Chapter 2
A Comparison of Barrier-Free Access Designs For the Elderly Living in the Community and in Care and Attention Homes in Hong Kong

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2.1 Introduction

As in other developed countries, Hong Kong is experiencing changes in the age structure of its population. The number of elderly people is rapidly growing, which has been attributed to increasing life expectancy and declining fertility (Hui and Yu 2009). The proportion of the elderly aged 65 years and over is expected to reach about 1.74 million (i.e., 22% of Hong Kong's population) in the next 10 years (Census and Statistics Department 2012). The rate of increase of the elderly population is creating concerns for research and policy makers, due to the high prevalence of disabilities in this age group (Cutler 2001; Spillman 2004).

In order to moderate the effects of medical intervention, reducing the levels of elderly people's dependence has been identified as a means of sustaining the elderly. A recognised method for enhancing elderly independence is the installation of barrier-free access to support their mobility and activities of daily living in the living environment. This study therefore seeks to compare the levels of satisfaction with barrier-free access designs between the elderly living in community buildings and the elderly living in C&A homes in Hong Kong.

2.2 Housing Types for the Elderly in Hong Kong

To meet the diverse needs of the elderly in Hong Kong, different housing types provide accommodation designed to sustain their daily life activities: community buildings and C&A homes. Community buildings are defined in this study as housing programmes designed to meet the needs of independent elderly people,

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while C&A homes take care of the elderly with poor health, disabilities and impairments in activities of daily living (Social Welfare Department 2005). In fact, the government has introduced the principle of a universal design in new residential developments, to ensure aging in place for the elderly in Hong Kong (Planning Department 2002). Similarly, some building regulations and modifications in designs have been provided for residential developments, in order to help residents remain in their living environments without any interruption to their daily activities. C&A homes are specially designed to cater for the needs of the elderly, as part of the government policy regarding independent living.

2.3 Barrier-Free Access Designs

Barrier-free access, which is also one of the features of a universal design, refers to the concept of designing a living environment for the use of every individual, irrespective of age, ability and status in life. Due to the increasing rates of both life expectancies and survival from injuries, the concept of barrier-free access designs is receiving global attention and growing interest in regard to the way in which it encourages independent living for every individual. Some features of the concept include handrails, signage, accessibility, width of doors and non-slip flooring. *Handrails* serve to support weak elderly people who may have difficulty turning and manipulating taps, switches and door handles (Buildings Department 2008). They help the elderly to maintain balance and reduce the risk of falling, collision and the straining of joints during the performance of daily activities (Donoghue et al. 2003). *Signage* employs the use of signs and information to direct elderly residents and their visitors in the residential unit (Cynthia 2000). The information conveyed could either be typographic (i.e., it communicates through letters, digits, words or phrases) or pictographic (e.g., symbols or icons), representing realities (Bajaj 2003). Changes in the elderly, such as the development of a curved spine or weak arm strength affects their ability to reach the standard heights installed for general adults. Hence, installations for accessibility, such as the height of toilets, lift bars and power supplies, should consider these changes, so as to ensure the elderly's independence in the living environment. The *width of doors* is required to provide reasonable and adequate access, enabling the safe and easy movement of people, including those with disabilities (Department of Building and Housing 2011). In addition to this, slips and falls contribute significantly to incidents, injuries and fatalities experienced by the elderly due to the poor slip resistance properties of the floor (Kim et al. 2001, 2013). Therefore, *non-slip flooring* is important in all rooms, in order to ensure adequate grip between the floor and shoes.

2.4 Research Method

A questionnaire survey was conducted to compare the levels of satisfaction with BFA items between the elderly in community buildings and the elderly in C&A homes in Hong Kong. A total of 11 BFA items were identified, including width of doors (B1), non-slip flooring in bedroom (B2), non-slip flooring in living room (B3), non-slip flooring in bathroom and toilet (B4), light switches (B5), height of power supply (B6), height of lifting bar in bathroom and toilet (B7), handrails in living room and bedroom (B8), height of toilet (B9), visible signage (B10) and tactile signage (B11). The satisfaction level was assigned a range from one (very unsatisfied) to seven (very satisfied) for each of the survey questions regarding the BFA items.

Two housing types in Hong Kong were identified; namely, community buildings (i.e., residents in public and subsidised (P&S) housing and private domestic (PD) buildings) and C&A homes in Hong Kong. The survey respondents were purposively selected based on certain criteria: (1) aged 60 years or older at the time of the survey; (2) residing in community buildings or C&A homes in Hong Kong; and (3) had sufficient cognitive ability to understand and respond to the questions. Two housing estates were selected from the New Territories and one each from Hong Kong Island and Kowloon for the different housing types. The survey questions were translated into Chinese and responses were received through face-to-face interviews, in order to ensure that any misunderstanding of the questions was eliminated in the course of the study. Between 15 and 25 elderly people were selected in each of the housing estates. A total of 269 responses were received from the elderly residents, including 189 community-dwelling elderly people and 80 elderly people in C&A homes; 20.1%, 37.0% and 42.9% of the respondents were aged 60–69, 70–79, and 80 years or older, respectively. A simple qualifying test was used to ascertain the cognitive ability of the elderly participants.

The data collected were analysed using SPSS 22.0. First, mean scores were calculated to indicate the levels of satisfaction of the elderly with BFA items in regard to the different housing types. Then, an independent samples t-test was used to compare the levels of satisfaction with BFA items in the two housing types.

2.5 Statistical Results

The results of the mean scores show that only four out of the 11 BFA items were higher than 5.00 in both housing types (i.e., width of doors—B1, light switches—B5, height of power supply—B6, and height of toilet—B9 for the community-dwelling elderly; and width of doors—B1, height of lifting bar in bathroom and toilet—B7, handrails in living room and bedroom—B8, and height of toilet—B9 for those in C&A homes). An independent samples t-test was used to compare the levels of satisfaction across the different housing types (see Table 2.1).

Table 2.1 Independent samples t-test for BFA items by housing type

BFA items	Community buildings (*x*)		C&A homes (y)		Mean Diff. (*x*−y)	t	Sig.
	M	SD	M	SD			
B1—Width of door	5.106	1.021	5.304	1.136	−0.198	−1.399	0.183
B2—Non-slip flooring in bedroom	**4.476**	1.620	**4.548**	1.965	−0.072	−0.278	0.782
B3—Non-slip flooring in living room	**4.476**	1.620	**4.575**	1.978	-0.099	−0.382	0.703
B4—Non-slip flooring in bathroom and toilet	**4.487**	1.603	**4.644**	1.946	−0.157	−0.614	0.541
B5—Light switches	5.190	0.879	**4.952**	1.184	0.238	1.468	0.146
B6—Height of power supply	5.059	1.071	**4.658**	1.336	0.401	2.295	**0.024***
B7—Height of lifting bar in bathroom and toilet	**4.048**	1.908	5.250	1.383	−1.202	−5.788	**0.000*****
B8—Handrails in living room and bedroom	**3.206**	2.025	5.269	1.474	−2.063	−9.266	**0.000*****
B9—Height of toilet	5.159	0.965	5.494	1.061	−0.335	−2.419	**0.017***
B10—Visible signage	**4.884**	1.040	**3.838**	1.608	1.045	4.998	**0.000*****
B11—Tactile signage	**4.746**	1.091	**3.352**	1.782	1.394	5.464	**0.000*****

Note Bold items are mean scores less than 5.00, indicating low levels of satisfaction

Six out of the 11 BFA items show significant differences in the satisfaction levels; namely, height of power supply (B6: t = 2.295, p = 0.024), height of lifting bar in bathroom and toilet (B7: t = −5.788, p = 0.000), handrails in living room and bedroom (B8: t = −9.266, p = 0.000), height of toilet (B9: t = −2.419, p = 0.017), visible signage (B10: t = 4.988, p = 0.000) and tactile signage (B11: t = 5.464, p = 0.000).

2.6 Discussion

2.6.1 Levels of Satisfaction with BFA Items

The average level of satisfaction with seven out of 11 BFA items in both housing types (B2–4, B7–8 and B10–11 for the elderly living in the community and B2–6 and B10–11 for those in C&A homes) indicates that the elderly are not completely satisfied with their residential units. In fact, the elderly people in both housing types were not totally satisfied with items measuring non-slip flooring (B2–4) and signage (B10–11) in their apartment. Due to the decline in the muscle elasticity and strength of the elderly, it becomes easier to lose flexibility and to fall or slip when walking or performing daily life activities as a person ages. The elderly's satisfaction with the

non-slip surface of the flooring (B2–B4) in the different housing types can encourage independent walking and ensure the safety of the elderly within their residential apartments. On the other hand, the failure of ciliary muscles results in the combination of long- and short-sightedness, while the accumulation of earwax in the middle ear affects the conduction of sound waves and interferes with hearing (Schmall 2000). In addition to this, memory loss creates difficulty for the elderly in finding their way through space in complex residential arrangements, such as those found in Hong Kong. Hence, poor visible and tactile signs (B10–B11) create difficulty for elderly people with impaired vision and hearing to get information about their way around their flats in the different housing types. The elderly spend most of their time in their living rooms or bedrooms and may need to support themselves while moving around their living environment. The satisfaction of the elderly with the handrails in the living room and bedroom (B8) is essential in regard to sustaining their body structures during their daily activities. Therefore, the provision of handrails in the living room and bedroom, particularly for the elderly living in the community, will minimise the risk of falling and collisions in the residential apartment. The spinal bones of the elderly become curved, which affects their ability to stand upright. Therefore, they may not be able to reach facilities in their flat that are placed at heights for standard adults. The height of power supply (B6) and height of lifting bar in the bathroom and toilet (B7) should, thus, consider this before installation, so as to ensure the satisfaction of the elderly.

2.6.2 Satisfaction in the Different Housing Types

In comparing the levels of satisfaction between the housing types, the results show that the elderly living in community buildings were significantly dissatisfied with the BFA items in their unit flats when compared with those in C&A homes in Hong Kong. The residential apartments for the elderly living in C&A homes are specifically designed or modified to meet the needs of those with disabilities and impairments. In fact, the government of Hong Kong has an established policy objective to provide barrier-free environments for people with disabilities, with a view of facilitating their independent living. Hence, most C&A homes take into consideration the varying disabilities of the elderly when designing or modifying the homes. This has contributed to the elderly's significantly higher satisfaction with some of the BFA items than that of their counterparts living in the community. However, there are either non-elderly specific or no guidelines for the elderly living in the community, which has affected their levels of satisfaction with the BFA items.

Furthermore, the elderly mostly reside in old flats, where handrails may be installed in bathroom and toilets but may not be available in the living room and bedroom. The reduction in the grip strength of the elderly necessitates the provision of *handrails* (B8) in the living room and bedroom, where they spend most of the time. This factor contributed to the significantly low satisfaction regarding the

handrails in the living rooms and bedrooms of the elderly living in the community. In fact, the *handrails* (B7) provided in the bathrooms and toilets of old flats may not meet the elderly's needs due to the curvature of the spine, which reduces the height required for the installations. In addition to this, residential developments for community-dwelling elderly people in Hong Kong are mostly high rise buildings, which are very large and complex to navigate. Hence, *signage* (B10–11) is generally installed in the buildings, in order to relay efficient information and direction to residents. Although C&A homes are often on the ground and first floors of a residential complex, expectations for signage are higher here, due to severe incidences of disabilities and memory loss. The installation of simple signage details may not be sufficient for the elderly to find their way within the living environment, which may affect their satisfaction levels.

2.7 Recommendations

2.7.1 Practical Implications

The results of the study have revealed the levels of satisfaction of the elderly in different housing types with BFA items in Hong Kong. Based on the findings, the following recommendations are suggested to facilities managers, to improve the satisfaction of the elderly in their living environments. The study suggests that universal design guidelines specifically considering the changes in elderly people's abilities should be established for those residing in the community, in order to address specific BFA items in their residential apartments. In addition to this, the study recommends the use of ceramic tiles in wet areas, such as bathrooms, toilets or kitchens, and PVC tiles with non-slip granules for dry areas, such as living rooms, dining rooms or bedrooms, with the edges of the tiles fixed firmly to the base (Building and Construction Authority 2007). Moreover, designers and facilities managers should improve upon signage details and the height of power supplies, to enable the elderly to navigate through the building and perform instrumental activities of daily living independently, so as to, in turn, increase their levels of satisfaction.

2.7.2 Further Research

The current study has subjectively assessed the satisfaction of the elderly in the different housing types; namely, community buildings and C&A homes in Hong Kong. Further studies can conduct anthropometric measurements of the elderly in order to specifically design the BFA items to meet their physical and cognitive strengths, capabilities and limitations, as well as to match their body dimensions.

In addition to this, the effect of barrier-free items on quality of life can be considered for the elderly in different housing types, in order to provide detailed guidelines for the elderly, based on their different characteristics and preferences. Moreover, interviews can be conducted for different housing types in the future in order to understand the reasons for their dissatisfaction with current barrier-free design facilities in their residential apartment. This will be helpful for facilities managers so as to consider such factors when designing new residential units.

2.8 Conclusion

The different housing types in Hong Kong are required to meet the diverse needs of the elderly. Due to the heterogeneous nature of the elderly population, the design of a supportive and enabling environment in the various forms of residential development may affect their satisfaction in later life. This study therefore compared the levels of satisfaction of the elderly living within the community and the elderly living in C&A homes with the BFA items in their residential apartments. The results revealed that the satisfaction of the elderly was low in regard to seven out of 11 BFA items, for both community-dwelling elderly people and their counterparts in C&A homes in Hong Kong. In addition to this, six of the BFA items were significantly different between the housing types. This study recommends the development of universal guidelines specifically designed to meet the changing needs of the elderly, particularly in regard to BFA items. Ceramic tiles are suggested for use in wet areas, such as bathrooms, toilets and kitchens, and PVC tiles with non-slip granules in dry areas, such as living rooms, bedrooms and dining rooms. In addition to this, designers and facilities managers should improve upon signage details and the height of power supplies, to increase the elderly's levels of satisfaction, particularly for those in C&A homes.

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