

A Study of Housing Typology and Perceived Age-friendliness in an Established Hong Kong New Town: A People-Environment Perspective

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Abstract

Our study examines older people's perceptions towards the urban environment and their spatial experience through a people-environment perspective. We argue that People-Environment (P-E) fit is critical to older people's quality of life: positive environmental stimuli and personal adaptation competence have been held to influence this fit, and quality of fit will eventually affect interactions between older people and place. In a mixed-methods study, a context sensitive place audit was applied to a new town in Hong Kong, with a view to identifying strengths and weaknesses in the built environment and older people's own strategies of living. Through 302 questionnaires and three focus groups with older participants, the results revealed high appreciation of outdoor spaces, transportation and social participation. The findings also indicate a strong association between housing typology and perceived age-friendliness. People accommodated in public housing estates tended to accord higher scores to their living environment although social exclusion has been identified among older-old respondents in particular. Older people's affective links with their living environment across time and their unique life-course experiences may help to explain their relatively relaxed attitudes when they face changes and hardships.

Keywords: housing typology, age-friendly city, well-being, P-E fit, Hong Kong

1 **Introduction: Urban Environment and Older Persons**

2 Demographic ageing is an almost global phenomenon in which East and Southeast
3 Asian countries reveal most rapid growth and largest percentages (WHO, 2015a). In this,
4 a large segment of older people will be living in cities. Urban setting has a direct bearing
5 on the quality of life of older people (Baars, Dannerfer, Phillipson & Walker, 2006;
6 Phillipson, 2015). This is because older people spend most of time in their local
7 neighbourhoods and are therefore sensitive to changes in the urban environment (Buffel,
8 Phillipson & Scharf, 2012; Day, 2008; Phillips & Yeh, 1999; Phillipson, 2010). Rapid
9 urbanization and its sometimes associated pathological effects (such as environmental
10 degradation, lack of resources, neighbourhood decay, crime) could bring many
11 challenges to living a healthy and purposeful life. Previous studies have shown that the
12 quality of the built and social environment affects the action space of older people, which
13 is likely to impact on their daily activities and social participation (Cerin, Nathan, van
14 Cauwenberg, Barnett & Barnett, 2017; Phillips, Siu, Yeh & Cheng, 2005; Chui, 2008).
15 As such, the interface between older people and environment needs to be articulated
16 carefully, and a match between what environment can offer and what older people want
17 will be critical to age-responsive urbanism in particular for Asian cities.

18 Theoretically, the concept of Person-Environment (P-E) fit would suggest that the
19 well-being of older people depends on their spatial experiences when they use the
20 environment and engage in different social relationships (Phillips, Cheng, Yeh & Siu,
21 2009). Quality of life is also dependent on older people's own adaptation strategies in the
22 built environment. Insights from environmental gerontology highlight two interrelated
23 aspects for ageing well. Environment, including the natural, built and social environments,

24 could act as stimuli for older people’s functioning and feelings. Correspondingly, older
25 people’s competence, for example, their health status and living capabilities, can
26 influence their various degrees of adaptation to environment changes. This will be a
27 useful perspective to identify the interface between environment and people wherein
28 synergies take place. It is important to bring environment into a systematic study so as to
29 find out the ‘best fit’ in which older people actively interact with the environment and the
30 extent it meets their needs.

31 Most studies in environmental gerontology to date have been in locations in Western
32 countries. Scholarship in other contexts is only starting to emerge, with emphasis
33 generally on various aspects of dwellings. To fill this gap, our study extends the focus of
34 environmental gerontology to the Asian context, examining P-E fit in an established new
35 town in Hong Kong. The key research question in Hong Kong, where social policy takes
36 on a strong characteristic of non-interventionism, is “how and to what extent do older
37 people appreciate urban living?” Specifically, older people’s behavioural patterns will be
38 examined to reflect their competence and habitability strategies in urban living. Older
39 people’s perceptions on the built and social environment will be evaluated, based on
40 World Health Organization (WHO)’s age-friendly city concept (WHO, 2007, 2015b).
41 This will help understand the advantages and weakness of environment and identify
42 environmental stressors/press reported by older people themselves.

43 Our analysis is presented in four parts. First, the relationships between environment
44 and ageing are reviewed. We note above that the interface between environmental press
45 and competence is key to older people’s well-being. The contents of P-E fit are reviewed
46 and existing studies suggest environment affects well-being through a variety of inter-

47 related factors that are sited at different scales in relation to individuals. In the second
48 part, we pay particular attention to the study of P-E fit in the Latin America and Asian
49 countries and, after a comprehensive review, we argue that the spatial experience of
50 people to a wide spectrum of environment settings, as well as their ways of adaptation,
51 should be highlighted. Mixed-methods research is reported in the third part, based on a
52 case study of Sha Tin new town in Hong Kong. Our place audit synthesizes the merits
53 from both the quantitative and qualitative research to identify strengths and weaknesses
54 of the built environment as well as older people's own surviving strategies. The
55 conclusion discusses major findings that could shed light on future urban planning and
56 design for age friendly community in Hong Kong and potentially other large cities in the
57 wealthier areas of the Asia-Pacific region.

58 The urban context of Hong Kong makes population ageing an increasingly important
59 issue, given its high density living environment, limited space and resources, high
60 housing costs, and apparently more frequent extreme weather events. Socioeconomic
61 conditions are crucial. In spite of the SAR's high GDP per capita, it is reported that one
62 in three older people in Hong Kong are living in poverty even if this is mediated by
63 access for some to low cost rental housing and health care (HKSARG, 2015). A recent
64 study of Hong Kong shows that older people has disintegrated identity in society which
65 becomes a source for societal alienation (Wong, Chau, Fang & Woo, 2017). For those
66 who are poor, society is hardly supportive and, for those who wish to work, there are
67 insufficient employment opportunities. The elderly social care and support system in
68 Hong Kong is highly dependent on services provided by a wide range of NGOs (many of
69 which receive basic government subsidies or subventions). These agency-based elderly

70 services in Hong Kong can create an emotional gap, meaning that it is becoming
71 important to incorporate strongly the needs and voices of the older population, who
72 should have a say in what the city offers (Sun, Chao, Woo & Au, 2017). This is very
73 much in line with the WHO's Age-friendly city (AFC) framework (WHO, 2015b).

74

75 **Ageing and Places: A People and Environment Perspective**

76 *People-Environment (P-E) fit*

77 The dynamic relationships between environment and ageing have been studied in
78 environmental gerontology adopting the ecological model of ageing. According to the
79 model, older people's embeddedness in various social and environmental contexts is
80 contingent to different interfaces and forms of interactions between environment features
81 and older people's perceptions, identification and behaviours (Wahl, Iwarsson & Oswald,
82 2012). Particularly, environment is a constellation of socio-spatial relationships. Starting
83 with the microsystem, the most immediate environment of an individual, environment
84 includes the mesosystem (such as family and home environment), exosystem
85 (neighbourhood and communities) and macrosystem (such as culture, law, and political-
86 economic structures) (Shaffer and Kipp, 2010). Older people confront, interact with and
87 adapt to these systems every day, during which they gain spatial experience as well as
88 developing ties towards their homes and places (Rodríguez-Rodríguez & Sánchez-
89 González, 2016; Peace, Holland, & Kellaher, 2006). There is a need to explore the
90 equilibrium between the demanding characteristics of environment and people's coping
91 strategies – the P-E fit, developed, as advocated by Lawton and his colleagues (Lawton &
92 Nahemow, 1973).

93 P-E fit emphasises two equally important elements. P is about a person's competence,
94 the basic capacities to survive that help satisfy human needs at different levels, in
95 Maslow's (1943) hierarchy, from satisfaction of basic psychological needs to a positive
96 end of self-actualisation. Older people are not always the passive recipients of
97 environment demands. They can be active managers of their own health and well-being,
98 through "selection, optimization, and compensation" (Baltes & Baltes, 1990), attempting
99 to maximize access to health related resources and reduce age-related loss. Accordingly,
100 older people may develop environment proactivity, a state with increased personal
101 capability to make use of environment resources, as well as an enhanced sense of
102 mastering the environment and tackling with social relationships (Satariano, 2006). Given
103 that competence ranges from low to high and may decline with ageing (including
104 deterioration in mental and physical condition), the other extreme is the emergence of
105 "environment docility" in which the daily life routines are constrained by the
106 characteristics of the environment (La Gory, M., Ward, R., & Sherman, 1985; Lawton,
107 1986).

108 Environment (E) is essential in a life-course which shapes people as social, intellectual
109 and natural beings (Sack, 1993). Particularly for older people, environment potentially
110 exhibits many "demanding characters", consisting of environment stressors and
111 behaviour demands that can paralyze competence (leading to environmental "press").
112 Environment is one of the prominent factors affecting health and human functioning, in
113 addition to the body, activities, and participation (Gitlin, 2003). Several pathways are
114 available wherein older people achieve better physical and mental health through
115 adaptive response to environment (Glass & Balfour, 2003). For example, if a place looks

116 comfortable and inviting, older people would come to use it, becoming more likely to
117 develop positive feelings about the environment, do more physical activities, and
118 socialize with other people (possibly leading to accumulation of social capital).

119 Again, the environment invokes mental and psychological reflections among older
120 residents about who they are and where they live. When people age, they may be prone to
121 “staying put” and their daily life routines are likely to be constrained to the immediate
122 environment of their homes. Consequently, older people are prone to developing stronger
123 cognitive and affective ties with their local communities. This psychological appreciation
124 of place is conducive to developing a self-identity among older people, whereby “social
125 and individual stories are combined or become indivisible” (Klein, 2016, p. 219). A
126 stronger territorial identification is often associated with a higher degree of self-control
127 and self-efficacy, which are important for quality of life (Smith, 2009). Having these
128 identities people can assist better understanding of a physical setting, sensitivity to any
129 changes in it and eventually undertaking necessary behavioural responses so as to bring
130 about a desirable change (Proshansky, Fabian & Kaminoff, 1983).

131 *Rearticulating urban environment in connection to health and well-being*

132 The best P-E fit illuminates a triangulation of interactions among individuals, places
133 and others (e.g., friends, acquaintances and neighbours) (Gustafson, 2001). It is critical to
134 create good environmental features that are in line with older people’s functional
135 capability. The same person, with the same level of competence, who is capable of
136 coping with a certain environmental press could be tipped into a state of imbalance under
137 a higher or lower press. The positive environmental stimuli are important either to

138 mitigate environmental press (e.g., by planning and design) or to provide assistance
139 conducive to people's social and psychological functioning (Lawton, 1977).

140 Environment related determinants affect health related behaviours (such as utilization
141 of health related services, active coping with stressors, and physical activities) and extent
142 of social interactions (Glass & Balfour, 2003). Bernard, Charafeddine, Frohlich, Daniel,
143 Kestens & Potvin (2007) argued that neighbourhoods involve the availability of, and
144 access to, health-relevant resources in a geographically defined area, and neighbourhood
145 is the most important local structure. The physical environment of a neighbourhood
146 includes many characteristics such as built, housing, and structural features, amenities,
147 parks, street connectivity, pedestrians, land use and population density. These
148 environmental characteristics have both aesthetic and functional qualities that can
149 potentially impact on older people's behaviour and social relations (Day, 2008). The
150 social environment of a place also has a direct bearing on its socioeconomic condition,
151 accumulation of social capital (which may be more important in later life; see, Nyqvist &
152 Forsman, 2015) and community cohesion, which affect people's self-identity and health
153 (Bernard, et al., 2007). The impacts of environment on any individual are compound
154 (Marmot, Friel, Bell, Houweling & Taylor, 2008).

155 Problems in the built environment can reduce physical activities and may encourage
156 reverse psychological effects on older people, such as anxiety, fear, stress and feeling
157 alone (Mitchell & Burton, 2006). For example, living in high density areas, older people
158 may feel less safe from, say, traffic and crime (Burton, Mitchell & Stride, 2011). The
159 types of housing, including height and quality, can affect mental well-being in various
160 ways and moving to better housing increases mental well-being significantly (Evans,

161 2003). Traffic conditions can influence people's daily behaviours. Streets busy with
162 traffic as well as unsafe/unsuitable street crossings can create impediments for older
163 people's activities, especially people with any disabilities (Michael, Green & Farquhar,
164 2006). Older people, like many other age groups, need convenient pedestrian access and
165 adequate time for street crossings. Safety can be a perceived concern that limits walking
166 for daily activities.

167 However, all is not negative. Among existing literature, urban design and place-
168 making are considered to be the most crucial factors since they are closely related to the
169 outdoor experience of older people. Certain place qualities (such as public areas, green
170 spaces, pavements, pedestrian ways, cycle paths, outdoor safety, buildings, and public
171 toilets) are necessary for enhancing people's active engagement in urban life (WHO,
172 2007). A good design of public and outdoor spaces brings, among other things, comfort,
173 conviviality (probably attractive, allowing people to meet and socialize), flexibility
174 (allowing for ad hoc events), and a sense of security (in terms of structural conditions and
175 presence of preventive measures) (Sassi & Molteni, 2011). Mixed-land uses are
176 suggested as one advantage of city living and may be seen to provide a welcoming setting
177 by older people (Mitchell & Burton, 2006). The use and implementation of Information
178 and Communication Technologies (ICTs), again, may exert positive effects on older
179 people's sense of well-being that improves their appreciation of the real world (Russell,
180 2012).

181 In current urban development, incentives for economic growth are often at odds with
182 the needs of inhabitants to lead a dignified life. Urban living sets many limitations for
183 older people, and other groups, in terms of access to urban resources and entitlement to a

184 full right to the city (Buffel, Phillipson & Scharf, 2013) – the right to obtain the requisite
185 resources, skills, and services as well as engage in processes that result in the upholding
186 of their right (Brenner, Marcuse & Mayer, 2012; Chatterjee, 2017). Potential spatial
187 injustice of older people can have various manifestations such as lack of opportunities for
188 social participation, fragmented spaces for various utilities, shortage of resources and
189 lack of opportunities to express their voices to decision-makers (Fadda, Cortés & Olivi,
190 2016). Socio-spatial justice is very much needed to rearticulate human subjectivity and
191 the lived experience of older people (Phillipson, 1998).

192

193 **P-E fit beyond the Western Context**

194 Whilst the study of environmental gerontology offers rich insights into ageing in place,
195 its theories and praxis have to date largely been situated in Western societies and, indeed,
196 mainly in the English-speaking countries. Recent years have witnessed some explorative
197 studies applying environmental gerontology to the Asia-Pacific region as well as the
198 developing economies (such as Latin America). It is because population ageing is take
199 place at an unprecedented speed among these regions. In Latin America, the most
200 challenging issue for ageing in place is probably a growing number of vulnerable older
201 persons suffering social exclusion, displacement, environment degradation, limited
202 mobility patterns and climate change (Rodríguez-Rodríguez & Sánchez-González, 2016).

203 A large number of studies focus on the quality of dwellings. Living spaces are a
204 collection of complex assemblies (housing, farmland, community, etc.) that, through a
205 social-cultural process, reshape lifestyles and the development of social identity
206 (Vázquez-Palacios, 2016). Better personal and community conditions will result in a

207 greater life satisfaction (Rojo-Pérez, Fernández-Mayoralas, Forjaz, Prieto-Flores &
208 Martínez-Martín, 2016). Specifically, Zunzunegui (2016) argued that P-E fit is
209 determined by socioeconomic conditions consisting of the physical attributes of
210 environment, social integration and availability of services and resources. Through an
211 empirical study of two cities of Latin America, the author showed that walkable
212 neighbourhood, active transport, mixed land use, and public safety are some of the salient
213 features that future place-making should understand. In studying quality of life of the
214 community dwellers in Spain, Rojo-Pérez, et al. (2016) articulated the functional
215 importance of residential environment as a locus for older people to develop emotional
216 ties as well as a sense of place that will eventually lead to a sense of wellbeing. Longer
217 residence and frequent use of environmental resources help develop place attachment;
218 and stronger place attachment generates higher competence to master the environment
219 (Casakin & Reizer, 2016). Fadda, et al. (2016) illuminated the interwoven relationships
220 between older people's spatial activities/experience and territorial identification through
221 empirical studies in Chile. Nurturing territorial identification appears to be a socio-spatial
222 process of ageing conducive to developing positive person-environment interactions for
223 an active life.

224 There is also a growing number of studies in the Asia-Pacific which emphasize
225 various environmental systems and their implications for subjective feelings of older
226 persons. Ageing and environment considerations were initially reflected in a collection of
227 studies in Hong Kong (Phillips & Yeh, 1999), many of which suggested that older
228 people's wellbeing is determined by both the internal and external environment. In a
229 further study, residential satisfaction revealed a strong correlation with different types of

230 housing (Phillips, Siu, Yeh & Cheng, 2004). For example, public housing residents were
231 prone to detaching themselves from the exterior environment, leading to possibly limited
232 physical and social activities. Theoretically, a good neighbourhood environment (e.g., a
233 pedestrian friendly neighbourhood) evokes physical activities and accumulation of social
234 capitals that are conducive to enhancing the quality of life of older people (Loo,
235 Mahendran, Katagiri & Lam, 2017). This proposition was empirically tested by
236 comparing Hong Kong, Singapore and Tokyo and through a quantitative approach. Loo,
237 Lam, Mahendran & Katagiri (2017) showed that apart from personal factors (lifestyle,
238 medical history, use of walking aid, etc.), neighbourhood factors, particularly subjective
239 walkability and peer supports, play a significant role in older people's physical and
240 mental health. Lastly, outside the physical environment domain, Hermalin (2002) made
241 sense of social and cultural realms (such as societal, economic, demographic and cultural
242 factors) in leveraging the wellbeing of older persons. Chinese cultural precepts, such as
243 filial piety, the role of women as caregivers at home, informal supports by family
244 members, should be considered in exploring the best P-E fit in the Asian context (Chan,
245 2005).

246 A review of the existing literature shows at least two inter-related gaps. First, the
247 interface between people and environment, that is, the spatial experience of people
248 towards different environment settings, has yet to be studied in-depth in non-Western
249 contexts. Among different environment characteristics, which one(s) are more crucial to
250 older people? Second, most discussions on P-E fit focus on older people's neighbourhood
251 and/or residential satisfaction, and their perceptions on a larger environment system, the
252 city, remain less known. Whilst the local neighbourhood is undoubtedly crucial to many

253 older people, articulation of P-E fit at the city scale will also be important since age-
254 responsive urbanism is very much needed for future development pathway (UN-
255 HABITAT, 2016). How will the discussions on P-E fit inform the planning of future age-
256 friendly cities? Existing study has shown that residents' perceived age-friendliness has a
257 positive relation with self-reporting health (Wong, Yu & Woo, 2017). Methodologically,
258 quantitative, cross-sectional analysis identifies the relationships between people's health
259 and environmental factors, yet fails to spell out the pathways or scenarios via which
260 people-environment interactions happen. For example, from quantitative analysis, it is
261 unclear how environment buoys or presses ageing dwellers in daily community life. It is
262 important to approach people's daily life routines for further generalization of their
263 spatial experience and subjectivity. To this end, a case study of a Hong Kong new town is
264 presented. In particular, through a mix-methods research approach, the strength and
265 weakness of environment in terms of age-friendliness will be identified. Moreover, older
266 people's competence and habitability strategies will be reflected through study of their
267 behavioural patterns.

268

269 **Research Methods: Place Audit of age-friendliness of Sha Tin New Town**

270 The habitability of an environmental setting is influenced both by older people's
271 spatial experience and their perceived values of places (factors in relation to the spatial
272 subjectivity) (Rodríguez-Rodríguez & Sánchez-González, 2016). This strongly suggests
273 that a conventional quantitative approach needs to be supplemented by in-depth
274 investigation of older people's subjective perceptions and expectations towards life in
275 relation to the environments in which they live. These perceptions are important

276 references in evaluating older people's feeling and moods, as well as their judgements
277 about the meanings and purposes of life (Steptoe, Deaton & Stone, 2005). For town
278 planners, place audit enables a context-sensitive assessment of a distinct area by
279 consulting community members as key informants (Project for Public Spaces, 2006; Sun,
280 Chau, Wong & Woo, 2017). By enabling a closer examination of environment and
281 community attributes, the results from a place audit are likely to reveal people's
282 perceptions towards different environment settings and their spatial experience in the
283 lived world.

284 Our place audit incorporates a mixed-methods qualitative and quantitative design.
285 Mixed techniques are particularly useful for investigations into processes and systems
286 that are complex and multilevel (Creswell et al., 2004; Curry et al., 2013). Sha Tin new
287 town was selected as a case study. Sha Tin, located in the New Territories to the north of
288 Kowloon, is an established new town in Hong Kong, one of three developed since the
289 late-1970s (several others have subsequently been added). Currently, Sha Tin is home to
290 some 670,000 residents. It was comprehensively planned to facilitate living and working
291 and ultimately to achieve a balanced community with the concept of self-containment
292 (Phillips and Yeh, 1987). Like Hong Kong society, Sha Tin has aged demographically
293 and has the second largest proportion of population aged 65 years and above (15.9%)
294 among all districts in the New Territories, after Kwai Tsing (16.7%) (Census and
295 Statistics Department, 2017).

296 A study of Sha Tin has strong policy implications. Being of the first generation of
297 major new towns, Sha Tin was considered a role model, adhering closely to many British
298 town planning principles, with particular initial reference to its function as a dormitory

299 town (Hartog, 2010). With a diversified supply of housing and facilities for people of
300 different social status, Sha Tin is now regarded as one of the more successful Hong Kong
301 new towns. Sha Tin has the largest population of Hong Kong's 18 districts. It has a good
302 economic status profile of general residents, and demographic ageing is critical. Sha
303 Tin's median age of 44.6 ranked the top amongst all new towns (Census and Statistics
304 Department, 2017). It has experienced vigorous population increase and land expansion
305 and is now able to accommodate many ageing and soon-to-be aged dwellers. What will
306 be a proper development pathway for Sha Tin and similar new towns that follow her path?
307 What environment characteristics need to be improved and what to be changed? The
308 study of Sha Tin is timely. Its experience will very probably shed light on common
309 experiences for future and existing new towns, where the majority of Hong Kong's
310 population now live.

311 In our study, older people living public rental housing (PRH), subsidized home
312 ownership housing (SH) and private housing (PR) were invited to respond to a
313 questionnaire and participate in focus groups. The sampling strategy aimed to select older
314 people of different social status living in different housing types and under different
315 levels of environmental press. Sampling was stratified based on a Social Vulnerability
316 Index (SVI) and the types of housing. The SVI aims to measure older people's various
317 levels of vulnerability to urban living, incorporating compound indicators (population
318 size, institutionalization, living alone, poverty, communication obstacles, disability and
319 access to primary care) (Chau, Gusmano, Cheng, Cheung & Woo, 2014; Sun, Chau,
320 Wong & Woo, 2017). The SVI ranges from 0-10, in which it is assumed that higher SVI
321 scores reflects greater levels of negative environmental press in urban living. Data from

322 the 2006 Census were used to calculate an SVI score for each of the then 400 District
323 Council Constituency Areas (CA) of Hong Kong. CAs were further divided into five SVI
324 bands with equal interval values, that is, <2 (I), 2- <4 (II), 4- <6 (III), 6- <8 (IV), and ≥8
325 (V).

326 In Sha Tin, 36 CAs were identified and clustered into four SVI score bands (Bands I to
327 IV). Under each SVI band, three CAs with the largest number of PRH, SH and PH
328 dwellers were selected. In Band I, the response rate from SH in the selected CAs was low,
329 so an additional CA with the second largest number of SH residents was selected; similar
330 sampling was performed for PH dwellers in SVI band III. For each selected CA,
331 respondents represented cover residents from major estates under its respective housing
332 type. Face-to-face interviews were conducted at suitable locations including community
333 health clinics, community halls, shopping malls, public open spaces and housing estates.
334 Approximately one-third of the sample was collected from each type of housing. In the
335 survey, 302 responses were from residents aged 65 and above, living in the major estates
336 in the selected CAs. Care was taken not to oversample elderly members of local NGOs
337 who may not fully represent the older population.¹

338 A 53-item questionnaire was designed, based on WHO's age-friendly city checklist
339 (WHO, 2007) which covers the eight domains of age-friendliness (outdoor spaces and
340 buildings, transportation, housing, social participation, respect and social inclusion, civic
341 participation and employment, communication and information, community supports and

¹ Many services for older persons in Hong Kong are provided by NGOs. It is acknowledged that many older people who are members of NGO are more active and have more active social participation; most members are female. This group represents a relatively small proportion of older people in general and may not represent "invisible" older people in most communities.

342 health services). Respondents rated each item from very unsatisfactory (1) to satisfactory
343 (6) on a 6-point Likert scale.

344 Questionnaire respondents were also invited to participate in focus groups. Three
345 focus groups (one “oldest-old” group aged 80 and above, two groups aged 65 and above)
346 were conducted in which participants were asked to describe and explain their
347 perceptions of strengths and weaknesses of the physical and social environments in their
348 community. In the focus groups, attitudes were explored to uncover specific concerns
349 from vulnerable groups, disadvantaged groups (such as persons with a disability), the
350 oldest-old (aged 80 and above), and marginalised people. The focus groups also sought to
351 discover exemplar practices or schemes that could be references or models, as well as
352 special issue(s) that have received little discussion but with significant generalizability
353 and applicability to other districts or regions. The questionnaire survey (four rounds) and
354 focus groups were conducted from August 2015 to January 2016.

355

356 **Building Age-friendly Communities: Strengths and Weaknesses**

357 The mean age was 73.9 ± 6.94 years. As in the wider community, over half of
358 respondents were women (56.3%) and the majority were married (68.1%), with education
359 below the secondary level (58.1%). Most lived in government housing (PRH and SH)
360 (73.2%) and most were retirees (84.8%), living with family or friends (82.8%), having
361 insufficient or just enough personal disposable income (83.8%). The mean length of
362 residence in their neighbourhood was 22.3 ± 11.61 years (Table 1).

363 (Tables 1 and 2 about here)

364 Scores were calculated on the eight Age-friendly city (AFC) domains, as in Table 2.
365 Highest (most favourable) was transportation (4.49 ± 0.68), and lowest (least favourable)
366 was civic participation and employment (3.68 ± 1.17). Regression analyses of domain
367 scores (Table 3) confirmed our assumption that frequent users of elderly community
368 centre services reported higher scores on social participation ($p < .0001$) and respect and
369 social inclusion ($p < .05$). Those who had prior experience of delivering informal care to
370 older persons tended to rate housing and social environment better (all $p < .05$).
371 Economically better-off groups seem to be more optimistic. Those having “enough” or
372 “more than sufficient” disposable income also reported higher scores on all 8 AFC
373 domains (all $p < .05$). Negative correlations reveal between duration of residence and
374 scores on outdoor space and buildings ($p < .01$), and on respect and social inclusion
375 ($p < .05$). People’s spatial experience in outdoor spaces appears to deteriorate when they
376 stay longer. This is likely due decline of older people’s competence and perceived social
377 exclusion among elderly participants. Although literature review suggests longer period
378 of residence is conducive to the formation of territorial identification which eventually
379 promotes wellbeing, older people’s place identity will be negatively affected by
380 increasing environmental press and a sense of alienation when they are detached from
381 workplace and spend most of the time in community.

382 (Table 3 about here)

383 *Nature and built environment are conducive to social participation*

384 The qualitative analysis aims to add explanation to the patterns found in the
385 quantitative analysis through reflecting older participants’ experiences in community
386 living as well as their engagement with urban life. A number of interesting issues

387 emerged, which the quantitative analysis alone would not have revealed. For example,
388 people's closeness with nature, including the value placed on Sha Tin's green spaces, the
389 central river, and its amenities, were greatly appreciated and perceived as an essential
390 element in helping older people to live well. For the built environment, many older
391 respondents emphasised that the design was critical and affected their frequency of use.
392 For example, open spaces and sheltered footpaths connecting residential blocks and
393 amenities were appreciated especially in view of Hong Kong's tropical climate, and older
394 people said they enjoyed walking around their neighbourhoods. They perceived Sha Tin
395 as a walkable environment and the town had been designed with walkways separating
396 pedestrians and traffic. Older people often said they felt happy with life and mentioned
397 that open space is a "popular stop" in their daily routines. They felt that easy use of open
398 spaces enhances opportunities to meet different people, through which older people
399 develop bonds with community and improves their feelings of well-being.

400 Indeed, we found positive relations between older people's use of spaces and their
401 reported social participation. Many older respondents perceived Sha Tin as having a great
402 deal of public and outdoor spaces (parks, running and cycling paths, and the beach) and
403 older people occasionally organised self-initiated activities in such places.

404 . . . I see groups of elderly men and women doing morning exercises there.
405 Sometimes someone would bring a microphone and speakers, and lead
406 everyone in a routine Sometimes the district council would organise
407 morning exercise or yoga classes for older people too. Also, you would
408 see lots of older people at Wu Kai Sha beach, especially in the summer.

409 In addition, local elderly centres played an important role in providing affordable,
410 accessible and varied social activities (dance, tai chi exercises, card games, and health
411 talks). The majority of social activities are organised in and via these formal community
412 centres. Whilst not all older people use community centres, they provide locales whereby
413 participating members establish more social contacts.

414 Transportation, a key AFC element, was also well evaluated. The Hong Kong
415 Government has introduced a territory-wide concessionary HK\$2 (US\$0.26) low fare
416 public transport scheme for residents aged 65 and over which was greatly appreciated..
417 Although many older people were no longer at work, their needs for mobility appeared to
418 remain high. Older people commute not only within the Sha Tin district but also travel to
419 other districts in the New Territories and Kowloon. This finding is supported by recent
420 studies that many older people are committed to various interpersonal social networks
421 (Cornwell, Laumann & Schumm, 2008), and demands for social (re)connections increase
422 their use of public transport. This somewhat goes against the contention that older
423 persons have limited activity and action spaces and limited “connectivity” demands.
424 Indeed, our respondents often travelled fairly widely. The public transport network was
425 perceived to be sufficient in terms of its capacity, efficiency and network coverage.
426 Nevertheless, not all older people were satisfied. People living in public rental housing
427 estates and subsidised housing in more peripheral areas complained that transportation
428 choices were quite limited. Moreover, transportation costs from travelling longer
429 distances to and from Kowloon and Hong Kong Island were perceived to be expensive
430 for those aged 60 to 65 years, a group including some retirees not yet eligible for the 65+
431 concessionary scheme.

432 Interestingly, from the quantitative analysis, people living in public housing estates
433 (public low-cost rental housing and subsidised home ownership schemes) accorded more
434 positive weight to outdoor spaces and buildings, and transportation, compared to those
435 living in private housing estates (Table 4). This could be attributed to the green and
436 universal design principles adopted by Housing Authority for almost all public housing
437 projects it constructed. These planning principles include, among other things, the
438 provision of specified amounts of public space and recreation facilities, the preservation
439 of green spaces, the construction of green buildings, and universal design for all ages
440 (Deng, Chan & Poon, 2016). Early generation Sha Tin public estates in particular tend to
441 be well connected with major transport facilities (such as the MTR and public bus
442 terminuses). The concept of mixed land-use was adopted so that residents' basic needs
443 could be met within walking distance. Older people living in public and subsidised
444 housing generally agreed that affordability and access to facilities (community centre,
445 amenities, supermarket, and wet market) were two advantages. Also, people living in
446 public rental housing feel safer – “sometimes we are out and come home late at night”.
447 However, for many private housing estates, purchase costs and/or rents and service
448 charges are high and management and facilities may not be concomitantly better than in
449 low-cost public rental housing.

450 (Table 4 about here)

451 These findings indicate that older people's perceptions about their local environments
452 are generally positive and this justifies their active social participation. The green and
453 open spaces, well-designed pedestrian walkways and mixed land uses were some key
454 elements older people seemed particularly to appreciate. Among older people, a relatively

455 strong sense of place attachment was revealed. This is evidenced by older people’s strong
456 willingness to use the environment, as well as their perceptions that the nature and
457 physical setting in Sha Tin have advantages influencing behaviour: the desire for people
458 to exercise, walk about and socialise. All these perceptions sustain older people’s
459 competence and their “state-of-being” in communities. However, further analysis on
460 older people’s civic participation and social inclusion showed a contrasting phenomenon:
461 while many older people were satisfied with nature and physical environment, lack of
462 opportunity for civic participation and a strong sense of social exclusion were expressed,
463 as discussed below.

464 *Civil participation and social exclusion as major impediments*

465 In terms of “civic participation and employment”, questions covered volunteering and
466 employment. According to Maslow (1943: 382), people have esteem needs to build up
467 self-confidence, capability, and adequacy of being useful, which finally lead to feelings
468 of self-actualisation (higher level needs). Given these needs, older people’s civic
469 participation seems to be essential. According to the quantitative data gathered,
470 employment conditions were perceived to be very negative and older people who wanted
471 to work found it very difficult to get a paid job. The focus groups revealed that older
472 people felt they encountered an effective ceiling when looking for a job, with age rather
473 than ability making it difficult for them to gain employment. Certain structural issues also
474 militated against the employment of older workers, for example, employees’
475 compensation insurance was much higher and most employers did not want to pay the
476 extra. One respondent commented that society currently erects many barriers to
477 employing older jobseekers:

478 If you look at their physical strength and wisdom, it can be argued that
479 many older people haven't deteriorated at all. Yet because of the
480 regulations, they have no way of keeping their job. Unless you're talking
481 about charity and voluntary work, the elderly cannot get paid work due to
482 regulations. In some cases, you can't even be a security guard when you're
483 over 65. With so many limitations, you simply can't help but admit that
484 you've become old.

485 Volunteering is often portrayed as an effective means of creating incentives for older
486 people to recognise and use their skills and capacities and as a means of relieving passive
487 feelings (such as anxiety and boredom) in retirement. The literature suggests that
488 volunteering is conducive to confirming older persons' sense of competence, inclusion
489 and purpose (Tinker & Ginn, 2015). Our respondents noted that information about
490 volunteering vacancies is often provided through the various community centres for the
491 elderly, so tends to be restricted to centre users. Both the amount of voluntary work
492 available and the means of participation were limited in Sha Tin. Simple jobs were
493 generally offered (such as stamping documents, cleaning tables and, in health care,
494 measuring blood pressure), which many older people found either uninteresting, boring
495 or age-inappropriate.

496 The marginalisation of older residents is also reflected in a very negative response
497 towards "opportunities for social inclusion", a common issue in many places (Scharf &
498 Keating, 2012). Perceived barriers to social inclusion can be attributed to several factors.
499 First, older people felt they were not treated in a respectful manner in their daily lives.
500 Many focus group participants reported that they had had unpleasant experiences in local

501 restaurants or markets. For example, quality of the service they received in local
502 restaurants was seen to be poor, people felt disrespected and remarked that “we have to
503 get hot water by ourselves”. Some older people had been cheated by vendors in the local
504 wet food market – “fresh foods are mixed with the stale, and these street vendors are
505 artful”. One elderly female recalled she felt offended in the supermarket – “When a
506 salesperson heard [me saying] the goods were not fresh, she interrupted me and I was
507 unhappy . . . I put back the goods and left.”

508 In addition, younger residents are perceived to be less considerate of older people.
509 Younger residents, in particular the new arrivals from outside Hong Kong, were not
510 considered courteous in the eyes of older people – “we walk slower and they will not wait
511 for us when they use the lift. . . they are sometimes self-centred”. However, some in the
512 younger ages felt that the misunderstandings between the two generations had emerged
513 since current urban living provides fewer chances for both generations to communicate,
514 giving community dwelling a strong imprint of anonymity.

515 In general, people do not take much notice of the elderly in this area. . .
516 You only know people you need to know, such as market vendors, porters,
517 and probably not even your neighbours. Since there is no community
518 centre in the area enabling residents of different blocks and buildings to
519 interact, you wouldn’t know nor feel close to each other as members of the
520 same community. So perhaps we are not disrespectful towards the elderly,
521 we just don’t have the opportunity to interact with them.

522 *Environment docility under a lack of community resources*

523 A community is generally the setting wherein individuals “learn about needed
524 facilities, their exact locations and offerings, and how taking advantage of one can be
525 efficiently integrated into a routine that includes taking advantage of others” (Logan &
526 Molotch, 2007: 104). Resources in a community pave a way for developing competence.
527 Accordingly, the information exchange and community services were discussed in the
528 focus groups. It emerged that the majority of older people received information through
529 their acquaintances, using informal rather than formal sources. Person-to-person
530 communication was the most common information source and formal sources more
531 patchy. Communication methods in public housing estates were more organized² and
532 older people living in a subsidised housing estate often walked to the nearby public
533 housing estates for information. In addition to person-to-person communication, some
534 leaflets and flyers were distributed via local NGOs and associations though these
535 materials were available only to participating members.

536 Health services (availability, accessibility and costs) and community support are
537 another important AFC domain. Many older people perceived community support and
538 health services for public to be insufficient. The oldest-old group, aged 80 and above, in
539 particular expressed the critical need for assistance when they were seeking medical
540 treatment and relevant community support services were perceived to be very limited.
541 Family members were the resources most drawn-on by older people when they needed
542 assistance. In some public rental housing, home visits were conducted for older people
543 but not on a regular basis. In addition, older people criticised as insufficient the medical
544 resources in local hospitals, with increased waiting times that may delay diagnosis and

² There were regular broadcasts to inform public housing residents of maintenance schedules, sales promotions and forthcoming events. However, people living in subsidised housing felt these were seldom posted.

545 treatment. Participants below 70 years old found health services to be very costly, given
546 that the current health subsidies (notably, a public healthcare voucher scheme) are
547 generally only provided to those aged 70 and above.

548 Inadequate community services can become a source of crucial environmental press
549 when competence to cope with environment changes declines. This will lead to a drop in
550 sense of environment mastery and eventually, social exclusion. The focus groups paid
551 particular attention to warning signs that might indicate social exclusion as it may then
552 potentially lead to displacement for older people in a mental and psychological sense.
553 One scenario posits that older-old persons live quite independently and their daily
554 routines are confined to the limited space around neighbourhood. Although the lives of
555 older people may seem detached from their wider surroundings, many people did seem to
556 be tolerant of urban hardships:

557 I have poor memory and hearing. . . I walk with an umbrella as a crutch.

558 While it takes me some time to get the community centre, I do not cause

559 any trouble to others . . . I seldom participate in activities or socialise

560 because my physical limitations [my memory and hearing] may bother

561 other people without me realising. . . I am content. . . when I think of my

562 age and what I am provided with.

563 Also, the focus group discussions on housing issues with older people revealed

564 tolerance about their internal (home) living environments, as living space area in Hong

565 Kong is generally very small:

566 . . . I find it is OK here, much better than living in cramped

567 accommodation where you are squeezed into a small space. So I find

568 the housing here acceptable. A small flat of 220 square feet
569 accommodating three to five tenants - it is very cramped, but eventually
570 you get used to it. . . . Living in this area feels quite pleasant and
571 comfortable.

572 Overall, these findings suggest that, whilst community resources are limited and under
573 pressure, many older people have developed rather “docile” attitudes to their local
574 environment. Many older people stated that they need to get used to the built
575 environment when their physical conditions decline. Our findings showed amongst the
576 oldest-old group, that action spaces did become limited, indicating that people-
577 environment exchange is variable. However, older people’s satisfaction with and attitudes
578 to community life were not extremely negative. One reason for this is their strong
579 attachment to the original community where many have stayed for decades, ageing in
580 place, perhaps since the inception of the new town. Most respondents expressed the view
581 that they would be sorry if they had to move from the neighbourhood. A second reason
582 for “acceptance” in this generation may relate to older people’s histories and experiences.
583 Many older people were refugees who had come to Hong Kong during the interwar
584 period (1918-1940) prior to the Japanese occupation of 1941-5, or in the years following
585 the Chinese revolution of 1949. This generation experienced enormous often extreme
586 hardships which may have led to their much higher tolerance of resource shortages. Their
587 strong inclination for “staying put” and their tough life-course experiences may well
588 explain apparent docile or tolerant attitudes when mismatches are found between
589 environment stressors and competence. However, we question whether future generations

590 of older persons, here or elsewhere in the region, who have aged in more prosperous
591 times will be so tolerant.

592

593 **Conclusion**

594 This study articulates P-E fit in the popular promotion of age-friendly cities. We found
595 that discussions on P-E should emphasize an equilibrium between environment settings
596 and older people's cognition, perceptions and behaviours. Environment could buoy or
597 constrain, and older people can adapt or get trapped. It is thus important to identify the
598 positive relations between good environment features and active adaptation patterns that
599 older people develop. **In particular, we extend the focal point of environmental**
600 **gerontology to the non-Western contexts and identify the value of contextualizing P-E fit**
601 **in an Asian location, in the region currently contributing to the largest global growth in**
602 **demographic ageing.** The literature review suggests that current studies may be
603 theoretically and methodologically insufficient. For example, the existing framework on
604 P-E is developed principally on evidence from Anglo-Saxon contexts. Emergent research
605 in Latin America and the Asia-Pacific regions represents important interest from non-
606 English speaking countries, although most studies so far tend to be limited in scope, most
607 commonly focusing on housing choice or residential satisfaction. **The interface between**
608 **P-E fit and development of age-friendly communities is mostly absent, meaning carefully**
609 **articulation of P-E fit can make considerable contribution to theorisation of environment**
610 **and ageing.** Methodologically, too simple cross-sectional quantitative analysis is
611 insufficient to reflect older people's spatial experience in the communities, or their
612 perceptions and behavioural patterns in daily routines.

613 This study in part addresses this research gap with an exploratory mixed-methods
614 study of environment, older people, and their interactions in the context of age-friendly
615 community principles. Our study offers one response to the suggestion to bring temporal
616 and behavioural dimension into existing environmental gerontology (Golant, 2003).
617 People’s embeddedness into different environment settings appears a longitudinal process,
618 and therefore their perceptions are based on spatial and subjective experiences from the
619 past and present. A people-centred, mixed-methods place audit was applied in which
620 community members are key informants with abundant local knowledge about place, and
621 who can contribute significantly to the good of their community. Participants in the focus
622 groups were articulate about positive and negative aspects of their environments,
623 reporting specific needs and suggestions for improvement from their personal, user
624 perspectives.

625 In summary, the research provides three important findings that add to existing studies
626 on P-E interactions. First, our study confirms that environment is a “setting for action”
627 with characteristics necessary for the pursuit of desired activities (Williams & Patterson,
628 2008: 108). Environmental characteristics at different levels are important to create
629 “people-friendly and relationship-rich places” (Ng, 2016, p. 4), conducive to older
630 people’s active functioning and positive feelings. Frequent use of spaces may lead to a
631 possible high level of social participation and connection. Moreover, both natural and
632 built environments appear to play a decisive role in older people’s perceptions of age-
633 friendliness. Positive features include greenery, cleanliness, sufficient and good access to
634 public open spaces, walkable neighbourhood environments and good quality pavements
635 and roads. Specifically, the analysis indicates that “nature”, green environments and

636 amenities, are perceived to possess ecological, aesthetical and affective functions for
637 people's active and healthy behaviours. Parks seemed to be popular, highlighting older
638 people's love of being close to nature and greenery.

639 Housing is a key aspect in the built environment. Particularly, housing type and tenure
640 is one influential factor contributing to social differences in perceived age-friendliness.
641 Respondents living in public housing (including subsidised housing estates) rated 6 out of
642 the 8 domains (outdoor spaces and buildings, transportation, housing, social participation,
643 respect and social inclusion, community and health services) higher than those living in
644 private housing. This contrasts with previous studies in which Hong Kong public rental
645 housing tenants paid little attention to the exterior environment (Phillips, et al., 2004).
646 Older residents in the new town public housing expressed a greater appreciation and were
647 willing to use their environments, an important reason for a higher score on social
648 participation. This finding may suggest that people's perceptions of community and
649 environment otherwise have relatively little to do with an individual's social position. A
650 previous study by La Grange (2010) had, for example, found that relationships with
651 neighbours are one perceived advantage for public housing dwellers in Hong Kong.
652 Possibly the role of social capital is crucial for older people living in public rental
653 housing. Building social capital, probably through more chances of meetings and mutual
654 support, may explain their positive attitude towards living environment and deserves of
655 further research. For people with lower incomes and less power, social networks are one
656 important instrument for maximizing individual access to health-related resources.

657 Second, our study confirms the importance of identifying specific social and cultural
658 imprints in the P-E fit. This articulates the generalization of P-E theories to different

659 countries and cultures may be necessary. For example, social supports and sharing of
660 important information take place informally between older people and their
661 acquaintances. When such informal networks of support become less available, older
662 people may be less willing to search for alternative channels. Importantly, many older
663 people have a passive view of their capacities to cope with environment stressors. Older
664 people tend to appreciate and value age-friendly features that are already in place (such as
665 good environment, transport scheme, availability of elderly centres, voluntary work
666 opportunity, and medical subsidies) but many felt they could not influence changes in
667 areas that were insufficiently age-friendly. The oldest-old group are more satisfied than
668 the younger-old with the age-friendly communities across the eight AFC domains.

669 Last, spatial and subjective experiences are important pathways to perceived good life
670 in the urban setting. Important spatial experiences include walking, chit-chat, exercise,
671 activities and travel, which are supported by a range of environmental factors like
672 sheltered footpaths, accessible open spaces, community centres, and affordable public
673 transport. However, subjective experiences are not overwhelmingly positive. Older
674 people felt socially excluded and developed a relatively relaxed attitude towards
675 hardships and difficulties. A passive-docile attitude was observed among the oldest-old
676 group when they continued living in the same place. Literature suggests environment
677 docility results from declined competence thereby behaviours of older people are greatly
678 confined by environment characteristics (Satariano, 2006). However, our study finds the
679 docility has much to do with psychological experiences and older people's life experience
680 in their early age. First, as one important psychological experience, place attachment (that
681 is, the established emotional ties with a place across time) adds to older people's stronger

682 inclination to maintain closeness with their familiar living environment. The second is the
683 unique life-course experience, particularly with historical extreme hardships during early
684 life. We conclude that the affective links and inclinations to stay put offset possible
685 dissonance between capabilities and environmental press. Our study suggests one
686 important “habitability strategy” among some older people, that is, a continuous
687 psychological investment that infused a strong appreciation to a place. This is associated
688 with the development of place identity as a part of self-identity, with a developed sense of
689 familiarity and continuity. This self-reflexive process occurs when individuals feel the
690 environment is not as supportive than before, or when they think they cannot cope with
691 environmental press if they are displaced from the original community.

692 Our study finds that when competence declines, a seeming satisfaction was, perhaps
693 surprisingly, developed in the absence of sufficient community supports and resources.
694 We may question how this will develop in the future, as the current very old cohorts have
695 lived lives through very hard times and may therefore be more tolerant of difficulties and
696 shortages than future older cohorts will be.

697 The study has a number of policy implications, and highlights that an age-responsive
698 urbanism should resonate with people’s place experience and their quality of life. Future
699 urban planning and design needs more consideration of “place-making” with place
700 qualities that can stimulate physical activities and social interactions, reduce social
701 exclusion and thereby likely promoting older people’s health and well-being. Equally
702 important, “people-making” should be emphasised to develop a relationship rich place
703 where people trust others, cooperate and exhibit a strong competence (Ng, 2016). This is
704 also likely to be very important in other rapidly-ageing Asia-Pacific cities, where social

705 and spatial contexts need to mesh well. More broadly, older people's right to the city
706 should remain not only "in the legal sense of a right to specific benefits, but . . . a right on
707 a higher moral plane that demands a better system in which the potential benefits of an
708 urban life can be fully and entirely realized" (Marcuse, 2012: 34). Community support is
709 essential to creating opportunities for collaboration and solidarity through which older
710 people may develop a strong attachment to a place. An effective nexus between
711 competence and environment will strengthen older people's self-identity in a community,
712 and will eventually provide opportunities for their self-actualisation.

713

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Table 1. Sha Tin Age-friendly City (AFC) survey respondents: descriptive statistics

		Sha Tin (n=302)	
		n	(%)
Age (years) (mean, \pm SD)		73.9	\pm 6.94
Sex	Men	132	(43.7)
	Women	170	(56.3)
Marital status ^{a,b}	Currently married	205	(68.1)
	Currently not married	96	(31.9)
Educational level	Primary and below	178	(58.9)
	Secondary	101	(33.4)
	Post-secondary	23	(7.6)
Type of housing	Public rental	131	(43.4)
	Subsidized home ownership	90	(29.8)
	Private permanent	81	(26.8)
Living arrangement ^a	Living alone	52	(17.2)
	Not living alone	250	(82.8)
Economic activity status ^a	Employed	13	(4.3)
	Retired	256	(84.8)
	Others	33	(10.9)
Prior experience of delivering informal care to elderly	No	135	(44.7)
	Yes	167	(55.3)
Use of elderly centre services ^b	No	148	(49.2)
	Yes	153	(50.8)
Personal disposable income	(Very) insufficient	63	(20.9)
	Just enough	190	(62.9)
	(Very) sufficient	49	(16.2)
Self-rated health	Poor/fair	178	(58.9)
	Good/very good/excellent	124	(41.1)
Length of residence in current neighbourhood (years) (mean, \pm SD)		22.3	\pm 11.61

^aMarital status: "Currently married" and "Currently not married", the latter included those who were never married, widowed, separated and divorced; Living arrangement was categorized into two groups: "Living alone" and "Not living alone", the latter included those living with parent(s), spouse and/or child(ren), or other members; Economic activity status was categorized into three groups: "Employed", "Retired" and "Others", the latter included unemployed persons, students and home-makers.

^bData were missing on marital status (n=1) and use of community centre services (n=1).

Table 2 Mean scores on AFC domains among older persons in Sha Tin (n=302)

AFC domains	Mean	SD	Rank
Outdoor spaces and buildings	4.38	0.74	2
Transportation	4.49	0.68	1
Housing	3.92	1.06	6
Social participation	4.17	1.08	3
Respect and social inclusion	3.93	1.05	5
Civic participation and employment	3.68	1.17	8
Information and communication	4.00	0.91	4
Community support and health services	3.75	0.94	7

Table 3 Multiple regressions assessing significant demographic factors associated with mean score of AFC domains

	Mean Score of Age-friendly City Domains															
	Outdoor spaces and buildings		Transportation		Housing		Social participation		Respect and social inclusion		Civic participation and employment		Communication and information		Community and health services	
	<i>B(SE)</i>	β	<i>B(SE)</i>	β	<i>B(SE)</i>	β	<i>B(SE)</i>	β	<i>B(SE)</i>	β	<i>B(SE)</i>	β	<i>B(SE)</i>	β	<i>B(SE)</i>	β
Age	0.008 (0.007)	0.078	0.006 (0.007)	0.061	0.015 (0.010)	0.095	-0.007 (0.010)	-0.043	-0.004 (0.010)	-0.029	-0.001 (0.011)	-0.006	-0.014 (0.009)	-	0.111 (0.009)	0.126
Women (vs men)	0.028 (0.103)	0.019	-0.033 (0.096)	-	-0.161 (0.143)	-0.076	0.114 (0.143)	0.053	0.178 (0.141)	0.085	0.134 (0.161)	0.057	0.133 (0.128)	0.074	0.044 (0.130)	0.023
Currently not married (vs married)	-0.011 (0.109)	-0.007	0.052 (0.101)	0.036	-0.168 (0.152)	-0.075	-0.099 (0.151)	-0.043	-0.121 (0.149)	-0.054	-0.183 (0.170)	-0.074	0.013 (0.136)	0.007	-0.007 (0.137)	-0.004
≥Secondary education (vs primary and below)	-0.134 (0.104)	-0.089	0.000 (0.096)	0.000	-0.011 (0.144)	-0.005	-0.029 (0.144)	-0.014	-0.128 (0.142)	-0.060	-0.078 (0.162)	-0.033	-0.034 (0.129)	-	0.019 (0.131)	-0.051
Subsidized Home Ownership (vs public rental)	-0.289 (0.104)	-	-0.191 (0.096)	-	-0.229 (0.144)	-0.100	-0.202 (0.144)	-0.087	-0.284 (0.142)	-0.124*	-0.415 (0.162)	-0.163*	-0.028 (0.129)	-	0.014 (0.131)	-0.115
Private Permanent (vs public rental)	-0.242 (0.117)	-	-0.242 (0.109)	-	-0.550 (0.163)	-	-0.513 (0.162)	-	-0.430 (0.160)	-	-0.408 (0.183)	-0.154*	-0.213 (0.145)	-	0.105 (0.147)	-
Length of residence in neighbourhood	-0.010 (0.004)	-	-0.002 (0.003)	-	-0.004 (0.005)	-0.040	-0.010 (0.005)	-0.103	-0.011 (0.005)	-0.121*	-0.004 (0.006)	-0.043	-0.002 (0.004)	-	0.022 (0.005)	-0.063
Not living alone (vs living alone)	-0.096 (0.124)	-0.049	0.056 (0.116)	0.031	-0.241 (0.173)	-0.087	0.053 (0.172)	0.019	-0.037 (0.170)	-0.013	0.237 (0.194)	0.076	0.021 (0.154)	0.009	0.072 (0.156)	0.029
Working (vs not working)	0.041 (0.208)	0.011	0.068 (0.193)	0.021	-0.233 (0.289)	-0.045	-0.150 (0.288)	-0.029	-0.130 (0.284)	-0.025	-0.060 (0.324)	-0.011	-0.202 (0.257)	-	0.046 (0.261)	-0.060
Prior experience of delivering informal care (vs none)	0.118 (0.086)	0.079	0.124 (0.080)	0.092	0.293 (0.119)	0.139*	0.219 (0.119)	0.102	0.381 (0.117)	0.181**	0.522 (0.134)	0.223**	0.274 (0.106)	0.153*	0.254 (0.108)	0.135*
Use of elderly community centre services (vs none)	0.030 (0.094)	0.02	0.125 (0.087)	0.093	0.304 (0.130)	0.145*	0.485 (0.130)	0.227**	0.263 (0.128)	0.126*	0.092 (0.147)	0.039	0.080 (0.116)	0.045	0.095 (0.118)	0.051
Enough personal disposable	0.226 (0.105)	0.124*	0.213 (0.097)	0.130*	0.414 (0.145)	0.161**	0.413 (0.145)	0.158**	0.498 (0.143)	0.194**	0.512 (0.163)	0.179**	0.329 (0.130)	0.151*	0.338 (0.132)	0.147*

income (vs insufficient)																
Good self-rated health (vs poor/fair)	0.131 (0.087)	0.087	0.085 (0.097)	0.063	0.210 (0.121)	0.099	0.317 (0.121)	0.146**	0.139 (0.119)	0.065	0.178 (0.136)	0.075	0.037 (0.108)	0.021	0.117 (0.110)	0.061
R²	0.135		0.087		0.168		0.202		0.189		0.147		0.082		0.145	
F	3.448** *		2.099*		4.437** *		5.578** *		5.129** *		3.786** *		1.965*		3.721** *	

Significance levels * p < .05; ** p < .01; *** p < .001

Table 4 AFC domains among older persons by housing types in Sha Tin (mean scores) (n=302)

AFC domains	Public rental		Subsidized home ownership		Private permanent		Difference (Public-Subsidized)		Difference (Public-Private)		p	p-trend	p-adjusted [†]
	Mean	SD	Mean	SD	Mean	SD	Raw	Adjusted	Raw	Adjusted			
Outdoor spaces and buildings	4.59	0.77	4.22	0.73	4.22	0.64	0.37	0.29*	0.36	0.26*	<0.001	<0.001	0.013
Transportation	4.64	0.71	4.42	0.61	4.31	0.66	0.21	0.19*	0.32	0.27*	0.002	0.001	0.030
Housing	4.18	1.07	3.91	0.99	3.51	0.97	0.28	0.23	0.67	0.57*	<0.001	<0.001	0.003
Social participation	4.44	1.02	4.18	0.92	3.71	1.21	0.26	0.17	0.74	0.53*	<0.001	<0.001	0.006
Respect and social inclusion	4.21	1.08	3.84	1.04	3.57	0.89	0.37	0.26	0.64	0.48*	<0.001	<0.001	0.010
Civic participation and employment	3.94	1.22	3.52	1.16	3.46	1.03	0.42	0.39*	0.48	0.43	0.004	0.004	0.022
Information and communication	4.09	0.93	4.04	0.80	3.79	0.95	0.04	0.03	0.29	0.26	0.061	0.022	0.165
Community and health services	4.01	0.98	3.68	0.84	3.41	0.88	0.33	0.21	0.60	0.44*	<0.001	<0.001	0.012

*Mean difference is significant at .05 level.

[†]P-values obtained from ANCOVA, adjusted for age, sex, marital status, education level, length of residence, living arrangement, employment status, user status of elderly centres, self-rated health, care experience of elderly and personal disposable income.