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Urban Sustainability and Ageing: Uncovering the critical links between the urban environment and successful ageing in place

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ABSTRACT

The physical environment is emerging as an important determinant of individual health outcomes. With growing evidence to suggest that health in later life is particularly sensitive to environmental characteristics, this link is of increasing interest to the ageing populations of the developed world. Much attention has focused to date on developing mechanisms for successful ageing in place. The term 'ageing in place' has traditionally referred to individuals growing old in their own homes with an emphasis on modification of the home environment to compensate for the limitations associated with ageing. It is no surprise that research consistently indicates the majority of older people prefer to age in familiar surroundings. It is also no surprise that ageing in place represents a more economically, environmentally and socially sustainable option to institutionalised care. However, the research agenda must be broadened beyond the immediate home environment if all the variables associated with successful ageing in place are to be thoroughly appreciated. This paper commences with an examination of the key concepts associated with ageing, sustainable development and environmental assessment. The key themes in a range of established sustainable urban environment assessment tools are then examined. The examination reveals that the ageing in place concept has not been adequately integrated into the assessment process. The paper argues that ageing in place is a critical factor in urban sustainability, and concludes with a conceptual model for the integration of ageing in place into the assessment of sustainable urban environments.

Key words: Ageing in Place, Ageing and the Built Environment, Environmental Assessment, Urban Sustainability

1 INTRODUCTION

There is increasing evidence to support the critical role that the physical environment plays in determining individual health outcomes. This is a specific area of interest in the field of gerontology where there is growing evidence to suggest that health in later life is particularly sensitive to environmental characteristics (Prohaska et al., 2006; Subramanian et al., 2006; Clarke and George, 2005). The importance of this health-environment relationship in later life can be further linked to the well documented implications of an ageing population across the developed world. By 2021, 18 per cent of the Australian population will be classified as elderly. This figure is predicted to reach 26 per cent by 2051 (ABS, 2006). A significant proportion will fall into the 80 years and over older elderly category, currently the fastest growing age group of the population and highest per capita user of health services. Many European countries and Japan are exhibiting an even more pronounced increase in the proportion of their aged population than Australia (ACIL Consulting, 1999).

This increase in the elderly population has implications for individual quality of life and social well-being. Although chronological age does not necessarily imply poor health, there is a strong correlation between age and a number of chronic illnesses (AIHW, 2006). Advanced age brings with it a greater possibility of physical and mental decline leading to frailty, loss of independent functioning and eventual institutionalisation and a reduction in quality of life. As a result, there is considerable debate about the extent to which additional years gained through greater life expectancy will be free from ill health and disability. While the incidence of a number of specific degenerative diseases such as heart disease is falling, there are corresponding increases in severe, non-fatal diseases such as dementia, and multi-dimensional events such as falls that lead to reduced quality of life (McCallum, 1999). The physical and mental decline associated with age further reduces the capacity for the elderly to engage in physical, social and community activity outside the immediate home environment (Glass et al., 2006; Newson and Kemps, 2005). This not only impacts on individual well-being but also community well-being through social exclusion and less representative patterns of civic engagement.

The increase in the elderly population also has implications for standards of living in the general community. As the proportion of over 65 year olds increases the corresponding proportion in the 15 to 64 years old category, traditionally defined as the working age group, declines. There is concern that labour shortages and an increased tax burden as more people enter retirement, will undermine the ability of future working age generations to support the aged. There is also concern about the impact of an ageing population on national health expenditure. Although only 12 per cent of the Australian population in 1996, people in the 65 years and over category accounted for about 35 per cent of expenditure on health (AIHW, 1998). Those who are 65 years and over have per capita health expenditure around four times that of

the rest of the population, are admitted to hospital more often, stay longer and account for 2.5 times the expenditure on pharmaceuticals (AIHW, 1998). While there is debate about the magnitude of the impact of these trends on general standards of living, there is no question that they will influence economic and social systems in Australia and similarly affected countries (Cooper and Hagan, 1999).

Given the implications of an ageing population, much research attention and policy development has focused on mechanisms that will better support successful ageing in place. The term 'ageing in place' has traditionally referred to individuals growing old in their own homes with an emphasis on modification of the home environment to compensate for the limitations associated with ageing (Pynoos, 1993). Increasing home-based medical care and social services are being used to further support ageing in place and help avoid early institutionalisation. Currently, over 90 per cent of Australian seniors live independently in the general community. Historically this meant remaining in the family home after retirement, but increasing numbers are seeking diverse housing types, such as apartments and age-segregated housing developments, to maintain independence for longer (ABS, 2001).

It is no surprise, therefore, that the majority of older people prefer to remain in familiar surroundings as they age (Subramanian et al., 2006; Ball et al., 2004; Gitlin, 2003) and that ageing in a familiar home environment represents a more economically, environmentally and socially sustainable option to institutionalised care (Andrews, 2001; ACIL Consulting, 1999). This not only requires diverse types of flexible housing that accommodates the changing condition of occupants as they age, it also requires a sympathetic urban environment that supports social inclusion and identification with community. However, to date none of the literature has focused on the link between the urban environment and successful ageing in place.

This paper addresses this gap by exploring the extent to which ageing in place concepts are linked to the assessment of urban sustainability. The intention is to sharpen the focus of the urban sustainability debate on social sustainability, and in particular, the assessment of the quality of life, social justice and social coherence issues that impact on an ageing population. The following paper initially considers the key concepts associated with ageing, sustainable development and environmental assessment. The intersection between these concepts and their practical application within the urban setting is then considered through an analysis of the key themes in a range of established sustainable urban environment assessment tools. The paper argues that ageing in place is a critical factor in urban sustainability but it is not adequately integrated into current assessment methods. The paper concludes with a framework for the assessment of sustainable ageing in place.

2 BACKGROUND

2.1 Primary health issues affecting older people

Before addressing the key theoretical constructs and practical strategies associated with ageing, it is worth considering the primary health conditions that affect the older population. The state of a nation's health has typically been assessed in terms of the length of life and the prevalence of major diseases. While life expectancy has increased, annual surveys conducted in Australia since 1981 indicate that this has been offset by an increasing level of disability suffered during those additional years (McCallum, 1999). The inclusion of varying levels of disability provides a more complex view of population health than has traditionally been used to develop health policy and interpret health outcomes. Singular fatal diseases in the elderly are becoming less important than combinations of non-fatal health conditions and events that lead to a reduction in quality of life.

According to the 2003 Survey of Disability, Ageing and Carers, 22 per cent of older Australians had a profound or severe limitation in their daily activity that resulted from a health condition. Arthritis was the most common reported health condition followed by hearing disorders, hypertension (high blood pressure), heart disease and stroke. Heart disease, stroke, diabetes and vision problems (cataracts) are the most common reasons for hospitalisation amongst older Australians. Hearing disorders, dementia and depression are the most commonly occurring health conditions which do not cause hospitalisation but which are noted as causing some form of activity limitation (AIHW, 2006). Falls are a further health issue for the elderly. Approximately 3 per cent of falls in older Australians require hospitalisation and 40 per cent of nursing home admissions are the result of a fall. Falls can severely impact on quality of life with 50 per cent of older people fearing a fall and 25 per cent reducing activity as a result of a fall (McCallum, 1999).

Of the non-fatal health conditions affecting the daily functioning of older people in Australia, the most significant are dementia, vision impairment, and arthritis and musculoskeletal conditions (Table 1). These conditions are associated with physical issues such as balance and gait disturbance, slow movement, reduced physical activity, and falls. In psychological terms these conditions can lead to social isolation, depression and loss of confidence. These conditions are also associated with a progressive increase in the level of disability, and a correlating decrease in autonomy and quality of life (AIHW, 2006).

Table 1: Significant health conditions affecting daily functioning of older people in Australia, 2004

Health Condition	Number	Rate (per cent)	Impact
Dementia	171,000	6.6	balance, language, memory, perception and understanding
Visual Impairment	169,600	6.5	social isolation, depression, balance and coordination
Arthritis	805,200	30.9	joint pain, stiffness, deformity and limited mobility

(Source: AIHW, 2006)

2.2 Successful ageing, ageing in place and quality of life

While the interaction between an individual's physical ability and their environment is a complex one (Lord et al., 2004), a large body of research supports the positive outcomes associated with ageing in the home environment (Cutler et al., 2006; Stark, 2004; Gitlin, 2003). Two key theoretical constructs stem from this body of research and provide the foundation for current approaches to ageing policy and service provision. The first is Rowe and Kahn's (1998) conceptualisation of 'successful ageing' as a hierarchy of three components – the absence or avoidance of disease and disability, the maintenance of cognitive and physical function, and an active social engagement in life.

Despite providing a useful alternative to medical models of ageing that reinforce loss of function, a variety of criticisms have been addressed at the successful ageing concept. Two of these criticisms relate directly to the relationship between ageing and the built environment. Firstly, the concept gives insufficient attention to the impact of equity issues on an individual's capacity to age successfully. Gender, ethnicity and socio-economic factors all influence an individual's capacity to modify their own behaviour toward a healthier lifestyle. Secondly, the narrow definition of successful ageing tends to marginalise those with a disability. As Minkler and Fadem argue (2002), rather than promote a more universal approach to the design of the built environment to accommodate the broadest range of functional limitations, disability is viewed as the result of individual impairment requiring modification of the built environment.

The second theoretical construct is that of 'ageing in place' whereby older persons remain in their own residence for as long as possible. Most individuals grow old in their long-term place of residence. Supporting this practice through home health care and the provision of support services is one of the primary strategies in aged care across the developed world. A further strategy is the use of environmental modifications to help manage health conditions, maintain or improve functioning, increase independence and improve safety (Clarke and George, 2005; Stark, 2004). The concept is supported by several factors described by Gitlin (2003). Firstly, ageing in place has been consistently documented in gerontological literature for over 30 years as a desire of older people and primary family caregivers. Secondly, remaining in a familiar environment reduces the impact of discontinuity associated with age-related decline and promotes a sense of personal autonomy and control. This is important as the home increasingly becomes the context for the delivery of short and long-term health services and support. Finally, remaining in familiar surroundings is an important strategy for successful adaptation to the loss of functional ability.

There is a significant body of ageing research focused on the immediate home environment. Studies include variations in living arrangements, housing standards, residential satisfaction and the relationship between housing characteristics and well-being. Further studies consider the impact of home modifications on functional limitations behavioural competence and dependency, and the relationship between home modifications and the cost of health care and personal assistance. Although this work supports the concept of ageing in place and the use of home environment modifications to achieve this, questions relating to the relationship between successful ageing in place and the broader urban environment remain a neglected but vital area of inquiry.

A third and related concept to successful ageing and ageing in place is 'quality of life', a term used in a number of fields including geronological and environmental research. In discussing the term in relation to the urban environment, Lloyd and Auld (2003) refer to the 1991 Australian definition of the Economic Planning Advisory Council which considered quality of life in terms of economic, health, pollution, crime, education and social indicators. Enhancing quality of life is consistently seen as something to be pursued by public policy, either in relation to aged care or environmental policy. In both areas, this has resulted in the use of measurable indicators for quality of life. Lloyd and Auld note that while important, current indicators fail to adequately address issues of perceptual and cultural differences.

The management of ageing populations has become a significant part of the political agenda in the developed world. Concepts such as successful ageing, ageing in place and quality of life have informed many of the national strategies developed to address the issue. One example is *The National Strategy for an Ageing Australia*

(Andrews, 2001), which makes reference to the need for:

- continued participation of mature age workers in the workforce;
- secure and sustainable retirement incomes;
- positive attitudes to older Australians and infrastructure that supports their participation in society;
- connection to society;
- promotion and support for healthy ageing; and
- a sustainable system of quality care.

The promotion of physical health, economic independence and social connectivity can be seen as key features of such a strategy. This implies an older population that engages in physical, social and community activity beyond the immediate home environment. This also implies an urban environment capable of supporting the broadest range of functional limitations. Such an urban environment requires a more coordinated approach to inclusive design, and performance assessment that addresses sustainable and successful ageing in place.

2.3 Sustainable development

Despite early recognition of the limited capacity of the earth's natural resources to support a growing population, the dilemma of resource depletion and the associated environmental and social impacts, have tended to be ignored in favour of efficient resource use. The current critical state of non-renewable natural resources and pressure from a growing global population, have focused attention back on whether the contemporary course of economic development is sustainable.

Since the early 1970's, there have been many attempts to define the term sustainable development and operationalise what is otherwise an abstract theoretical concept. The most widely accepted definition was proposed in 1987 by the World Commission on Environment and Development (WCED), or the Brundtland Commission. The WCED (1987:43) defined sustainable development as ". . . development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The foundation of the definition is a state of equilibrium across three sustainability dimensions – economic, environmental and social. Despite criticism in relation to the social sustainability dimension in particular (Littig and Greißler, 2005; Agyeman and Evans, 2003), this remains the prevailing world economic development paradigm and the one adopted in this paper.

2.4 Balancing the dimensions of sustainable development

The most influential operationalisation of the term sustainable development can be found in *Agenda 21,* one of five international agreements framed at the UN's

Conference on Environment and Development (or 'Earth Summit') held in Rio de Janeiro in 1992. *Agenda 21* addresses the sustainable development of cities by proposing a number of tangible strategies to achieve sustainability across the three sustainability dimensions. Citing Kahn's theoretical elaboration, Basiago (1999) also suggests that *Agenda 21* introduces a new paradigm of urban development by assuming that economic, environmental and social sustainability are integrated and inter-linked. Economic sustainability, therefore, implies a system of production that satisfies present consumption levels without compromising future needs. Environmental sustainability requires resources be harvested no faster than they can be regenerated and wastes be emitted no faster than they can be assimilated by the environment. Social sustainability assumes economic growth constrained by the requirements of social equity. Kahn's theoretical framework is presented in Table 2.

Table 2: Conceptual dimensions of sustainable development

Dimension	Criteria
Economic sustainability	growth development productivity trickle down effect to the poor
Environmental sustainability	eco-system integrity carrying capacity biodiversity
Social sustainability	equity empowerment accessibility participation sharing cultural identity institutional stability

(Source: adapted from Kahn in Basiago, 1999)

While the three dimensions of the sustainability model described above are broadly agreed upon, a more detailed assessment reveals a problem balancing priorities across the three dimensions and defining appropriate sustainability indices. As long as environmental and economic objectives are more readily quantifiable than the social objectives of sustainable development, there will be problems associated with the equal treatment of the three sustainability dimensions proposed in *Agenda 21*.

Considering the practical application of the theoretical principles to the urban environment helps to highlight the difficulties associated with balancing the three sustainability dimensions. In a study of three UK proposals for more sustainable

patterns of urban development, Brindley (2003) found the three dimensions of sustainability in a consistent set of interdependent strategies set out in Table 3. Economic sustainability was based on mixed-use economic activity and local employment. Environmental sustainability was based on low levels of energy consumption, pollution and mobility, and social sustainability combined higher residential densities, cultural diversity and local social integration. Each proposal represents the three sustainability dimensions as highly interdependent.

Table 3: Practical strategies of sustainable urban development

Dimension	Criteria
Economic sustainability	local jobs home-based work mixed activities
Environmental sustainability	low energy low pollution low mobility
Social sustainability	higher densities cultural diversity social integration

(Source: adapted from Brindley, 2003)

Brindley (2003) argues that such models for sustainable urban development make strong moral claims but run counter to a number of long-term patterns of social change. These include increasing consumerism, social differentiation and segregation, and fragmented patterns of social relations and lifestyle choices. Brindley's (2003) findings echo those of Littig and Greißler (2005:68) who analysed a selection of national and international social sustainability approaches and found indicators were ". . . frequently not founded in theory but rather in a practical understanding of plausibility and current political agendas". A definition of social sustainability adopted by the City of Vancouver (2005) is more balanced. The definition refers to those attributes and resources that individuals can contribute to their own well-being and the well-being of the community (education, skills, health, values and leadership), and those relationships, networks and norms that facilitate collective social or community action to improve quality of life and sustainability. These are underpinned by four guiding principles – equity, social inclusion and interaction, security and adaptability.

2.5 Environmental assessment

Even given the problems associated with achieving a balance across the three sustainability dimensions, there remains an undeniable need to assess progress toward a more sustainable future. The generic term used to describe any evaluation

of the impact of human activity on the environment is environmental assessment. Environmental assessment is a context specific procedure generally undertaken for infrastructure projects but also used to determine the impact of public policies.

A wide variety of assessment tools have emerged to evaluate a broad range of sustainability issues. These include quantifiable factors such as energy use, indoor air quality and water use, and less quantifiable factors such as social capital, quality of life and cultural diversity (BRE, 2006; Levett-Therivel, 2004). The process can be used to identify economic, environmental and social impacts prior to decision-making or it can be used for ongoing monitoring of various environmental outcomes (Frame and Vale, 2006; Cole, 1999). There has been a significant increase in the range and prominence of environmental rating tools for building projects over the past ten years. While there have been positive benefits from these developments, a gap still exists between building and urban-scale environmental assessment practice.

3 SUSTAINABLE ENVIRONMENT ASSESSMENT TOOLS

3.1 Sustainability indicators

Environmental assessment tools use a set of indicators to capture and communicate specific information. Indicators can be used to describe the state of a given system, detect changes in a system, or show cause-and-effect relationships within a system. Indicators provide an attractive way to capture and measure particular aspects of sustainability policy in an easily communicated form. However, the large number of context specific indicators means there is a confusing array of different systems which are difficult to interpret and compare meaningfully (Frame and Vale, 2006).

A more theoretical argument put forward by Rydin et al. (2003), suggests indicators need to be more clearly understood in terms of their contextual, contested and socially constructed nature. Key themes in the sustainability agenda are the need to address the local context, provide for multiple stakeholder participation, and provide a balance between the competing sustainability dimensions. This requires the development of context specific indicators and debate between multiple stakeholders over what constitutes sustainable development for a particular community. Evidence so far suggests there is as much difficulty with capturing the variety of contested stakeholder views in a set of sustainability indicators as there is in balancing the economic, environmental and social dimensions in sustainable development policy.

3.2 Sustainability assessment

Two recent studies have undertaken evaluations of national and other proprietary environmental assessment systems. The BRE Report (2006) conducted a detailed evaluation of 25 sustainability tools. All 25 tools focused on the environmental

dimension but most included economic and social dimensions. Seven of the tools were categorised as urban planning tools the remainder were categorised as building rating systems, life-cycle analysis tools and infrastructure tools. The Report concluded that none of the tools were truly holistic with regards to coverage of the three sustainability dimensions and the approach to multiple stakeholder participation varied greatly. Only one tool had been developed for use by local communities and none of the tools considered all identified stakeholders in the evaluation process.

The Levett-Therivel Report (2004) conducted an evaluation of 78 sustainability tools. The tools covered a wide range of issues across all three sustainability dimensions. Tools were categorised as describing and monitoring the status of sustainability, predicting and evaluating sustainability impacts, or modifying perceptions and actions towards sustainability. While the report provided critical analysis of the various tools with regards to social sustainability, there is no specific reference to urban environment assessment tools. The Report concluded that few tools successfully integrated the three sustainability dimensions and there was significantly less emphasis and consensus in regards to the social sustainability dimension.

4 URBAN SUSTAINABILITY AND AGEING

4.1 Ageing in place and the scope of current assessment practice

The extensive number of sustainability assessment tools and indicators is highlighted by the BRE Report (2006), the Levett-Therivel Report (2004) and others (Frame and Vale, 2006; Rydin et al., 2003). Any comparative evaluation of the various tools is complicated not only by the abundance of tools, but also by the variation in approach and specificity of each tool. However, some general observations can be made. Firstly, the Levett-Therivel Report notes an inconsistent approach to the involvement of the public in the tools studied while the BRE Report concludes that there is a need to set minimum standards for stakeholder communication. Given that many of the health conditions associated with ageing can lead to social isolation, stakeholder participation that is so central to the sustainability agenda needs to extend beyond representative groups to more fully engage with the ageing population.

Secondly, both reports agree that the social sustainability dimension is inadequately defined and there is little consensus as to what social sustainability criteria should be addressed. The BRE Report for example, evaluated seven social sustainability themes – social inclusion and equity, safety and security, health and comfort, liveability, employee satisfaction, corporate social responsibility, and quality of life. Justification for the use of these themes was not given and definitions were not provided. Given the potential impact of ageing populations across the developed world, there needs to be greater consensus in relation to the social dimension of

sustainability and greater emphasis given to criteria that address the specific needs of older people in the urban environment.

Finally, even given the complexity of the evaluation process, there is limited evidence to suggest in either the BRE Report or the Levett-Therivel Report that the ageing in place concept is being adequately addressed in any of the assessment tools. A fit and active older population should be seen as an essential component of any sustainable community. Recognising that the three components of successful ageing (avoidance of disease, maintenance of functionality and active engagement in life) can all be impacted positively or negatively by the urban environment should lead to a greater acknowledgement of ageing in place issues in the assessment process.

4.2 A framework for sustainable ageing in place

A conceptual model that arises from the three WCED sustainability dimensions and the subsequent *Agenda 21* criteria is shown in Figure 1. The model situates the issue of ageing in place firmly within the social sustainability dimension while acknowledging that elements of economic and environmental sustainability interact concurrently with it. The first innovation in the model is an additional layer of factors that inform each of the seven *Agenda 21* criteria. It is logical to suggest that when assessing each criterion there will be a range of factors, some of which will be shared by all social groups while others will be unique to a single social group.

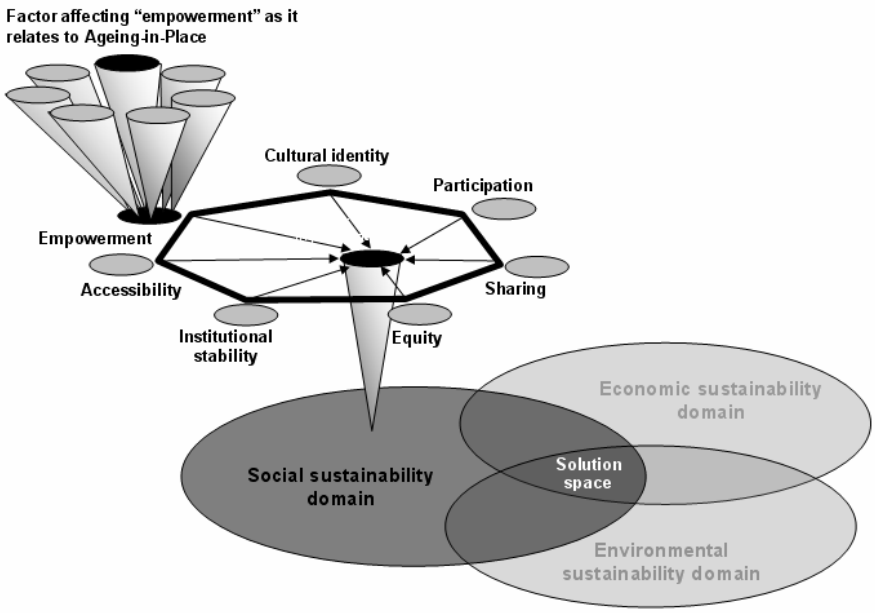

Figure 1: Conceptual model for the assessment of urban environments for sustainable ageing in place

The second innovation evident in the model results from the acceptance that optimal specifications for a particular social group, in this case the over 65 year old age group, result from a unique mix of the seven sustainability criteria identified in *Agenda 21*. This in turn impacts upon a range of shared and unique factors. It is an inevitable consequence therefore, that each social group being accommodated within an urban environment will require a unique mix of factors. By way of explanation Figure 2a suggests a hypothetical optimised mix of criteria for ageing in place, expressed in terms of vector quantities. Figure 2b similarly maps an optimal mix for a different social group, in this case those with a visually impairment only. Figure 2c maps the resultant compromise. It is important to understand that these diagrams illustrate a concept they are not intended to illustrate a proposed assessment tool.

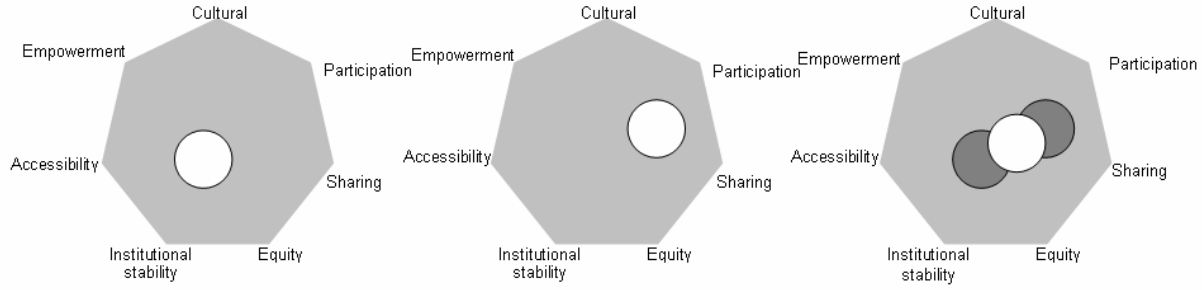

Figure 2: Accommodating optimal social sustainability needs of different user groups

While there is evidence to suggest that the use of simple tools and metrics leads to a more widespread acceptance by users, it is recognized that the generation of a sustainable urban design solution that is acceptable to the widest group of users will be inherently complex. It is suggested that the model might be further developed as a 'fitness landscape' similar to those used in organisational design and capability mapping. A capability map would chart the relationship between multiple interlocking criteria while allowing for changes to a single criterion to be reflected in changes elsewhere in the map.

5 CONCLUSIONS

Ageing in the home represents the preferred option for the majority of older people and their carers. For many governments across the developed world, ageing in the place also represents a significant strategy in the management of ageing populations. Given the evidence to support the centrality of the home in sustaining functionality and quality of life in older people, the lack of research in relation to the link between the home environment and the broader urban environment is surprising. The primary health conditions affecting older people are associated with issues such

as balance disturbance, reduced physical activity, social isolation and loss of confidence. Redefining the ageing in place theoretical framework to account for complexities in the broader urban setting should be a key theme for future research.

The lack of attention given to ageing as a critical factor in the sustainable environment debate is also disappointing given the emphasis on quality of life, social justice and social coherence found in the WCED sustainability model. Again, research indicates that the primary health conditions affecting older people can be avoided, improved or exacerbated by the characteristics of the immediate urban environment. Poor neighbourhood amenity can affect the desire to exercise, increase the incidence of falls and reduce social engagement. Potential research directions include the development of indicators and methodologies that evaluate specific person and environment characteristics and adaptive responses, as well as the development of urban planning and design strategies that maximise quality of life.

The research agenda suggested in this paper broadens the concept of successful ageing in place beyond the home and links ageing with the sustainable development debate. The conceptual model that has been presented in the paper is by necessity multidimensional, requiring the identification of a full range of factors that feed into *Agenda 21's* seven criteria for social sustainability. Assessment of their relative importance and consequent weighting should utilise multiple stakeholder perspectives, with particular understanding given to differences in capacity for active social and civic engagement. The sustainability assessment process should take place at two levels, firstly at the social sustainability criteria level, and secondly, at the sustainability dimension level. Armed with such information, these factors could then be used to either drive the development of a new sustainability assessment tool, or be incorporated into an existing tool that adequately links urban sustainability to successful ageing in place.

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