social participation (Kochera et al., 2005; Huang & Lee, 2020). Notably, baby boomers in Hong Kong are active internet users, with 89% spending 3.2 hours daily online (Yuen, 2022). They also demonstrate a great interest in health information (Cangelosi & Markham, 1994), seeking it from sources other than medical practitioners and settings (Chin, 2003). Therefore, there is merit in conducting an inquiry into the inclinations of older adults with regard to service information, particularly in the context of health resources within the community. Moreover, with the advent of the information age, gaining an understanding of the information-seeking habits of current older adults has become essential.

Considering the attributes explored in previous studies, this study enriches the discourse of aging-in-place by examining the spectrum of older adults' views and preferences on the above elements, design and planning features, and their significance to aging-in-place.

Study context

The aging of Hong Kong's population is accelerating, with the baby boomers entering their old age (Hong Kong's Information Services Department, 2017), with older adults aged 65 or above accounting for 19.7% of the entire population (Census & Statistics Department, 2022). It indicates Hong Kong is an "aged society" according to the definition of United Nations (United Nations, 2019). Since 1994, the Hong Kong SAR Government has adopted "aging-in-place" as the core of elderly care policy (Legislative Council, 2018), but the statutory control on housing design and planning is yet to be integrated and considered holistically. A recent

baseline assessment revealed that "Housing" and "Community support and health services" in Hong Kong were rated the lowest among the eight domains under the World Health Organization's Age-friendly Cities Framework (Jockey Club Age-friendly City, 2019). This study contributes to knowledge of aging-in-place and sheds light on resource allocation, practice calibration and policy-making in promoting aging-in-place in high-density urban contexts, like Hong Kong.

Research methodology

Questionnaire design

The questionnaire had thirty-one questions in six sections covering demographics, living arrangements, housing and neighborhood features, property management and service provision, information dissemination, and home modifications. The questions were close-ended, including multiple-choice and scaled questions using a five-point Likert scale and matrix questions. Participation in this study was voluntary and anonymous.

Data collection

The study used convenience sampling in several districts of Hong Kong, and was conducted over the course of three months between December 2020 and February 2021. The questionnaire was distributed in hard and electronic copies. The hard copies were distributed to residents through community care services centers, daycare centers, and mailboxes in private housing estates assisted by the research team's collaborator. Electronic copies were distributed through social media, and snowball sampling was adopted. A non-monetary incentive in the form of a ticket to a health-related seminar was given to each respondent. The study was approved by the Survey and Behavioral Research Ethics Committee, The Chinese University of Hong Kong (Reference No. SBRE-19-552).

Data analysis

The data were analyzed by using SPSS version 26.0. For scaled-questions using 5-point Likert scale, non-normal distributions were observed using Kolmogorov-Smirnov Test. Therefore, Kruskal-Wallis Test was applied to the scaled-questions. Spearman's rank correlations were performed to assess the correlation between age and age-sensitive factors. In addition, the Wilcoxon Signed-rank Test was employed to determine respondents' overall attitudes by comparing the median score 3 out of 5. For multiple-choice questions, Pearson's chi-square Test identified significant differences among

age groups. In cases of no significant difference, the frequency of multiple responses was used to rank preferred options.

Respondents

Out of 455 collected questionnaires, 298 (65%) were valid, including 131 males, 166 females, and one respondent who declined to give gender information. The target population was older adults aged 50 and above residing in private housing estates who could understand and complete the questionnaire in Chinese independently or with assistance. The respondents' residential locations encompassed 15 out of the 18 districts in Hong Kong, excluding Wan Chai, Kwai Tsing, and Islands District. The respondents were segmentised into three age categories: 199 (66.8%) emerging-old (aged 50–64), 81 (27.2%) young-old (aged 65–74) and 18 (6%) old-old (aged 75 and above). The cutoff of three age groups is based on relevant literature in the field (Yuen et al., 2019). The study defined emerging old start with the age 50 following other relevant studies on property management and homeownership, which considered the age 50 to be a critical turning point in determining the dynamics of household size and individuals are more likely to remain in their residence after the age of 50 (Angelini et al., 2014; Huang & Lee, 2020).

The respondents' demographic information is summarized in Table 1. The majority were married, with higher rates of widowhood in the older age group. Educational attainment ranged from primary school to college, with most achieved at least secondary school education. Many more respondents resided in private ownership housing than those in private rental housing across all older age groups. The majority of emerging-old (55.7%) and young-old (52.6%) lived in areas that they perceived as urban areas, compared to the majority of old-old lived in rural-like areas (68.8%). Almost half of the respondents overall (49%) had lived in their current neighborhoods for over 20 years, with similar proportions across age groups. Income was perceived as sufficient to make ends meet among all age groups. Subjective health was lowest in the old-old respondents (median = 2, meaning "average"), while the other two older age groups showed "good" (median = 3) in this item. Most demographic indicators did not differ significantly among the age groups.

Result

Aspects with significant age-group differences

The data analysis revealed that, in general, there were no significant differences in most survey questions, except for four specific questions that

Table 1. Socio-demographic information of the sample by age group.

	Overall	Emerging-old (aged 50–64)	Young-old (aged 65–74)	Old-old (aged 75+)	Diff.[#]
Respondents number	298 (100%)	199 (66.8%)	81 (27.2%)	18 (6.0%)	
Gender (female)	188 (55.7%)	114 (57.3%)	44 (54.3%)	8 (44.4%)	n.s.
Marital status (% in each age group)[2]					**
Single	35 (11.7%)	26 (13.1%)	9 (11.1%)	0	
Married	229 (76.8%)	156 (78.8%)	59 (72.8%)	14 (77.8%)	
Divorced/separated	14 (4.7%)	10 (5.1%)	4 (4.9%)	0	
Widowed	19 (6.4%)	6 (3.0%)	9 (11.1%)	4 (22.2%)	
Highest education attainment (% in each age group)[3]					n.s.
Elementary school	15 (5.0%)	7 (3.5%)	5 (6.2%)	3 (16.7%)	
Middle school	118 (39.6%)	78 (39.2%)	31 (38.2%)	9 (50.0%)	
College degree	162 (54.3%)	112 (56.3%)	45 (55.6%)	5 (27.8%)	
Type of housing tenure (% in each age group)					n.s.
Private rental	23 (7.7%)	18 (9.0%)	3 (3.7%)	2 (11.1%)	
Private ownership	275 (92.3%)	181 (91.0%)	78 (96.3%)	16 (88.9%)	
Perceived type of neighborhood (% in each age group)[4]					n.s.
Urban	154 (51.7%)	108 (55.7%)	41 (52.6%)	5 (31.3%)	
Rural*	134 (45.0%)	86 (44.3%)	37 (47.4%)	11 (68.8%)	
Period of residence (% in each age group)[5]					n.s.
Less than 1 year	4 (1.3%)	4 (2.0%)	0	0	
1–10 years	75 (25.2%)	56 (28.3%)	16 (19.8%)	3 (16.7%)	
11–20 years	71 (23.8%)	41 (20.7%)	25 (30.9%)	5 (27.8%)	
Over 20 years	146 (49.0%)	97 (49.0%)	39 (48.1%)	10 (55.6%)	
No opinion	1 (0.3%)	0	1 (1.2%)	0	
Income sufficiency (1–5), Median[6]		3	3	3	n.s.
Subjective health (1–5), Median[7]		3	3	2	n.s.

Remarks:

(#) Differences were examined through Chi-test. n.s.: not significant. *$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed).

(*) Respondents chose urban or rural to describe their neighborhoods based on their subjective acknowledgement of its characteristics.

There were respondents chose not to answer certain questions, and the record was as follows: (2) one respondent, (3) three respondents, (4) ten respondents, (5) one respondent, (6) six respondents, (7) three respondents.

exhibited preferences increasing with age, as illustrated in Figure 1. These questions collectively focused on concerns related to safety, thermal comfort, and information dissemination.

Firstly, the increasing emphasis on safety concern with age is evident in the results of two questions: question 3.3.e, where respondents rated the importance of "smart technology enhancing safety (such as fall detection systems and temperature sensors)," and question 3.4.a, where respondents were asked about their willingness to "replace the bathtub with a walk-in shower to enhance home safety." Both questions yielded significant age-related differences ($p < 0.05$) and a positive correlation ($p < 0.01$) as indicated by the Kruskal-Wallis Test and Spearman's rank correlation, highlighting an increased focus on safety with advancing age.

Additionally, the growing preference for thermal comfort becomes apparent suggested in the result of question 3.3.a, which inquired about participants' rating of the importance of "comfortable architectural design." The Kruskal-Wallis Test revealed significant age-related differences ($p < 0.05$),

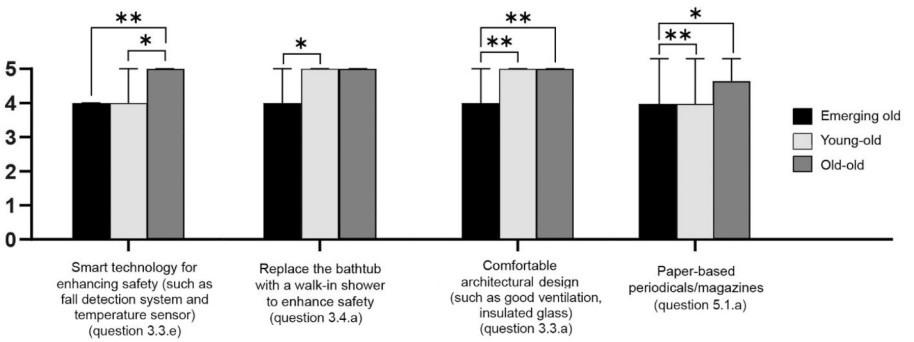

Figure 1. Survey questions with significant differences among three older age groups.
Remark: The symbols (*) and (**) refer to $p < .05$ and $p < .01$, respectively.

and the Spearman's rank correlation showed a positive age-related correlation ($p < 0.05$), suggesting that older age groups place a higher degree of importance on comfortable architectural design.

Lastly, the increasing preference for paper-based periodicals as a source of property service information is observed in question 5.1.a, where participants rated their agreement to receive property management information through specific channels. Similar analytical methods were employed, and the results indicated significant age-related differences ($p < 0.01$) and a positive correlation ($p < 0.01$) between age and the preference for paper-based periodicals. However, it is important to note that this result does not necessarily imply a preference for paper-based information channels over digital means, as respondents also rated digital platforms highly (see the section "Preference for Information Dissemination").

Preferences for living arrangements

The survey examined the types of accommodation preferred by older adults for aging-in-place, and the chi-square test result showed no significant difference among the three age groups (results refer to Table 2). The majority preferred to stay in their current housing estates (77.4%), followed by housing estates tailor-designed for older adults, (either public or private housing estates) (42.4%) and retirement villages (37.0%). Residential care homes, either public or private, were the least chosen option (6.1%). Intergenerational co-housing was less preferred, with only 20.9% expressed interest. There was no significant difference among the three older age groups regarding respondents' preferred companions to live with. Most respondents preferred to live with their spouse (73.1%), followed by children (36.4%). A very small proportion preferred living with non-familial younger individuals (6.8%).

Table 2. Results on preference for living arrangement.

		Emerging-old (50–64) (n = 199)		Young-old (65–74) (n = 81)		Old-old (75+) (n = 18)		All respondents	
		N	%	N	%	N	%	N	%
2.1 Desired accommodation for aging in place (can choose more than 1 option) **1 non-respondent*	Continue living in current housing estates	153	77.3%	62	76.5%	15	83.3%	230	77.4%
	Housing estates tailor-design for older adults	85	42.9%	36	44.4%	5	27.8%	126	42.4%
	Tetirement village	75	37.9%	33	40.7%	2	11.1%	110	37.0%
	Intergenerational co-housing	42	21.1%	18	22.2%	2	11.1%	62	20.9%
	Residential care homes for the elderly	12	6.0%	3	3.7%	3	16.7%	18	6.1%
	Others	2	1.0%	0	0%	0	0%	2	0.7%
2.2 Who do you want to live with? (can choose more than 1 option) **4 non-respondents*	Partner	151	77%	53	66.3%	11	61.1%	215	73.1%
	Children	74	37.8%	26	32.5%	7	38.9%	107	36.4%
	Carer(s)	45	23.0%	25	31.3%	5	27.8%	75	25.5%
	Friend(s)	26	13.3%	11	13.8%	3	16.7%	40	13.4%
	Relatives (s)	17	8.7%	7	8.8%	1	5.6%	25	8.4%
	Different age (multi-gens co-living)	13	6.6%	6	7.5%	1	5.6%	20	6.8%
	Similar age (unrelated people)	24	12.2%	12	15.0%	3	16.7%	39	13.1%
	Parent(s)	9	4.6%	0	0%	1	5.6%	10	3.4%
	Living alone	24	12.2%	11	13.8%	2	11.1%	37	12.4%

Preference for housing design and planning features

Across all older age groups, respondents prioritized environmental comfort over other design and planning features in housing estates (results refer to Table 3). Respondents emphasized design and planning features that can promote a livable living environment (e.g., good ventilation, air quality, noise control, and greenery) (50.7%) as the most important residential neighborhood characteristic, followed by the availability of community facilities and services for everyday uses (e.g., community center, bank) (49.7%), the availability of elderly facilities and services (e.g., barrier-free design, elderly fitness facilities) (46.7%), and adequate healthcare support (36.7%). Similarly, respondents gave high ratings (median = 5) to "comfortable environment" (e.g., appropriate temperature, good air quality, and absence of excessive noise) and "safety design and proper management" as characteristics expected in communal facilities around their living environments.

Safety is another prominent feature emphasized by all older age groups. Respondents emphasized "design and material enhancing safety (e.g., anti-slip floor tiles)" as the most important element (median = 5) over other design aspects, such as durability, flexibility, and smart technology. There is an increasing agreement on "replacing bathtub with a walk-in shower" with age as previously mentioned, and the median score on such statement was significantly higher than 3, indicating that respondents across all older age groups highly prefer such intervention to enhance safety. Respondents also consistently agreed to replace an enclosed kitchen with an open kitchen, and to replace an open flame stove with an induction cooking stove for safety reason.

A general preference for healthcare services and community facilities in close proximity to older adults' homes was observed across all older age groups. Nearly half (49.7%) emphasized the importance of the availability and spatial proximity of community and healthcare facilities for everyday uses (such as clinics and community centers) as key neighborhood components promoting aging-in-place. The top three preferred places for activities promoting physical and mental well-being (e.g., physical exercise, meditation) were "within estate" (66.9%), "at home" (57.4%) and "community facilities" (40.5%). Only a few respondents chose government facilities (20.9%) and outdoor public spaces (26.7%) as the preferred activity places.

Preference for property management and service provision

The survey showed a consistent preference for access to healthy food, elderly and healthcare services over other services within housing estates (results refer to Table 4). Respondents' ratings on "medical center (i.e.,

Table 3. Results on preference for housing design and planning features.

			Emerging-old (50–64) (n = 199)		Young-old (65–74) (n = 81)		Old-old (75+) (n = 18)		All respondents	
			N	%	N	%	N	%	N	%
3.1 What are the most important living environment characteristics? (can choose not more than 3 options) **4 non-respondents*	Close to natural environment		57	29.1%	17	21.3%	4	22.2%	78	26.5%
	Livable environment (e.g., good ventilation, air quality, noise control, greenery)		98	50.0 %	42	52.5%	9	50.0%	149	50.7%
	Availability of community facilities and services for everyday use (e.g., clinic, community center, etc.)		93	47.4%	45	56.3%	8	44.4%	146	49.7%
	Familiar community		18	9.2%	6	7.5%	2	11.1%	26	8.8%
	Availability of elderly facilities and services (barrier-free facility, fitness facility, etc.)		90	45.9%	39	48.8%	9	50.0%	138	46.9%
	Adequate healthcare support		73	37.2%	31	38.8%	4	22.2%	108	36.7%
	Convenient transportation safety of community		58	29.6%	25	31.3%	9	50.0%	92	31.3%
	Flexibility for home modification (living space for carer(s), the possibility for the installation of railing, etc.)		61	31.1%	21	26.3%	2	11.1%	84	28.6%
3.2 What are your preferred places for healthy activities? (can choose not more than 3 options) **2 non-respondents*	At home		120	60.9%	45	55.6%	5	27.8%	170	57.4%
	Within estate		131	66.5%	55	67.9%	12	66.7%	198	66.9%
	Community facilities (e.g., senior service)		36	18.3%	20	24.7%	6	33.3%	120	40.5%
	Countryside (e.g., country park)		63	32.0%	25	30.9%	5	27.8%	93	31.4%
	Private club house (e.g., gymnastics/fitness center)		70	35.5%	22	27.2%	3	16.7%	95	32.1%
	Public space (outdoor)		53	26.9%	22	27.2%	4	22.2%	79	26.7%
	Government facilities (e.g., government parks)		36	18.3%	20	24.7%	6	33.3%	62	20.9%
3.3 Do you agree with the following opinion about home safety? *(There are 199 responses to this question, respectively, 132 emerging-old, 58 young-old and 9 old-old)*	**a. Comfortable architectural design (e.g., good ventilation and insulated glass)**	1 (Most unimportant)	1	0.8%	1	1.7%	0	0.0%	2	1.0%
		2 (Unimportant)	2	1.5%	0	0.0%	0	0.0%	2	1.0%
		3 (Neutral)	12	9.1%	4	6.9%	0	0.0%	16	8.0%
		4 (Important)	76	57.6%	21	36.2%	2	22.2%	99	49.7%
		5 (Most important)	41	31.1%	32	55.2%	7	77.8%	80	40.2%
	b. Durable material and design	1 (Most unimportant)	1	0.8%	0	0.0%	0	0.0%	1	0.5%
		2 (Unimportant)	1	0.8%	0	0.0%	0	0.0%	1	0.5%
		3 (Neutral)	25	18.9%	10	17.2%	2	22.2%	37	18.6%
		4 (Important)	66	50.0%	25	43.1%	3	33.3%	94	47.2%
		5 (Most important)	39	29.5%	23	39.7%	4	44.4%	66	33.2%
	c. Design and material enhancing safety (e.g., anti-slip floor tiles)	1 (Most unimportant)	1	0.8%	0	0.0%	0	0.0%	1	0.5%
		2 (Unimportant)	1	0.8%	0	0.0%	0	0.0%	1	0.5%
		3 (Neutral)	7	5.3%	4	6.9%	0	0.0%	11	5.5%
		4 (Important)	59	44.7%	17	29.3%	3	33.3%	79	39.7%
		5 (Most important)	64	48.5%	37	63.8%	6	66.7%	107	53.8%
	d. Adaptable and flexible design accommodating for older adults' needs	1 (Most unimportant)	1	0.8%	0	0.0%	0	0.0%	1	0.5%
		2 (Unimportant)	0	0.0%	0	0.0%	0	0.0%	0	0.0%
		3 (Neutral)	20	15.2%	9	15.5%	1	11.1%	30	15.1%
		4 (Important)	69	52.3%	26	44.8%	4	44.4%	99	49.7%
		5 (Most important)	42	31.8%	23	39.7%	4	44.4%	69	34.7%
		1 (Most unimportant)	3	2.3%	1	1.7%	0	0.0%	4	2.0%

(*continued*)

Table 3. Continued.

			Emerging-old (50–64) (n = 199)		Young-old (65–74) (n = 81)		Old-old (75+) (n = 18)		All respondents	
			N	%	N	%	N	%	N	%
	e. Smart technology enhancing safety (e.g., fall detection system and temperature sensor[#])	2 (Unimportant)	5	3.8%	2	3.4%	0	0.0%	7	3.5%
		3 (Neutral)	39	29.5%	19	32.8%	1	11.1%	59	29.6%
		4 (Important)	58	43.9%	15	25.9%	2	22.2%	75	37.7%
		5 (Most important)	27	20.5%	21	36.2%	6	66.7%	54	27.1%
3.4 Do you agree with the following opinion about home safety?	**a. I am willing to replace the bathtub with a walk-in-shower to enhance home safety**	1 (Very disagree)	1	0.5%	0	0.0%	0	0.0%	1	0.3%
		2 (Disagree)	1	0.5%	4	4.9%	0	0.0%	5	1.7%
		3 (Neutral)	34	17.1%	6	7.4%	3	16.7%	43	14.4%
		4 (Agree)	74	37.2%	18	22.2%	3	16.7%	95	31.9%
		5 (Very agree)	89	44.7%	53	65.4%	12	66.7%	154	51.7%
	b. I am willing to replace the enclosed kitchen with an open kitchen to enhance home safety *3 non-respondents	1 (Very disagree)	6	3.0%	10	12.5%	2	11.8%	18	6.1%
		2 (Disagree)	26	13.1%	9	11.3%	2	11.8%	37	12.5%
		3 (Neutral)	48	24.2%	23	28.7%	8	47.1%	79	26.8%
		4 (Agree)	74	37.4%	15	18.8%	2	11.8%	91	30.8%
		5 (Very agree)	44	22.2%	23	28.7%	3	17.6%	70	23.7%
	c. I am willing to replace the open flame stove with an induction cooking stove to enhance home safety *2 non-respondents	1 (Very disagree)	5	2.5%	0	0.0%	0	0.0%	5	1.7%
		2 (Disagree)	5	2.5%	3	3.8%	0	0.0%	8	2.7%
		3 (Neutral)	43	21.6%	22	27.5%	7	41.2%	72	24.3%
		4 (Agree)	69	34.7%	24	30.0%	5	29.4%	98	33.1%
		5 (Very agree)	77	38.7%	31	38.8%	5	29.4%	113	38.2%

[#]Temperature sensors refer to heat detectors (e.g., to determine the presence of a fire in the kitchen) and extreme temperature sensors (e.g., if the temperature is high or low enough to potentially harm individuals).

Table 4. Results on property management and service provision.

			Emerging-old (50–64)(n = 199)		Young-old (65–74) (n = 81)		Old-old (75+) (n = 18)		All respondents	
			N	%	N	%	N	%	N	%
4.1 Do you agree with the following opinions about payment model of services?	**a. I am willing to replace the all-inclusive model (i.e., entirely included in a regular property management fee or a separate all-inclusive service fee) with the user-pays model (pay per usage/ visit)**	1 (Very disagree)	11	5.5%	2	2.5%	1	5.6%	14	4.7%
		2 (Disagree)	15	7.5%	6	7.4%	3	16.7%	24	8.1%
		3 (Neutral)	64	32.2%	29	35.8%	7	38.9%	100	33.6%
		4 (Agree)	78	39.2%	35	43.2%	1	5.6%	114	38.3%
		5 (Very agree)	31	15.6%	9	11.1%	6	33.3%	46	15.4%
	b. I am willing to pay a higher management fee for getter facilities	1 (Very disagree)	14	7.0%	11	13.6%	1	5.6%	26	8.7%
		2 (Disagree)	38	19.1%	11	13.6%	3	16.7%	52	17.4%
		3 (Neutral)	87	43.7%	23	28.4%	8	44.4%	118	39.6%
		4 (Agree)	48	24.1%	30	37.0%	4	22.2%	82	27.5%
		5 (Very agree)	12	6.0%	6	7.4%	2	11.1%	20	6.7%
4.2 If the following facilities applied a user-pay model, will it influence your visiting/using habit?	**a. Fitness/multipurpose rooms for physical activities**	1 (Very disagree)	76	38.2%	30	37.0%	8	44.4%	114	38.3%
		2 (Disagree)	42	21.1%	14	17.3%	2	11.1%	58	19.5%
		3 (Neutral)	50	25.1%	22	27.2%	5	27.8%	77	25.8%
		4 (Agree)	20	10.1%	7	8.6%	2	11.1%	29	9.7%
		5 (Very agree)	11	5.5%	8	9.9%	1	5.6%	20	6.7%
	b. Swimming pool **6 non-respondents*	1 (Very disagree)	79	40.3%	30	38.0%	7	41.2%	116	39.7%
		2 (Disagree)	31	15.8%	15	19.0%	3	17.6%	49	16.8%
		3 (Neutral)	51	26.0%	13	16.5%	5	29.4%	69	23.6%
		4 (Agree)	21	10.7%	12	15.2%	2	11.8%	35	12.0%
		5 (Very agree)	14	7.1%	9	11.4%	0	0.0%	23	7.9%
	c. Community farm/garden **8 non-respondents*	1 (Very disagree)	83	42.3%	35	44.9%	7	41.2%	125	43.0%
		2 (Disagree)	35	17.9%	7	9.0%	1	5.9%	43	14.8%
		3 (Neutral)	50	25.5%	18	23.1%	5	29.4%	73	25.1%
		4 (Agree)	16	8.2%	11	14.1%	3	17.6%	30	10.3%
		5 (Very agree)	11	5.6%	7	9.0%	1	5.9%	19	6.5%
	d. Activity room **11 non-respondents*	1 (Very disagree)	76	38.8%	27	35.5%	8	47.1%	111	38.4%
		2 (Disagree)	34	17.3%	12	15.8%	1	5.9%	47	16.3%
		3 (Neutral)	52	26.5%	20	26.3%	3	17.6%	75	26.0%
		4 (Agree)	18	9.2%	11	14.5%	4	23.5%	33	11.4%
		5 (Very agree)	14	7.1%	6	7.9%	1	5.9%	21	7.3%
4.3 Do you agree the following facilities and related services are what you desire within the housing estate?	**a. Medical center (i.e., facilities for medical consultation)**	1 (Very disagree)	4	2.0%	3	3.7%	0	0.0%	7	2.3%
		2 (Disagree)	5	2.5%	1	1.2%	0	0.0%	6	2.0%
		3 (Neutral)	34	17.1%	19	23.5%	6	33.3%	59	19.8%
		4 (Agree)	64	32.2%	21	25.9%	3	16.7%	88	29.5%
		5 (Very agree)	92	46.2%	37	45.7%	9	50.0%	138	46.3%
	b. Wellness center (i.e., primary care facilities providing health plans and consultation services)	1 (Very disagree)	4	2.0%	1	1.2%	0	0.0%	5	1.7%
		2 (Disagree)	7	3.5%	1	1.2%	0	0.0%	8	2.7%
		3 (Neutral)	55	27.6%	22	27.2%	8	44.4%	85	28.5%

(*continued*)

Table 4. Continued.

			Emerging-old (50–64)(n = 199)		Young-old (65–74) (n = 81)		Old-old (75+) (n = 18)		All respondents	
			N	%	N	%	N	%	N	%
		4 (Agree)	61	30.7%	22	27.2%	4	22.2%	87	29.2%
		5 (Very agree)	72	36.2%	35	43.2%	6	33.3%	113	37.9%
	c. Healthy food outlets	1 (Very disagree)	17	8.5%	3	3.7%	0	0.0%	20	6.7%
		2 (Disagree)	31	15.6%	9	11.1%	1	5.6%	41	13.8%
		3 (Neutral)	78	39.2%	33	40.7%	8	44.4%	119	39.9%
		4 (Agree)	42	21.1%	24	29.6%	5	27.8%	71	23.8%
		5 (Very agree)	31	15.6%	12	14.8%	4	22.2%	47	15.8%
	d. Residential canteen	1 (Very disagree)	14	7.0%	3	3.7%	0	0.0%	17	5.7%
		2 (Disagree)	26	13.1%	8	9.9%	2	11.1%	36	12.1%
		3 (Neutral)	55	27.6%	24	29.6%	6	33.3%	85	28.5%
		4 (Agree)	59	29.6%	26	32.1%	6	33.3%	91	30.5%
		5 (Very agree)	45	22.6%	20	24.7%	4	22.2%	69	23.2%
4.4 What are the most expected services provided by property management? (can choose not more than 2 options) **3 non-respondents*	Good management of environmental hygiene		187	94.4%	76	95.0%	15	88.2%	278	94.2%
	Flexible charges for facilities (e.g., early-bird discount, free quota for seniors, etc.)		67	33.8%	28	35.0%	8	47.1%	103	34.9%
	Holding diverse interest classes		56	28.3%	25	31.3%	5	29.4%	86	29.2%
	Assist in coordinating residents-led activities through online platforms or social media		30	15.2%	12	15.0%	4	23.5%	46	15.6%
	Use of big data to meet individual needs (e.g., energy saving, personalized promotion of information)		27	13.6%	9	11.3%	2	11.8%	38	12.9%
4.5 What are the most desired elderly services to be provided in the housing estate? (can choose not more than 3 options)	Regular telephone care		19	9.6%	6	7.6%	5	27.8%	30	10.2%
	Daily assistance (e.g., technical support, minor hardware maintenance, household cleaning service)		121	61.4%	53	67.1%	11	61.1%	185	62.9%
	Personalized care plan		77	39.1%	32	40.5%	4	22.2%	113	38.4%
	Health management information provision		41	20.8%	21	26.6%	4	22.2%	66	22.4%
	Outpatient escort service		44	22.3%	15	19.0%	2	11.1%	61	20.7%
	Home care services (by booking)		72	36.5%	25	31.6%	6	33.3%	103	35.0%
	Emergency support		109	55.3%	37	46.8%	8	44.4%	154	52.4%
	Home safety assessment and improvement		17	8.6%	11	13.9%	0	0.0%	28	9.5%
	Matching services for volunteers		30	15.2%	14	17.7%	3	16.7%	47	16.0%

facility for medical consultation)", "wellness center (i.e., primary care facility providing health management and consultation services)", and "residential canteen" were significantly higher than 3 ($p < 0.05$), indicating respondents were in favor of having these facilities in their housing estates. The survey found older adults preferred a flexible user-pay model (i.e., pay per visit/usage) over the all-inclusive model (i.e., entirely included in a regular property management fee or a separate all-inclusive service fee). They showed less willingness to have better facilities at the cost of higher management fees. They expressed that user-pay models would not negatively influence their daily routines and habits nor the utilization of estate common facilities, including fitness or multipurpose rooms for physical activities, swimming pools, community gardens, and activity rooms.

In recent housing developments, there has been a trend of incorporating resident-oriented services in property management. This phenomenon informed the survey design to examine participants' preferences for elderly-related services within estates. Over half of the respondents preferred daily assistance (e.g., technical support, minor hardware maintenance and household cleaning) (62.9%) and emergency support (52.4%). About one-third of the respondents preferred personalized care plans (38.4%) and home care services by booking (35.0%), followed by health management information provision (22.4%) and outpatient escort service (20.7%). The least popular options were regular phone care (10.2%) and home safety assessment and improvement (9.5%). Respondents had high expectations of "good management of environmental hygiene" (94.2%) in general property management services, while virtual means of accessing services, such as "use of big data to meet individual needs (e.g., energy saving, personalized promotion of information)" (12.9%) and "assist in coordinating residents-led activities through online platforms or social media" (15.6%), were less popular options.

Preference for information dissemination

Although internet-based or digital assistant services were unpopular among respondents, they generally accepted digital platforms and channels for receiving property management and services information (results refer to Table 5). Regarding the questions about preferred means of information dissemination, the result showed mean scores of "mobile app of the estate", "social media", "smart TV at home", and "estate website" were all significantly higher than 3 ($p < 0.05$), indicating a positive attitude toward internet-based platforms or channels. Specifically, the three most preferred health-related information sources were "Internet" (66.9%), "television" (62.8%) and "property management services" (55.7%). In contrast, more

Table 5. Results of preference for information dissemination.

			Emerging-old (50–64)(n = 199)		Young-old (65–74) (n = 81)		Old-old (75+) (n = 18)		All respondents	
			N	%	N	%	N	%	N	%
5.1 Do you agree that you prefer the following communication channels provided by property management? **4 non-respondents*	**a. Paper-based periodicals/ magazines**	1 (Very disagree)	28	14.1%	3	3.7%	0	0.0%	31	10.4%
		2 (Disagree)	29	14.6%	7	8.6%	1	5.6%	37	12.4%
		3 (Neutral)	85	42.7%	37	45.7%	8	44.4%	130	43.6%
		4 (Agree)	36	18.1%	21	25.9%	6	33.3%	63	21.1%
		5 (Very agree)	21	10.6%	13	16.0%	3	16.7%	37	12.4%
	b. Smart TV at home	1 (Very disagree)	13	6.5%	3	3.7%	9	0.0%	16	5.4%
		2 (Disagree)	15	7.5%	8	9.9%	0	0.0%	23	7.7%
		3 (Neutral)	76	38.2%	35	43.2%	6	33.3%	117	39.3%
		4 (Agree)	58	29.1%	20	24.7%	4	22.2%	82	27.5%
		5 (Very agree)	37	18.6%	15	18.5%	8	44.4%	60	20.1%
	c. Mobile app of the estate	1 (Very disagree)	8	4.0%	6	7.4%	0	0.0%	14	4.7%
		2 (Disagree)	8	4.0%	2	2.5%	0	0.0%	10	3.4%
		3 (Neutral)	64	32.2%	30	37.0%	6	33.3%	100	33.6%
		4 (Agree)	67	33.7%	22	27.2%	7	38.9%	96	32.2%
		5 (Very agree)	52	26.1%	21	25.9%	5	27.8%	78	26.2%
	d. Estate website	1 (Very disagree)	11	5.5%	7	8.6%	0	0.0%	18	6.0%
		2 (Disagree)	17	8.5%	3	3.7%	0	0.0%	20	6.7%
		3 (Neutral)	74	37.2%	36	44.4%	10	55.6%	120	40.3%
		4 (Agree)	65	32.7%	19	23.5%	3	16.7%	87	29.2%
		5 (Very agree)	32	16.1%	16	19.8%	5	27.8%	53	17.8%
	e. Social media	1 (Very disagree)	12	6.0%	4	4.9%	0	0.0%	16	5.4%
		2 (Disagree)	14	7.0%	5	6.2%	0	0.0%	19	6.4%
		3 (Neutral)	64	32.2%	39	48.1%	7	38.9%	110	36.9%
		4 (Agree)	64	32.2%	14	17.3%	5	27.8%	83	27.9%
		5 (Very agree)	45	22.6%	19	23.5%	6	33.3%	70	23.5%
5.2 Where do you prefer to receive health related information? (can choose more than 1 option) **2 non-respondents*	Television		118	59.9%	54	66.7%	14	77.8%	186	62.8%
	Radio		38	19.3%	23	28.4%	4	22.2%	65	22.0%
	The Internet		139	70.6%	53	65.4%	6	33.3%	198	66.9%
	Newspaper		30	15.2%	23	28.4%	8	44.4%	61	20.6%
	Friends		47	23.9%	13	16.0%	6	33.3%	66	22.3%
	Property management services		115	58.4%	43	53.1%	7	38.9%	165	55.7%
	Community center		77	39.1%	27	33.3%	5	27.8%	109	36.8%
	District health center		70	35.5%	34	42.0%	7	38.9%	111	37.5%

conventional channels, such as "newspaper" (20.6%) and "radio" (22.0%), and "friends" (22.3%) were the least selected.

Opinions on home modification

Timely home modification according to individual needs is critical to the success of aging-in-place. The survey investigated the considerations and factors influencing older adults' decision to undertake home modification. Key deterrents were insufficient financial support (51.4%) and lack of reliable contractors (53.1%). Other push factors included considering modification troublesome (like finding a place to live temporarily) (37.4%), lack of knowledge (31.6%), declined physical strength (31.3%) and being constrained by conditions of the current building/unit (30.3%). Lack of time was not a significant concern (8.2%). Moreover, the awareness of financial assistance schemes supporting building rehabilitation provided by the Hong Kong SAR Government and other quasi-public organization (such as the Urban Renewal Authority) was low. While over half of the respondents had heard about the Mandatory Building Inspection Subsidy Scheme (54.6%), the other five schemes were only known by less than a quarter of the respondents. 35.2% of respondents had not heard of any schemes mentioned in the survey, indicating limited access to relevant information (results refer to Table 6).

Discussion

Housing design and modification: Thermal comfort, safety and adaptability

The survey found no significant age-related differences in most attributes of housing preference for aging-in-place, concurring with similar studies in comparable contexts (Müller & Oswald, 2020; Yuen et al., 2019). While not exhaustive, this study argues that older adults across different age groups generally share similar views, needs, and aspirations about their home areas (Kearns & Parkinson, 2001), but there may be varying concerns and interests that should be considered in the planning, design and operation of housing estates for promoting aging-in-place in Hong Kong.

The survey results showed increasing concern about thermal comfort with age, emphasizing the need for design standards upgrade and spatial adaptability to support aging-in-place. Previous studies showed the significance of thermal comfort in both housing units (Mulliner et al., 2020) and neighborhood outdoor environments (Yung et al., 2019) for promoting older adults' health and well-being under the trajectory of climate change. Older adults have lower thermal non-acceptance levels (i.e., lower tolerance) than younger people (Indraganti & Rao, 2010), making inadequate

Table 6. Results on home modification.

		Emerging-old (50–64) (n = 199)		Young-old (65–74) (n = 81)		Old-old (75+) (n = 18)		All respondents	
		N	%	N	%	N	%	N	%
6.1 What are the factors that discouraged you from undertaking home modifications? (multiple choice) **4 non-respondents*	Lack of time	20	10.2%	3	3.7%	1	5.9%	24	8.2%
	Limited by declined physical strength	63	32.1%	24	29.6%	5	29.4%	92	31.3%
	Too troublesome (e.g., finding a place to live temporarily)	69	35.2%	34	42.0%	7	41.2%	110	37.4%
	Insufficient financial support	108	55.1%	34	42.0%	9	52.9%	151	51.4%
	Lack of information	58	29.6%	22	27.2%	7	41.2%	87	29.6%
	Lack of knowledge	65	33.2%	21	25.9%	7	41.2%	93	31.6%
	Lack of reliable contractors	103	52.6%	42	51.9%	11	64.7%	156	53.1%
	Constrained by building condition of the existing building (e.g., load-wearing wall, etc.)	62	31.6%	23	28.4%	4	23.5%	89	30.3%
6.2 In the following supports under the Integrated Building Rehabilitation Assistance Scheme, which have you heard about? (can choose more than 1 option)	Smart tender building rehabilitation facilitating services provided by the Urban Renewal Authority (URA)	23	11.7%	8	10.0%	1	6.3%	32	10.9%
	Mandatory building inspection subsidy scheme offered by the URA	114	57.9%	40	50.0%	6	37.5%	160	54.6%
	Common area repair work subsidy provided by the URA	18	9.1%	11	13.8%	1	6.3%	30	10.2%
	Home renovation interest-free loan provided by the URA	35	17.8%	14	17.5%	3	18.8%	52	17.7%
	Building maintenance grant scheme for needy owners provided by the URA	35	17.8%	23	28.8%	4	25.0%	62	21.2%
	Building safety loan scheme provided by Buildings Department, HKSARG	26	13.2%	10	12.5%	0	0.0%	36	12.3%
	I have not heard of any of the above schemes	71	36.0%	26	32.5%	6	37.5%	103	35.2%

building design, especially envelope insulation, a health risk to older adults (Miller et al., 2017). There are existing guidelines on residential building design, both units and outdoor spaces, concerning the thermal environment in Hong Kong (BEAM Society Limited, 2019; Building Authority, 1995; Buildings Department, 2014, 2023; Electrical & Mechanical Services Department, 2005), but their effectiveness and robustness would require further review and calibration amid the rising number of very hot days and nights (Hua et al., 2022).

The study found significant concern about home safety among older adults, consistent with studies in other geographical contexts (Mulliner et al., 2020; van Leeuwen et al., 2019) and Hong Kong (Mesthrige & Cheung, 2020; Jayantha et al., 2018). It is suggested to allocate resources and develop specific statutory control to improve the safety standards of certain features in housing units, such as bathroom design, kitchen design and choice of kitchen appliances (e.g., stoves) to support aging-in-place.

Home modification is crucial in addressing the lack of elderly-friendly features in existing housing estates in Hong Kong. Studies underscore the need to design adaptations to compensate for older adults' physical declines ensuring home safety (Huang & Lee, 2020), increase the feeling of independence and autonomy (Danziger & Chaudhury, 2009), and enhance overall health and well-being of older adults (Park & Kim, 2018). However, the present study revealed insufficient awareness and interest in home assessment among respondents, despite their growing concerns for home safety and thermal comfort. Some older adults may not realize that home assessments and modifications could effectively reduce safety risks and improve comfort. They may also overlook their functional decline due to aging and fail to anticipate safety risks from poor fit with the environment (Lysack, 2010).

This study suggests improving home adaptations for older adults by considering the following measures: (i) enhance the promotion of home modification assistance schemes, (ii) enhance public education about home assessments and modifications, (iii) create implementable demonstrations and prototypes of home modification, and (iv) develop technical accreditation for contractors or builders to ensure appropriate competence (in terms of knowledge, skills, and experience) and professionalism (in terms of workmanship, attitude, and project management). Property management companies should consider cross-disciplinary cooperation and staff training to provide estate-based technical services (Huang & Lee, 2020).

Spatial planning: Preference of facilities and gated environment

The study found that older adults residing in private housing estates prefer to participate in activities within their estates or neighborhood, possibly

due to declining mobility (Béland et al., 2018; Fristedt et al., 2022) and a sense of privacy and security in a familiar environment (Wang & Lau, 2013). It is recommended to include older adults' preferred spaces, such as cafeterias/residential canteens, healthy food outlets, community and healthcare facilities, and a variety of exercise spaces, within housing estates to create a favorable environment for aging-in-place and active aging.

The planning of resident-exclusive facilities in gated communities could lead to socio-spatial segregation, limiting older adults' social participation, and reducing age-friendliness (World Health Organization, 2002). In the hyper-dense urban context of Hong Kong, the pursuit of privacy and exclusivity (Wang & Lau, 2013), coupled with the vertical urban form with residential towers located on top of podiums, contributes to the prevalence of gated communities. There would be landscaped open spaces, playgrounds, swimming pools, ball courts, and jogging trails on top of podiums for residents' exclusive uses (Wang & Lau, 2002). These privately-owned, exclusive residential spaces offer desirable social spaces for older adult residents because of the quieter and greener surroundings and proximity to home (Trivic, 2021; Yung et al., 2016). The positive environments within gated housing estates may promote older adult residents' activities, but such spatial planning also confines their activity locations, leading to a decrease in social contact with the wider community at large (Mantey, 2017). This is a noteworthy issue because the growing individualism and privatization of spaces in high-dense urban environments threaten social connectedness (Barreto et al., 2021; Chan, 2020), a significant factor contributing to older adults' mental and physical well-being (World Health Organization, 2021). Without a socially vibrant neighborhood environment, older adults may have a higher risk of loneliness when aging at home (Fernández-Carro & Evandrou, 2014; Powell, 2016; Rosenwohl-Mack et al., 2020).

Therefore, it is worth reviewing related policies, statutory building control and management practices to promote a socially enabled and inclusive living environment. Studies have shown that shared use of facilities and infrastructure tends to promote a sense of community (Belk, 2017) and encourage greater social integration (Williams, 2005). The study results showed that the respondents were in favor of a flexible user-pay model that could allow sharing of estates' facilities with the wider community for revenue generation, contributing positively to the financial viability of residential facilities and possibly reducing overall management fees paid by individual households. However, open access to facilities requires further research to unfold the complexity of issues related to legal liability, statutory control, financial model, risk management, and residents' willingness.

Property management: Virtual vs in-person

Respondents showed high acceptance of social media for property management information, but they were less interested in virtual assistance, such as telecare, web-based functions or services. This suggests that social media could be a preferred channel for information dissemination, echoing the findings of technology-readiness of baby boomers concluded in other studies (Choi et al., 2022; Sheldon et al., 2021; Yuen, 2022). Despite their familiarity with web-based technological applications, respondents preferred real-time interactive enquiry with the physical presence of relevant personnel over virtual assistance. In-person home visits can provide social functions through human interaction and hands-on care, and are thus more preferred by older adults (Corbyn, 2021; Rykkje & Hjorth, 2017). In recent years, smart home devices and telecare have gained popularity in home-care services (Memon et al., 2014). However, the study result suggests that tele-driven or smart initiatives should complement in-person property management and services rather than replace them. The provision of on-site professionals is irreplaceable by any smart technology. Having said that, property management personnel often lacks training in addressing older adults' needs (Ewen et al., 2017). Thus, the content of property management training should be reviewed and calibrated to broaden the service pledge and scope for aging-in-place. Specifically, training content may contain multidisciplinary knowledge and skills in gerontology, social work and public health (Ewen et al., 2017).

Limitations and further study

There are limitations in the study that could be addressed in future research. Firstly, convenience sampling was used instead of stratified sampling, which may better represent different older age groups. Due to the exclusivity of private housing estates, survey questionnaires could only be distributed to limited housing estates with the project funder's assistance. Such data collection method was more prone to research bias. Due to the diverse spatial and demographic characteristics of private housing estates, the study results may not be generalized. Besides, the notable difference in the sample sizes of the three age groups, particularly the smaller size of the old-old group ($n = 18$), is a limitation of this study. Consequently, the findings should be interpreted with caution, as they may not be broadly generalizable. Despite this, our research provides valuable insights into the nuanced differences in housing preferences and choices across varied older age groups. Future studies should consider using random stratified sampling for better generalizability. Moreover, the study only focused on older adults' views. It did not examine perspectives from real estate, property

management, design and planning professionals, which might provide practical insights into how older adults' preferences could be tackled in real life. Lastly, the study found that some living arrangements, such as intergenerational living, received little interest, but underlying reasons were not explored. Existing literature shows the potential benefit of intergenerational living for improving older adults' quality of life (Arentshorst et al., 2019; Labit & Dubost, 2016). Future research could address such deficiencies.

Conclusion

This study investigated housing preferences of three older age groups in Hong Kong's private housing estates. While limited differences among the three older age groups were observed, consistent preferences positively related to age emerged, such as the need for thermal comfort, safety, demands for diverse facilities inside housing estates, and on-site support. This study suggests improvement in housing design standards, property management practices, and promotion of home modification for older adults. It provided empirical insights into the preferences of older adults in a high-density urban Asian context. Future research could consider perspectives from housing and service providers, design and planning professionals, and explore alternative living arrangements, like intergenerational living.

Acknowledgements

The research team is grateful for the support offered by Chinachem Group, community partners, working group members, and all study participants. The survey was conducted as part of a consultancy project commissioned by Chinachem Group.

Disclosure statement

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for research, authorship, and publication of this article: this material is based on a research study commissioned by Chinachem Group.

ORCID

Kar Him Mo http://orcid.org/0000-0001-6579-1358
Danyang Lei http://orcid.org/0000-0003-4735-5493
Jean Woo http://orcid.org/0000-0001-7593-3081
Rina Ko http://orcid.org/0009-0003-7685-7027

References

Abramsson, M., & Andersson, E. (2016). Changing preferences with ageing–housing choices and housing plans of older people. *Housing, Theory and Society*, *33*(2), 217–241. https://doi.org/10.1080/14036096.2015.1104385

Andersson, E. K., Abramsson, M., & Malmberg, B. (2019). Patterns of changing residential preferences during late adulthood. *Ageing and Society*, *39*(8), 1752–1781. https://doi.org/10.1017/S0144686X18000259

Angelini, V., Brugiavini, A., & Weber, G. (2014). The dynamics of homeownership among the 50+ in Europe. *Journal of Population Economics*, *27*(3), 797–823. https://doi.org/10.1007/s00148-013-0477-5

Ahn, M., Kwon, H. J., & Kang, J. (2020). Supporting aging-in-place well: Findings from a cluster analysis of the reasons for aging-in-place and perceptions of well-being. *Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society*, *39*(1), 3–15. https://doi.org/10.1177/0733464817748779

Arentshorst, M. E., Kloet, R. R., & Peine, A. (2019). Intergenerational housing: The case of humanitas Netherlands. *Journal of Housing for the Elderly*, *33*(3), 244–256. https://doi.org/10.1080/02763893.2018.1561592

Barreto, M., Victor, C., Hammond, C., Eccles, A., Richins, M. T., & Qualter, P. (2021). Loneliness around the world: Age, gender, and cultural differences in loneliness. *Personality and Individual Differences*, *169*, 110066. https://doi.org/10.1016/j.paid.2020.110066

BEAM Society Limited. (2019). BEAM Plus New Buildings Version 2.0. https://www.hkgbc.org.hk/eng/beam-plus/file/BEAMPlus_New_Buildings_v2_0.pdf

Belk, R. (2017). Sharing without caring. *Cambridge Journal of Regions, Economy and Society*, *10*(2), 249–261. https://doi.org/10.1093/cjres/rsw045

Béland, F., Julien, D., Bier, N., Desrosiers, J., Kergoat, M.-J., & Demers, L. (2018). Association between cognitive function and life-space mobility in older adults: Results from the FRéLE longitudinal study. *BMC Geriatrics*, *18*(1), 227. https://doi.org/10.1186/s12877-018-0908-y

Bigonnesse, C., & Chaudhury, H. (2020). The landscape of "aging in place" in gerontology literature: Emergence, theoretical perspectives, and influencing factors. *Journal of Aging and Environment*, *34*(3), 233–251. https://doi.org/10.1080/02763893.2019.1638875

Building Authority. (1995). Code of *practice for overall thermal transfer value in buildings.* https://www.bd.gov.hk/doc/en/resources/codes-and-references/code-and-design-manuals/OTTV1995_e.pdf

Buildings Department. (2014). PNAP APP-156 *design and construction requirements for energy efficiency of residential buildings.* https://www.bd.gov.hk/doc/en/resources/codes-and-references/practice-notes-and-circular-letters/pnap/APP/APP156.pdf

Buildings Department. (2023). PNAP-APP-67 *energy efficiency of buildings building (energy efficiency) regulation.* https://www.bd.gov.hk/doc/en/resources/codes-and-references/practice-notes-and-circular-letters/pnap/APP/APP067.pdf

Cangelosi, J., Jr, & Markham, F. S. (1994). A descriptive study of personal, institutional, and media sources of preventive health care information. *Health Marketing Quarterly*, *12*(1), 23–36. https://doi.org/10.1300/J026v12n01_04

Census and Statistics Department. (2022). Main *t*ables. https://www.census2021.gov.hk/tc/main_tables.html

Centers for Disease Control and Prevention. (2019). Healthy *places terminology*. https://www.cdc.gov/healthyplaces/terminology.htm

Chan, E. (2020). Public space as commodity: Social production of the Hong Kong waterfront. *Proceedings of the Institution of Civil Engineers – Urban Design and Planning*, *173*(4), 146–155. https://doi.org/10.1680/jurdp.19.00024

Cheng, M. (2003). *A study of the housing needs of middle-class elderly*. HKU Theses Online (HKUTO)

Chin, T. (2003). New survey finds fewer patients searching online. *American Medical News*, *46*(14), 17.

Chiu, R. L. H., & Ho, M. H. C. (2006). Estimation of elderly housing demand in an Asian city: Methodological issues and policy implications. *Habitat International*, *30*(4), 965–980. https://doi.org/10.1016/j.habitatint.2005.08.001

Choi, N. G., DiNitto, D. M., Marti, C. N., & Choi, B. Y. (2022). Telehealth use among older adults during COVID-19: Associations with socio-demographic and health characteristics, technology device ownership, and technology learning. *Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society*, *41*(3), 600–609. https://doi.org/10.1177/07334648211047347

Corbyn, Z. (2021). The future of elder care is here – and it's artificial intelligence. The Guardian. https://www.theguardian.com/us-news/2021/jun/03/elder-care-artificial-intelligence-software

Costa-Font, J., Elvira, D., & Mascarilla-Miró, O. (2009). Ageing in place'? Exploring elderly people's housing preferences in Spain. *Urban Studies*, *46*(2), 295–316. https://doi.org/10.1177/0042098008099356

Danziger, S., & Chaudhury, H. (2009). Older adults' use of adaptable design features in housing units: An exploratory study. *Journal of Housing for the Elderly*, *23*(3), 134–148. https://doi.org/10.1080/02763890903035498

Electrical & Mechanical Services Department. (2005). Performance-based *building energy code*. https://www.emsd.gov.hk/filemanager/en/content_724/pb-bec.pdf

Ewen, H. H., Lewis, D. C., Carswell, A. T., Emerson, K. G., Washington, T. R., & Smith, M. L. (2017). A model for aging in place in apartment communities. *Journal of Housing for the Elderly*, *31*(1), 1–13. https://doi.org/10.1080/02763893.2016.1268555

Fernández-Carro, C., & Evandrou, M. (2014). Staying put: Factors associated with ageing in one's 'lifetime home'. Insights from the European context. *Research on Ageing and Social Policy*, *2*(1), 28–56. https://doi.org/10.4471/rasp.2014.02

Filipovič Hrast, M., Sendi, R., Hlebec, V., & Kerbler, B. (2019). Moving house and housing preferences in older age in Slovenia. *Housing, Theory and Society*, *36*(1), 76–91. https://doi.org/10.1080/14036096.2018.1510854

Fristedt, S., Kammerlind, A.-S., Fransson, E. I., & Ernsth Bravell, M. (2022). Physical functioning associated with life-space mobility in later life among men and women. *BMC Geriatrics*, *22*(1), 364. https://doi.org/10.1186/s12877-022-03065-9

Hong Kong's Information Services Department. (2017). Ageing pace increasing. https://www.news.gov.hk/en/categories/health/html/2017/02/20170227_154933.shtml

Horner, B., & Boldy, D. P. (2008). The benefit and burden of "ageing-in-place" in an aged care community. *Australian Health Review: A Publication of the Australian Hospital Association*, *32*(2), 356–365. https://doi.org/10.1071/ah080356

Hua, J., Shi, Y., Ren, C., Lau, K. K.-L., & Ng, E. Y. Y. (2022). Impact of urban overheating and heat-related mortality in Hong Kong. In *Urban Overheating: Heat Mitigation and the Impact on Health* (pp. 275–292). Springer.

Huang, Y.-H., & Lee, P.-C. (2020). Role of property management in service demands of elderly residents of apartment complexes. *International Journal of Strategic Property Management*, *24*(1), 24–37. https://doi.org/10.3846/ijspm.2019.10852

Hui, E. C. M., Wong, F. K. W., Chung, K. W., & Lau, K. Y. (2014). Housing affordability, preferences and expectations of elderly with government intervention. *Habitat International*, *43*, 11–21. https://doi.org/10.1016/j.habitatint.2014.01.010

Indraganti, M., & Rao, K. D. (2010). Effect of age, gender, economic group and tenure on thermal comfort: A field study in residential buildings in hot and dry climate with seasonal variations. *Energy and Buildings*, *42*(3), 273–281. https://doi.org/10.1016/j.enbuild.2009.09.003

Jayantha, W. M., Qian, Q. K., & Yi, C. O. (2018). Applicability of 'aging in place' in redeveloped public rental housing estates in Hong Kong. *Cities*, *83*, 140–151. https://doi.org/10.1016/j.cities.2018.06.016

Jockey Club Age-friendly City. (2019). Cross-district report of baseline assessment on age-friendliness (18 Districts). https://www.jcafc.hk/uploads/docs/Cross-district-report-of-baseline-assessment-on-age-friendliness-(18-districts).pdf

Jong, P., Rouwendal, J., Hattum, P., & Brouwer, A. (2012). Housing preferences of an ageing population: Investigation in the diversity among Dutch older adults.

Keeling, S. (1999). Ageing in (a New Zealand) place: Ethnography, policy and practice. *Social Policy Journal of New Zealand*, *13*, 95–114.

Ke, P., Xu, M., Xu, J., Yuan, X., Ni, W., Sun, Y., Zhang, H., Zhang, Y., Tian, Q., Dowling, R., Jiang, H., Zhao, Z., & Lu, Z. (2023). Association of residential greenness with the risk of metabolic syndrome in Chinese older adults: A longitudinal cohort study. *Journal of Endocrinological Investigation*, *46*(2), 327–335. https://doi.org/10.1007/s40618-022-01904-5

Kearns, A., & Parkinson, M. (2001). The significance of neighbourhood. *Urban Studies*, *38*(12), 2103–2110. https://doi.org/10.1080/00420980120087063

Kim, H., Ahn, Y. H., Steinhoff, A., & Lee, K. H. (2014). Home modification by older adults and their informal caregivers. *Archives of Gerontology and Geriatrics*, *59*(3), 648–656. https://doi.org/10.1016/j.archger.2014.07.012

Kochera, A., Straight, A., & Guterbock, T. (2005). Beyond 50.05: A report to the nation on livable communities: Creating environments for successful aging.

Labit, A., & Dubost, N. (2016). Housing and ageing in France and Germany: The intergenerational solution. *Housing, Care and Support*, *19*(2), 45–54. https://doi.org/10.1108/HCS-08-2016-0007

Lawlor, D., & Thomas, M. A. (2008). Residential design for aging in place (p.7). John Wiley & Sons.

Lawton, M. P., & Simon, B. (1968). The ecology of social relationships in housing for the elderly. *The Gerontologist*, *8*(2), 108–115. https://doi.org/10.1093/geront/8.2.108

Legislative Council. (2018). LCQ17: Elderly Services Programme Plan. https://www.info.gov.hk/gia/general/201807/04/P2018070400621.htm?fontSize=1

Lysack, C. L. (2010). Household and neighborhood safety, mobility. In *Handbook of assessment in clinical gerontology* (pp. 619–646). Academic Press.

Mantey, D. (2017). Social consequences of gated communities: The case of suburban Warsaw. *Professional Geographer*, *69*(1), 151–161. https://doi.org/10.1080/00330124.2016.1184986

Memon, M., Wagner, S. R., Pedersen, C. F., Beevi, F. H. A., & Hansen, F. O. (2014). Ambient assisted living healthcare frameworks, platforms, standards, and quality attributes. *Sensors (Basel, Switzerland)*, *14*(3), 4312–4341. https://doi.org/10.3390/s140304312

Mesthrige, J. W., & Cheung, S. L. (2020). Critical evaluation of 'ageing in place' in redeveloped public rental housing estates in Hong Kong. *Ageing and Society*, *40*(9), 2006–2039. https://doi.org/10.1017/S0144686X19000448

Miller, W., Vine, D., & Amin, Z. (2017). Energy efficiency of housing for older citizens: Does it matter? *Energy Policy*, *101*, 216–224. https://doi.org/10.1016/j.enpol.2016.11.050

Mulliner, E., Riley, M., & Maliene, V. (2020). Older people's preferences for housing and environment characteristics. *Sustainability*, *12*(14), 5723. https://doi.org/10.3390/su12145723

Müller, H., & Oswald, F. (2020). An intergenerational approach to perceived housing. *Journal of Aging and Environment*, *34*(3), 270–290. https://doi.org/10.1080/02763893.2019.1680129

Oswald, F., & Wahl, H.-W. (2013). Creating and sustaining homelike places in residential environments. In *Environmental Gerontology: Making Meaningful Places in Old Age* (pp. 53–77). Springer Publishing Company.

Park, S. J., & Kim, M. J. (2018). A framework for green remodeling enabling energy efficiency and healthy living for the elderly. *Energies*, *11*(8), 2031. https://doi.org/10.3390/en11082031

Phillips, D. R., Siu, O.-L., Yeh, A. G. O., & Cheng, K. H. C. (2005). The impacts of dwelling conditions on older persons' psychological well-being in Hong Kong: The mediating role of residential satisfaction. *Social Science & Medicine (1982)*, *60*(12), 2785–2797. https://doi.org/10.1016/j.socscimed.2004.11.027

Pickard, L., Wittenberg, R., Comas-Herrera, A., King, D., & Malley, J. (2012). Mapping the future of family care: Receipt of informal care by older people with disabilities in England to 2032. *Social Policy and Society*, *11*(4), 533–545. https://doi.org/10.1017/S1474746412000346

Powell, K. H. (2016). A new neighborhood every fall: Aging in place in a College Town. *Journal of Gerontological Social Work*, *59*(7–8), 537–553. https://doi.org/10.1080/01634372.2016.1256363

Ralston, M. (2018). The role of older persons' environment in aging well: Quality of life, illness, and community context in South Africa. *Gerontologist*, *58*(1), 111–120. https://doi.org/10.1093/geront/gnx091

Rosenwohl-Mack, A., Schumacher, K., Fang, M. L., & Fukuoka, Y. (2020). A new conceptual model of experiences of aging in place in the United States: Results of a systematic review and meta-ethnography of qualitative studies. *International Journal of Nursing Studies*, *103*, 103496. https://doi.org/10.1016/j.ijnurstu.2019.103496

Rykkje, L., & Hjorth, G. H. B. (2017). Safety at Home": Experiences from testing of video communication between patients and home health care personnel. *SAGE Open*, *7*(4), 215824401774490. https://doi.org/10.1177/2158244017744900

Sheldon, P., Antony, M. G., & Ware, L. J. (2021). Baby Boomers' use of Facebook and Instagram: Uses and gratifications theory and contextual age indicators. *Heliyon*, *7*(4), e06670. https://doi.org/10.1016/j.heliyon.2021.e06670

Sixsmith, A., & Sixsmith, J. (2008). Ageing in place in the United Kingdom. *Ageing International*, *32*(3), 219–235. https://doi.org/10.1007/s12126-008-9019-y

Sun, Y., Phillips, D. R., & Wong, M. (2018). A study of housing typology and perceived age-friendliness in an established Hong Kong new town: A person-environment perspective. *Geoforum*, *88*, 17–27. https://doi.org/10.1016/j.geoforum.2017.11.001

Trivic, Z. (2021). A study of older adults' perception of high-density housing neighbourhoods in Singapore: Multi-sensory perspective. *International Journal of Environmental Research and Public Health*, *18*(13), 6880. https://doi.org/10.3390/ijerph18136880

United Nations. (2019). World population prospects 2019: Methodology of the United Nations population estimates and projections. https://population.un.org/wpp/

van Leeuwen, K. M., van Loon, M. S., van Nes, F. A., Bosmans, J. E., de Vet, H. C. W., Ket, J. C. F., Widdershoven, G. A. M., & Ostelo, R. W. J. G. (2019). What does quality of life mean to older adults? A thematic synthesis. *PloS One*, *14*(3), e0213263. https://doi.org/10.1371/journal.pone.0213263

Wang, J., & Lau, S. S. Y. (2013). Hierarchical production of privacy: Gating in compact living in Hong Kong. *Current Urban Studies*, *01*(02), 11–18. https://doi.org/10.4236/cus.2013.12002

Wang, X., & Lau, S. Y. (2002). Pursuing new urban living environment in the new millennium: Projecting the future of high-rise and high density living in Hong Kong.

Williams, J. (2005). Designing neighbourhoods for social interaction: The case of co-housing. *Journal of Urban Design*, *10*(2), 195–227. https://doi.org/10.1080/13574800500086998

World Health Organization. (2002). *Active ageing: A policy framework*. World Health Organization. https://apps.who.int/iris/handle/10665/67215

World Health Organization. (2021). *Advocacy brief: Social isolation and loneliness among older people*. Decade of Healthy Ageing, 1–20. https://www.who.int/publications/i/item/9789240030749

Yuen, B., Withanage, C., & Nair, P. (2019). Surveying older adults' perceptions and aspirations. In *Ageing and the built environment in Singapore* (pp. 1–44). Springer.

Yuen, S. (2022). Study: Mobile video consumption by baby boomers in HK on the rise. Marketing-Interactive. https://www.marketing-interactive.com/hk-baby-boomer-study

Yung, E. H. K., Conejos, S., & Chan, E. H. W. (2016). Social needs of the elderly and active aging in public open spaces in urban renewal. *Cities*, *52*, 114–122. https://doi.org/10.1016/j.cities.2015.11.022

Yung, E. H. K., Wang, S., & Chau, C. (2019). Thermal perceptions of the elderly, use patterns and satisfaction with open space. *Landscape and Urban Planning*, *185*, 44–60. https://doi.org/10.1016/j.landurbplan.2019.01.003