1. Introduction

In recent years there has been increasing recognition of the need to improve the quality of cities and urban neighbourhoods in reference to supporting an ever-increasing ageing society (see Australian Local Government Association, 2006; Burton and Mitchell, 2006; Department of Health and Ageing, 2006; Inclusive Design for Getting Outdoors, 2007a, 2007b; World Health Organisation, 2007). There has been growing attention given to the urban neighbourhood environment of older people not only in gerontology but also across a wide range of disciplines including geography, urban design, transport studies and public health (Day, 2010; Ziegler and Schwanen, 2011). This cross-disciplinary interest is fuelled by the inter-related factors of increasing urbanisation and population ageing (Beard and Petitot, 2010; Lui et al., 2009; Smith, 2009) and the significant challenges these trends pose for landscape planning and design.

With the losses in functioning associated with the ageing process, the quality and type of environment becomes a significant factor in determining well-being and independence of older people (Smith, 2009; World Health Organisation, 2007). The design of the neighbourhood and provision of neighbourhood amenities can enhance or inhibit participation and are especially important for older people to be able to continue to age in place (Judd et al., 2010). While there is limited research evidence related to access to urban neighbourhood amenity among older people (Quinn et al., 2009), projects undertaken in the United Kingdom and in Australia identify age-friendly built environment design approaches (Burton and Mitchell, 2006; Inclusive Design for Getting Outdoors, 2007a, 2007b; Judd et al., 2010). Many western governments are developing strategies for age-friendly cities (see Australian Local Government Association, 2006; Department of Health and Ageing, 2006; Inclusive Design for Getting Outdoors, 2007a,

2007b; World Health Organisation, 2007) and are pursuing urban planning policy aimed at reducing the physical separation of daily activities with a more effective integration of land use and transport (Neal, 2003). Policies aimed at changing the physical urban neighbourhood environment in ways that increase ready access to amenities assumes an improvement in the experience of liveability for residents within that neighbourhood (McCrea et al., 2006). While there is no universally accepted definition of liveability, it can be broadly defined as "the well being of a community and represents the characteristics that make a place where people want to live now and in the future" (Victorian Competition and Efficiency Commission, 2008). The purpose of this paper is to explore the effect of the neighbourhood environment and its influence on liveability for older urban residents.

An ecological perspective of ageing

An ecological perspective of ageing "assumes an interplay between an individual's functional capacity, adaptation, and their physical and social environment" (Beard and Petitot, 2010, 430). There are a number of models which could be seen to embody such a theoretical foundation. For example, urban consolidation models, such as urban village and smart growth, with planning designs that co-locate residential and other uses around transport nodes, promote easy local access to diverse amenities and public transport which may encourage older people to maintain social networks and remain engaged with their local community. Similarly, policy initiatives that seek to enforce the permanent removal of impediments to walking, including street crossings that do not allow older people or people with disability enough time to cross, deteriorating footpaths or other physical barriers are instrumental in older people's ability to age in place (Frumkin et al., 2004). These issues relate to liveable neighbourhoods, universal design and also

feature strongly in the healthy cities and age-friendly cities agenda (Inclusive Design for Getting Outdoors, 2007a, 2007b; National Heart Foundation of Australia, 2009; World Health Organisation, 2007) for improving the design of cities and neighbourhoods to be more conducive to ageing in place (Beard and Petitot, 2010).

It is broadly recognised that ageing in place (growing older in one place without the need to move as a result of health impacts) is in the interests of both older people and the government (Judd et al., 2010). The independence, health and wellbeing of older people are advanced by ageing in place and there is a reduced economic burden on government through reduced demand for institutionalised aged care. While a quality environment is a right requiring no empirical justification, social policy and social change needs to be driven by a better understanding of what constitutes a 'quality' environment in which older people are committed to ageing in place (Lawton in Smith, 2009; Rosso et al., 2011). The need to better understand older people's experiences is in part driven and supported by research that suggests that environment matters (Rosso et al., 2011; Smith, 2009).

Environmental gerontology, an ecological perspective of ageing, has been increasing in importance over the past few decades (Day, 2010; Peace et al., 2011; Peace et al., 2007; Smith, 2009). While acknowledged for expanding the body of knowledge pertaining to older people's environments and extending the methods used in this topic area (Smith, 2009; Wahl and Weisman, 2003), it has also been criticised for having no standard methodology or theoretical approach (Kendig, 2003), relying too heavily on quantitative methods (Wahl and Weisman, 2003) and for predominantly focusing on micro-environments (Kendig, 2003). Kendig (2003,

612) has argued for research to be expanded beyond the micro-environment to urban neighbourhoods, cities and regions especially in light of "important macro-dimensions to change, such as aging of the baby boom cohort". The term 'urban' is used in this study in a specialised sense to refer to inner-city, high density environments/neighbourhoods (a minimum of 30 dwellings per hectare).

The study of the neighbourhood setting

While the term "neighbourhood" is used in everyday conversation it lacks any single or widely agreed definition. Neighbourhoods are comprised by residence and home-related facilities that are in close proximity and which serve residential needs (Kearns and Parkinson, 2001). Characteristics of proximity of access to everyday needs, influenced by both distance and transport infrastructure, could be considered a widely acknowledged definitional attribute of neighbourhood (Galster, 2001) especially as it relates to neighbourhood liveability (Jacobs, 1961). Physical approaches to neighbourhoods and neighbourhood liveability are often discussed relative to their walkable proximity to some form of centre (institutional, educational, retail or other public facility) (Galster, 2001). Walkable proximity is difficult to define geographically due to variables such as the age and ability of residents, the state of the streetscape, and the topography of a given urban area. Notwithstanding these qualifications, for the purposes of this research, walkable proximity is considered to be an area within 10 minutes walking distance of home.

Rather than conceiving neighbourhood and neighbourhood liveability on the basis of particular inherent physical qualities in the environment, a second conceptual approach views them as a

behaviour-related function of the interaction of neighbourhood and person-based characteristics (Anderson et al., 1999). Everyday household activities influence the perceived dimension of the neighbourhood: for example, how far people are willing to walk to public transport, banks, health facilities, shops and recreational facilities. This suggests that neighbourhoods are identifiable through the link between their residential function and their non-residential uses and how this linkage draws and encourages activity. Neighbourhood behavioural and use patterns may extend into other neighbourhoods as people function in different social networks, at different scales, across different times and spaces, and thus as a result may look for different things than those that exist within their home area (defined as an area of 5-10 minutes walk) (Kearns and Parkinson, 2001). For some, time-geography of their neighbourhood is delimited across a wider region (Kearns and Parkinson, 2001).

Out-of-home mobility

Out-of-home mobility has been positively correlated to well-being (Ziegler and Schwanen, 2011) and is often a pre-requisite for commercial, cultural and social activities (Alsnih and Hensher, 2003; Shoval et al., 2011). While, engagement and use of outdoor environments have various benefits for older people through participation in physical activity, exposure to outdoor elements, and social interaction (Sugiyama and Ward Thompson, 2007), research has shown that older people spend most of their time at home with estimates of around 19.5 hours on average per day (Brasche and Bischof, 2005; Moss and Lawton, 1982). Mobility, broadly defined as the ability to move oneself by, for example, walking or transport (Webber et al., 2010), allows older people the opportunity to engage and use environments for everyday activities outside the home (Ziegler

and Schwanen, 2011). The most common forms of mobility among older people are walking and driving (Schwanen and Ziegler, 2011).

Key correlates of the decision to walk include local availability and design of amenities including an accessible, time efficient, safe and comfortable transport network of public transport nodes, transport corridors and available and interconnected walking infrastructure (Berke et al., 2007; Judd et al., 2010; Leslie et al., 2007). Close proximity and accessible amenities such as restaurants, cafes, shops, employment, health care facilities, parks and recreational facilities have been linked to residential satisfaction and quality of life (Glaeser et al., 2001; Lloyd and Auld, 2003) and to decisions of whether to walk or take the car (Southworth, 2005). Easy access to everyday activities significantly adds value to liveability for both the individual and the broader community (Glaeser et al., 2001).

The preferred mode of transport for older people is the car (Adler and Rottunda, 2006). Motor vehicles are widely used among all those of driving age and above but they are especially important to older people for mobility and their overall well-being. The inability to drive has been associated with reduced quality of life (Gabriel and Bowling, 2004) and declining out-of-home mobility and life satisfaction (Harrison and Ragland, 2003). For those with fading sensory ability and physical strength, the use of a car is seen as crucial to maintain everyday activity and social engagement (Mollenkopf et al., 2002). Inability to drive or use public transport renders older people dependent on others for travel (Judd et al., 2010).

Recent research

There has been criticism of the extensive use of quantitative methods in environmental gerontology studies because these methods fail to capture the *experience* of the environment for older people (Ewing and Handy, 2009). More recently, however, there have been a number of studies using either qualitative methods (Day, 2010) or a mixed methods approach (Lord and Luxembourg, 2007; Shoval et al., 2011) to explore older people's experiences within their neighbourhood environment. Lord and Luxembourg (2007) and Shoval and colleagues (2011) both employed in-depth interviews and geographic technology to study the mobility of their participants with the former using geographic information systems (GIS) and the latter, global positioning system (GPS) devices.

There were three main issues from the findings of this group of studies regarding older people and their out-of-home mobility. Firstly, transport planning has traditionally and incorrectly viewed older people as a homogeneous group. Secondly, there are varied reasons why older people heavily rely on cars for their out-of-home mobility and not just because of problems with availability of amenities and public transport. Thirdly, problems with neighbourhood walkability continues to discourage walking and reinforce reliance on the car. Such findings help to explain why urban consolidation models, such as smart growth, which serve to shorten trip distances, increase travel options and thereby reduce the need for car ownership (Behan et al., 2008; Judd et al., 2010) are debatable (see Alsnih and Hensher, 2003; Therese et al., 2010). There are established norms around car ownership and use which act as significant barriers to reducing people's reliance on the private motor vehicle (Lee and Moudon, 2004; Therese et al., 2010).

Context of the current study

There is international interest in the demographic profile of older people in preparing to meet the needs of an older urban society (Smith, 2009). This impending global phenomenon holds relevance for landscape planning and design in creating age-friendly urban form that facilitates ageing in place. Many advanced societies are developing strategies for age-friendly urban environments (see Australian Local Government Association, 2006; Department of Health and Ageing, 2006; Inclusive Design for Getting Outdoors, 2007a, 2007b; World Health Organisation, 2007) and their entrenched default conceptual framework is the urban neighbourhood. Proximity characteristics of access to everyday activity is an integral attribute of liveability and the complex commodity called neighbourhood. The extent that higher density living actually encourages walkable neighbourhood activity and reduces car use among older people within Australia is unclear. It is important therefore to investigate the relationship between high density living and amenity access when making determinations of neighbourhood liveability. Given the possibility that differences exist between the *perception*s and actual *behaviour* of older people within their urban neighbourhoods, both subjective and objective measures are needed to explore the neighbourhood environment as older people experience this phenomenon through space and time. Thus, this paper reports on findings based on the use of twelve case studies employing both quantitative and qualitative measures for the purpose of exploring the effect of the neighbourhood environment and its influence on liveability for older urban residents.

2. Methods

The data used for this study comprises a sub-set of data related to the experiences of older Australians residing in inner-urban, high density suburbs, which were gathered as part of a larger project exploring ageing and liveability in rural, regional and urban locations. The research

methodology used for the current study involves three different data collection methods: time-use diaries, Global Positioning Systems (GPS) mapping, and in-depth qualitative interviews. Two weeks prior to the semi-structured in-depth interviews, participants were given a GPS tracking device and paper diary and were asked to carry the GPS everywhere they went and to complete a daily diary on their activities for that one week period in 2010. Ethical approval for this project was obtained from a university Human Research Ethics Committee, with all case study participants providing written informed consent prior to their participation in the current study.

Participants

A total of 12 participants (6 men, 6 women) living in selected high density areas were used for this research with all but one of the sample drawn from a database of a past project ('*Living in the City'*) (see Table 1 for a summary of respondents' profile). This previous study utilised a proportionate sampling technique for a postal survey completed by 636 inner-urban residents (28% response rate) in 2007, involving research that focussed on the social, environmental and economic aspects of inner-city life. Using this database, participants who had indicated a willingness to participate in further research and were now aged 55 years or older were contacted and invited to participate, ensuring that those recruited allowed exploration of differences that might emerge as a function of age or gender. Since the original sample from which these participants were drawn lacked any persons of low socioeconomic status (SES), a twelfth participant was recruited through a community group to facilitate a case study within this particular demographic.

INSERT TABLE 1 ABOUT HERE – Table 1: Summary Table of Case Study (CS) Respondents and Location Profile

Case Study Location

The location for all case studies was Brisbane, Queensland, one of the fastest growing cities in Australia and in the western world. Brisbane has a sub-tropical climate with undulating topography. The study was undertaken in late March to early April at the start of autumn, normally characterised by pleasant outdoor weather conditions. The population of the greater Brisbane area under the jurisdiction of the Brisbane City Council is expected to increase from 991,000 (2009) to 1,270,000 people by 2031 (Australian Bureau of Statistics, 2007). In 2006, the inner five kilometres of Brisbane included 231,526 people and 105,783 dwellings (ABS, 2007). Participants were selected from six inner-urban higher density areas (defined as 30 or more dwellings per hectare) within five kilometres of the Central Business District (CBD) (see Table 1 for details of areas covered). Figure 1 is a map of the inner-urban high density areas included in this study.

INSERT FIGURE 1 ABOUT HERE - Figure 1 Map of the inner-urban high density areas included in this study

Apparatus

Global Positioning Systems

Objective measures of each participant's travel over a seven-day period were obtained via a person-based GPS device (lightweight portable *TSI GPS Trip Recorder Model 747A*), which was used to track all of their out-of-home movement. The accuracy of the GPS device is reported to be +-3 metres (TranSystem Incorporated, 2008); this level of error can increase significantly

however, depending on the level of signal interference caused by buildings, canopy cover, indoor environments, and so on. Participants placed the GPS device into a handbag or pocket during waking hours and charged the battery each night. The GPS devices were programmed to record position, time, date, speed and altitude at a time interval of one minute. This allowed for accurate tracking of each participant's outdoor movements, although the GPS would not record points when no signal was available (for instance, if the participant travelled underground for a period of time).

GIS Data Preparation and Analysis

Data from the GPS devices were downloaded using software specific to the GPS device (included in the purchased package). Using this software, the raw data were then exported as spreadsheets using a comma-delineated file format with each row representing a logged position (one each minute). These spreadsheets were converted to Google Earth files using an online converter and mapped in Google Earth. The different tracks of each participant's travel on the yielded maps were colour-coded by mode of travel used, according to information entered in participants' travel diaries (refer to Daily Diaries below). The creation of each participant's time/space activity maps (involving day-by-day and total weekly travels) took approximately 6 hours per diagram and was accompanied by tabulated information relevant to each journey and destination. These maps were used during the interviews.

Daily Diaries

Participants kept a daily diary for the same week that they were using the GPS tracking device. The diary had space to record their daily travel, destinations, activities and reflections upon

issues pertaining to their environment or any undertaken activity. The diary also included a brief survey which captured demographic information, use of transport, volunteering and aspects of community liveability and engagement. The diaries offered an efficient and affordable way to assess specific details about activity (i.e., duration, frequency, social context, travel mode, and location), thereby supplementing information derived from the GPS devices.

In-depth Interviews

Residents' perceptions of place were elicited through their responses to open-ended questions focussed on both the positive and negative experiences and features of their respective neighbourhoods. The importance of the 'ordinary knowledge' of residents for providing insight into local issues and the functioning of daily life in place is crucial in effective liveability research (Myers, 1987). The interviews were sequenced so that initial discussion centred on participants' general pattern of movement over the tracking period, followed by a day-by-day review of each participant's trips and activities. This enabled exploration of the nature and level of activity of each participant within their respective immediate urban environments. The diary and map information acted as basis for generating further discussion to examine participants' experience of the built environment and the factors that facilitate and hinder their activity. In this way, their potential and realised out-of-home activity could be examined. All interviews were recorded and subsequently transcribed verbatim.

Procedure

Participants were telephoned prior to them being sent a paper travel diary, a GPS device and recharger, and a typed set of instructions about the use and battery charging of the GPS device

(previously trialled for ease of use and comprehension). The GPS device and diary were posted back to the research team for interpretation prior to the interview. The recorded GPS data were merged, with interactive individual 'activity maps' created for each participant. These '*individual time/space life path maps*' were then reviewed and compared with the time-use diaries to identify any key patterns, issues or anomalies to be discussed at interview. As the computer used at interview was large and difficult to move, the semi-structured interviews were conducted predominantly at a central location (the university) and, on occasion, in participants' homes. The interviews lasted approximately 90 minutes on average. The process captured both narration and mapped information about destinations, activities, lifestyles, journeys and general experiences when moving about their community for the target week in each case study participant's life. Through the interviews, diaries and mapping, the study captured the frequency of participants' activity on different days and at different times, identified the sites used for spending free time and allowed interviewers to explore the manner in which the participants' respective urban environments facilitated their physical activity (eg shopping, walking) and social interactions.

Data Analysis

In this study, objective indicators were gathered using GPS to track the respondents' movements and to map their movements using GIS, and also to gather objective indicators of available services and facilities within their respective urban environments. These quantitative measures were then analysed for the second phase of subjective measurement via interviews. The data from the interviews, diaries and maps were subsequently compared and analysed as individual case studies. The audio recordings were fully transcribed and then analysed using a thematic

approach, identifying key categories, themes and patterns (Liamputtong, 2009). An iterative process was utilised, with the transcripts being read and re-read in order to code the data and identify emerging themes and meaningful categories. To enable understanding and interpretation, each participant's diaries and time/space life path maps were also qualitatively analysed to identify key patterns in where and how participants moved during the monitored week.

3. Results

Data gathered from the survey items revealed that all participants loved their neighbourhoods and did not report any negative issue relating to their neighbourhood. The main two findings are that older people are not using local amenities in their high density neighbourhoods and that only a small percentage of each day is being used for outside activity (see Figure 2 below for a graphical representation of time spent in and outside the home for each participant, based on their mapped activities over the tracked seven-day period). As can be seen from this diagram, the majority of cases spent most of their time within the confines of their home. One notable exception to this overall pattern of behaviour was CS5 (male) who cycled extensively throughout his immediate and surrounding neighbourhood (see also Table 2 for detail of kilometres travelled by mode of transport).

INSERT FIGURE 2 ABOUT HERE - **Figure 2 Graphical representation of time spent at home/away from home during tracking period**

The two main themes that emerge from the data explaining why older people are not using local neighbourhood amenities relate to the availability and accessibility of amenities within these local high density neighbourhoods. Figure 3 below shows the weekly activity maps of two

residents. One resident, CS1 was from Newstead which has limited available amenities and the other resident, CS7 was from Hamilton with excellent availability of local amenities but with a number of barriers to easy walking access to these amenities. These barriers are discussed below.

INSERT FIGURE 3 ABOUT HERE - **Figure 3 Weekly travel maps for two residents – one from a neighbourhood with few available amenities (CS1) and the other from an amenity rich neighbourhood with access issues (CS7).**

Residents were found to be driving outside their local neighbourhoods for everyday goods and services, rather than accessing everyday amenities within their own high density neighbourhoods. Figures 4 and 5 below show the weekly services accessed by two residents, CS3 and CS10, with the five and ten minute walk zones highlighted on each map. Figure 4, CS3's map, depicts the retail and service network accessed by this resident. This resident lives in a newly established urban village with new and varied amenities. This resident, however, has issues associated with affordability and landscape topography which form barriers to accessing available amenities. The retail and service network activity map depicted in Figure 5 is from a resident who lives in an amenity poor neighbourhood referred to by two residents as a "dormitory suburb". There was a great deal of similarity in the appearance of the activity maps regardless of the availability of amenities in residents' local walkable neighbourhoods. This would indicate that there are factors other than availability of amenities which affect older residents' decisions to walk within their local neighbourhood. Residents discussed significant issues pertaining to walkable access to local amenities. These are captured below under *Barriers to Accessing Local Amenities*.

INSERT FIGURE 4 ABOUT HERE - Figure 4 Services accessed by CS3 resident who lives within a high amenity neighbourhood

INSERT FIGURE 5 ABOUT HERE - Figure 5 Services accessed by CS10 resident who lives within a neighbourhood with few amenities

Local availability of amenities

There appears to be great diversity between the high density urban areas under study in terms of locally available amenities. Participants experienced two different realities: residents from two areas in particular (Kangaroo Point and Newstead) have minimal amenity choice and have to travel by motor vehicle in order to access most services - since they are poorly served by public transport - while others choose to drive or be driven to access their services of choice.

> *I used to live at Kangaroo Point which doesn't have a sense of community. It doesn't have a heart or soul. It's what I call a dormitory suburb. People go there to sleep. There are no amenities there. So by comparison, if you look at West End, there's a centre…there's a hub.* (CS2)

Basic developed world infrastructure (eg, internet, telecommunications, consistent electricity supply) can be of poor quality or lacking altogether in some high density areas.

> *There's no cabling…We get intermittent power - I think all the infrastructure is really old…I feel that we were misrepresented…It never occurred to us to ask about the (television and internet infrastructure) that it wasn't cabled.* (CS4)

All of those interviewed reported loving their urban environment and a number of them reported that they loved it because it met their needs. The mapping (the objective, quantitative measure) showed that they used very few or no local services and utilised their motor vehicle extensively (see Figures 3, 4 and 5). While they identified the importance of having facilities and activities within their urban neighbourhoods, they were still dependent on private motor vehicle transport for the majority of trips outside their homes.

Amenity accessibility

Each of the individual maps revealed that private motor vehicles were used for the majority of activities. While this was seemingly due in part to the freedom motor vehicles provide, participants identified their reliance on their motor vehicles as a consequence of poor provision of and/or problems with access to amenities that service everyday needs and activities. Their low use of public transport appears to be attributable to some limitation or dissatisfaction with available public transport services, rather than a lack of their availability.

> *I have heard this place referred to as Kangaroo Island* [rather than the suburb name of Kangaroo Point] *because of how bad public transport is.* (CS11)

Car trips for some residents were necessitated by their wish to access specialist items or preferred health service providers outside their neighbourhood precinct.

I have always been travelling there because she's a good optometrist and that's why I go out there…I had been chasing a book that day and I couldn't get it anywhere, and then back to [dress shop], *oh, yes, I bought something at the dress shop.* (CS4)

Barriers to accessing local amenities

Affordability, aspects of the built environment (including pedestrian pathways, streetscape and buildings) and public transport were highlighted by interviewees as being key areas that either facilitate or hinder their participation within their respective neighbourhood communities.

Affordability

Where services and facilities did exist in the local urban environment, there was often a premium that older people were reluctant to pay. Those interviewed often chose to bypass local chain grocery stores and travel across suburbs to shop at a cheaper grocery outlet.

It depends who has got the best specials. (CS2)

Another interviewee was mindful of the need to support local services even though this might involve greater cost to her than non-local services.

I have always been a firm believer you have to support your local shopkeepers. If you don't, you lose them. So I always feel very strongly about that. Even if sometimes it might be a little bit more costly, but when you measure that against convenience, it's ahead. (CS11)

Built Environment

Three key design characteristics of the built environment restricted participants' participation in the community: pedestrian pathways, streetscape and buildings.

Pedestrian Pathways

The quality of pedestrian footpaths varied between urban neighbourhoods. Some were well maintained with even surfaces and hand rails being provided adjacent to any steps along the path, while others had uneven surfaces with no handrail support for stairs. Uneven footpath surfaces and steep terrain pose problems for older people when walking around their neighbourhoods.

> *I would do a lot more walking if I could walk uphill and down hills* (CS3)

Footpaths in high density areas are often overcrowded and narrow and difficult for older people to negotiate. Some participants noted increasing numbers of runners and bicycle traffic along shared pedestrian/cycling paths becoming a real and significant threat to older people.

> *Yes, cyclists. They are the biggest one. It's becoming very frightening. A lot of them are very abusive…Most of them don't have a bell, so you get frightened for your life, even though you are keeping to the left and everything. What I am really concerned about, is that I feel there's animosity that's developing between walkers and cyclists.* (CS11)

In some urban neighbourhoods, footpaths are dangerously close to busy roads where people have fallen and been killed. Also, on these busy roads, some pedestrian crossings appear not to provide enough time for older people to safely cross the road before the lights change. Figure 6 below is an overhead view of such an intersection. The land surrounding this intersection has been earmarked for significant high rise re-development.

> *That is the problem, crossing Kingsford Smith Drive…There's lights on the corner with pedestrian crossing. I try to get across as fast as I can and I can't get across in one change of the lights. People on the walking sticks haven't got a hope… we have taken it up with the council. They have increased the time to 2 seconds, but that's still not enough...Yes, these lights – we have had one (person), at our tower, hit by a truck.* (CS12)

INSERT FIGURE 6 ABOUT HERE - Figure 6 An overhead view of a dangerous intersection identified by residents

Streetscape

Lack of shade and street seating for those living in Brisbane's subtropical climate were evident in some urban neighbourhoods, as was clean and safe public toilets.

It has got no shade. It's got no seating for older people, strollers I call them. People who want to stroll rather than - so it's for, you know, the 15 to 50 age group but they forget about the (ages) beyond that. (CS12)

Buildings

Lack of hand rails on steps to be negotiated when entering and leaving buildings was identified as a problem, as was uncomfortable and inadequate seating in public shopping areas and buildings. Difficulty accessing buildings and uncomfortable seating also restricts favoured activity.

From the footpath, there's four/five steps up and then you go into a lift or if you are coming through the car park, they is still a step up. One step up and then there's two doors to sort of go through. If you were by yourself in a wheelchair, you probably wouldn't be able to do it because the doors are very heavy and it's on a spring and it's got a lock and it's quite narrow. (CS1)

Public Transport

Some urban neighbourhoods are poorly serviced by public transport. Some urban older people: perceive public transport services to be irregular or unreliable; experience difficulty in physical access onto buses, trains or ferries; experience excessive distance or steep topography when travelling to transit nodes or excessive waiting including transfer times between changes of transport; and find timetable and route information confusing. Use of public transport was also found to be limited to certain destinations and locations, such as inner-city travel. The findings

from interviews illustrated that choice of travel mode was largely affected by perceptions of convenience related to physical access, seamless journeys (perception of inconvenient bus routes or connections) and journey destination or purpose. Table 2 below details the total distance travelled (in kms) by each participant, according to the modes of transport used during the monitored week, as well as comments regarding factors that serve to either enable or constrain participants' use of public transport (gathered at interview or from travel diary entries).

INSERT TABLE 2 ABOUT HERE - Table 2 Transport mode used in total kilometers over 7 day tracking period

4. Discussion and Conclusions

The findings from this study suggest that there is a gap between the rhetoric of neighbourhood amenity that surrounds the high density living policy agenda and the reality of life within these settings for older Australian people, particularly in relation to the availability of and accessibility to neighbourhood amenities within walking distance. However, availability and access issues to neighbourhood amenities do not appear to lead to older adults being dissatisfied with life within high density contexts. From the subjective data gathered in this study, it is apparent that overall, participants believe that their neighbourhoods meet their needs and that they "love" their respective communities. Nevertheless, these positive perceptions arise within the context of them having access to and extended use of private motor vehicles, as evidenced by the objective map data documenting their driving behaviour.

Innovative method

508 The methods used by this study in gathering both subjective and objective data that capture
509 participants' subjective perceptions of their neighbourhoods and their patterns of movement is a
510 key strength of this study, with the information each provides having the potential to inform
511 policy strategies associated with high density environments. Previous research has provided rich
512 quantitative data on older people's trip-making (Mollenkopf et al., 2011) or on the physical
513 features of urban environments for older people (Ewing and Handy, 2009) but there has been a
514 lack of research on the perceptions, preferences and experiences of older people when venturing
515 out-of-home (Banister and Bowling, 2004; Coughlin, 2001; Ziegler and Schwanen, 2011).
516 Rarely are objective and subjective indicators analysed in conjunction with one another (McCrea
517 et al., 2006), thereby precluding simultaneous consideration of the subjective dimensions of life
518 within neighbourhoods and the actual movement and participation of residents that occurs within
519 them. The breadth of information gathered from the objective and subjective measures used in
520 this study strengthens the case for using both and thus acknowledging the importance of the
521 subjective when investigating the objective environment (Pacione, 2003).
522
523 ***Research highlights***
524 The majority of participants, with the exception of CS5, spent most of their time at home (see
525 Figure 2 above). While there can be no generalising of the findings due to the small number of
526 participants, the average time spent at home by the participant group is in keeping with previous
527 research (see Brasche and Bischof, 2005; Moss and Lawton, 1982). This is of concern given the
528 benefits derived for older people from engagement and use of outdoor environments (Sugiyama
529 and Ward Thompson, 2007; World Health Organisation, 2007).
530

531 This research demonstrates that the mixed-use neighbourhood outcomes and better quality public
532 transport systems that best support an ageing population are not uniform across Brisbane's high
533 density neighbourhoods. The research highlights that some urban neighbourhoods in Brisbane
534 have minimal facilities or services, while others have the necessary facilities but lack ease of
535 access. Problems with availability of or access to amenities may explain the lack of local
536 walking undertaken by the majority of participants. A recent review of empirical literature
537 published between 1990 and 2010 was undertaken by Rosso and colleagues (2011) that
538 examined objective measures of the built environment and older people's mobility. Rosso et al.
539 (2011) concluded that the direct impact on older people's mobility by urban design, land use and
540 transportation systems remains unclear due to inconsistent findings across studies. They found
541 more promising evidence in street and traffic conditions, intersections and proximity to select
542 locations as the most likely factors to impact mobility (Rosso et al., 2011). All of these factors
543 surfaced as having an influence for the participants of the current study thereby supporting the
544 quantitative studies reviewed by Rosso and colleagues (2011). Key issues raised by residents
545 included: poor quality or inadequate provision of walking paths, transport nodes, public open
546 space, street seating, local cafes and public toilets; steps to public buildings and lack of handrails
547 beside steps; competing with cyclists and runners along walking paths; lack of pedestrian
548 crossings or inadequate time to cross at traffic lights; ambiguous crossing cues; and close
549 proximity to busy roads. These built environment characteristics have previously been
550 acknowledged as concerns for older people's out-of-home mobility (Booth et al., 2000; Burton
551 and Mitchell, 2006; Inclusive Design for Getting Outdoors, 2007a, 2007b; Judd et al., 2010).
552 What emerges from this study, as it did for Judd and colleagues (2010), is an uneven standard of
553 design, provision of amenities and maintenance of the public realm.

554

555 ***A wider concept of neighbourhood***

556 All residents in this study identified the importance of having facilities and activities within their
557 urban neighbourhood (consistent with high density policy agendas), however, the GPS and GIS
558 mapping showed these residents to have very low levels of locally-based everyday activity
559 within walking distance of their residences and that they relied on vehicle transport for the
560 majority of trips made outside of their homes. Almost all residents undertook their everyday
561 activities outside of their walkable neighbourhood, despite no obvious barrier of physical
562 incapacity preventing them from walking in their local areas. When asked to identify their
563 neighbourhood on the Google Earth map during their interviews, residents indicated a much
564 wider geographic region than their immediate walkable neighbourhood (five to fifteen minutes
565 walking distance from their residence). The neighbourhood identified was in keeping with their
566 everyday activity base - which relied on the use of a motor vehicle. This suggests an extended
567 neighbourhood based physically and subjectively on spaces of behavioural use.

568

569 While problems with accessibility and availability of amenities are plausible explanations for a
570 lack of local neighbourhood activity and a preference for the private motor vehicle, there are
571 established norms surrounding driving. There is inherent value in cars for older people because
572 they represent freedom and ease of movement as well as enjoyment resulting from the act of
573 driving itself (Lord et al., 2011; Lord and Luxembourg, 2007). This poses the question as to
574 whether substantial improvements to the accessibility and availability of local neighbourhood
575 amenities would necessarily result in a substantial reduction in the use and reliance of cars by
576 older people without implementing significant community engagement strategies aimed at

changing norms around car use and encouraging the value of neighbourhood walking for older people.

Barriers to public transport

A number of barriers to public transport use were identified for older people living in Brisbane which included: a lack of services in some urban neighbourhoods; terrain or distance to transport nodes; inconvenient bus routes or connections; queues, crowding and lack of seating on buses and at bus stops; problem with negotiating steps onto public transport and difficulties with walking supports on buses. These findings are consistent with previous research on the nature of barriers to the use of public transport by older people. Broome and colleagues (2009) in their review of the literature on bus use by older people found that bus design, service provision and performance, information, attitudes of staff and the community all affect older people's use of buses. Only two participants in this study travelled by bus over the monitored seven day period and this represented only a small proportion of their travel time (see Table 2). The issues raised with the use of busses in this current study are consistent with those identified in studies reviewed by Broome et al. (2009). An issue that was particularly important to one participant in the current study was level access from the front door of the bus onto the road-side kerb. Currently, the Brisbane City Council (BCC) has 1006 low-floor busses in the Council's fleet which equates to approximately 85 per cent of the fleet (Brisbane City Council, accessed 22 February, 2012). Continuing improvement in public transport services, access and infrastructure is needed for older people to find public transport more attractive and reduce their use of their car.

Access to everyday amenities

Currently, access to amenities that facilitate participation in everyday type activities (e.g., retail shopping, hairdressers, medical services and the like) appears to be made easy through the availability and use of the private motor vehicle. With the increased losses in functioning that occur due to the ageing process, older people's spatial movement shrinks to the vicinity of their immediate environment (Weiss et al., 2010). When the older person or his or her partner can no longer drive, there will be significant problems with access to everyday goods and services unless they live in an accessible, amenity-rich local environment. With availability or access issues to amenities including public transport, the loss of a driving licence would limit older people's ability to participate in activities outside their local home environment and jeopardise their ability to age in place. It becomes imperative that environmental factors that negatively impact on older people's everyday living are understood and addressed so as to maximise their opportunities to age in place. This area of research and policy is still in its early stages however, is gaining increased recognition by Australian and international governments, health and built environment professionals, and will inevitably continue to grow in importance as the population ages (Judd et al., 2010).

Conclusions

The findings of this study highlight the relevance and importance of objectives outlined by the National Heart Foundation (NHF) of Australia if older Australians are to change their behaviour by driving less and walking more. The NHF (2009) has called for the build and retrofit of existing neighbourhoods to increase pedestrian access to shops and public transport and to consider the mobility and access needs of older Australians when planning pedestrian

623 infrastructure, road crossings, public open space, public transport access and recreational
624 infrastructure. This needs to extend beyond the planning stage however, to the maintenance of
625 this infrastructure. Their lack of upkeep has repeatedly been shown to negatively affect older
626 people's mobility (Judd et al., 2010).
627
628 This study used an innovative, mixed-methods approach in investigating the socio-spatial
629 environment and everyday lived experiences of twelve older people living in high density
630 neighbourhoods in Brisbane, Australia. One limitation of this research is that it is based on a
631 small sample of older Australians living in one capital city. Nevertheless, the sample size
632 contributed to the feasibility of the innovative approach taken in this study. The use of case
633 studies has enabled the gathering of comprehensive information derived from multiple sources
634 and the undertaking of analyses linking and relating both subjective (perceptions of behaviour
635 obtained through the interviews) and objective (activity gathered from the GPS and GIS and
636 expanded through the individual diaries) indicators. The results therefore provide insight into the
637 lived experience of a group of older adults living in high density settings and their experiences
638 are likely to have relevance to other high density contexts elsewhere.
639
640 This research contributes to a growing body of knowledge that explores interactions between
641 residential density and liveability especially as it applies to older people. As they continue to age
642 and become less able to drive a motor vehicle, older people will require more appropriate service
643 provision within their local urban neighbourhood in order to remain living in their own homes
644 and familiar neighbourhoods for as long as possible. These findings have implications for
645 landscape planning, design and management of services, facilities and infrastructure that serve

646 older people. By highlighting issues that impact on the liveability and sustainability of older
647 people as high density residents, this research furthers our understanding of the specific
648 landscape planning and design factors which make the urban neighbourhood more liveable and
649 sustainable and can thus inform actionable and implementable policies, programs and designs.

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List of Tables

Table 1: Summary Table of Case Study (CS) Respondents and Location Profile

Person	Age	Gender	Marital Status	Income	Working/ Retired	Length of time in residence	Location#	Population*	Land mass	Distance from GPO, Brisbane
CS1	57	Male	Married	>70K	Works**	> 11 years	Newstead+	4818	1.3km^2	3kms NE
CS2	62	Female	Single	>70K	Works**	> 9 years	West End^	6206	1.9km^2	3kms SW
CS3	64	Female	Married	40-50K	Retired	2 years	Kelvin Grove Urban Village+	4246 for all of KG	Urban Village 16ha	3kms NW
CS4	65	Female	Married	>70K	Retired	> 6 years	Kangaroo Point+	6868	1.3km^2	0.75km SW
CS5	70	Male	Single	>70K	Works**	8 years	Highgate Hill^	5428	1.2km^2	2kms SE
CS6	72	Female	Widowed	<20K	Retired	49 years	West End^	6206	1.9km^2	3kms SW
CS7	73	Male	Single	>70K	Retired	9 years	Hamilton^	4366	1.7kms^2	5kms NE
CS8	75	Female	Widowed	N.A.†	Retired	35 yeas	Highgate Hill^	5428	1.2km^2	2kms SE
CS9	78	Male	Married	N.A.†	Retired	10 years	Kangaroo Point+	6868	1.3km^2	0.75km SW
CS10	79	Male	Married	>70K	Retired	9 years	Kangaroo Point+	6868	1.3km^2	0.75km SW
CS11	80	Female	Married	50-70K	Retired	10 years	Kangaroo Point+	6868	1.3km^2	0.75km SW
CS12	80	Male	Married	>70K	Retired	> 6 years	Hamilton^	4366	1.7kms^2	5kms NE

*Population data from 2006 Census, gathered by the Australian Bureau of Statistics (2007)

† Income not available as it was not disclosed

Each of these areas are targeted for further urban renewal and being developed specifically for high density living. The different inner-urban areas have different topography and varying levels of infrastructure and available services

^Hamilton, Highgate Hill, West End, (well established residential areas)

+Newstead, Kangaroo Point and Kelvin Grove Urban Village (areas which have undergone massive transformation from semi-industrial to high residential density)

**One quarter of respondents were in full- or part-time work, representing a growing and new breed of wealthy workers who reject retirement, coined 'nevertirees' (Barclays Wealth, 2010). Cities have the defining feature of occupational cadres (Hamnett, 2005) who have highly remunerative employment from economic activities characteristic of major cities (Webber, 2007).

Table 2 Transport mode used in total kilometers over 7 day tracking period

Case Study No.	Transport mode in total kms over 7 days of tracking	Identified public transport barriers and facilitators
CS1	Car - 93.7kms Bus - 21.63kms Walk - 7.04kms	*…the public transport is so good. Next to our driveway is a bus stop and it comes every ten minutes during the day*
CS2	Car - 51.33kms Walk - 12.75kms	*I could catch the bus. But I have got to walk down there to catch the bus*
CS3	Car - 150.2kms Walk - .86kms	*Public transport doesn't always go where you want to go.*
CS4	Car - 115.72kms Walk – 7.4kms Ferry – 1.77kms	*that* [taking away the Ferry service] *would be devastating...See, we have got no bus service.*
CS5	Car – 53.25kms Bike – 197.65kms Walk – 18.53kms	*…this go card stuff means I will avoid public transport unless I can walk in and put my money down and get on the bus because I only occasionally use it.*
CS6	Car – 65.39kms	*I can get on a bus but I can't get off the bus. It depends how - if it's a good driver and he goes right to the kerb, I can get off easily, but usually they don't… Most places I would have to go to the city and go and get another bus out*
CS7	Car – 66.78kms Taxi – 6.98kms Bus – 5.72kms Foot – 26.98kms Ferry – 8.46kms	*…it was suitable to me because it was close to public transport, close to the airport,*
CS8	Car – 36.34kms	*They don't all go the right way that you want to go, the busses, but there's nothing that we can do about that.*
CS9	Car – 159.02kms	I don't want to get too far away from the loo [toilet]…*Of course you will worry about it; you don't want to wet yourself. So, yeah, basically things like busses don't appeal.*
CS10	Car – 309.51kms Taxi – 6.43kms Walk – 2.33kms	*the only bus that comes down, comes off the Story Bridge and stops on the other side of the Bradfield Highway and then carries on down there. There's nothing that actually comes round in the Kangaroo Point area itself.*
CS11	Car – 11.33kms Taxi – 7.75kms Walk - 8.62kms Ferry – 1.43kms	*It's hazardous just in the crossing* [to the ferry]
CS12	Car - 46.67kms Walk – 1.74kms	*The City Cat is good in that… it's available and cheap for seniors but when you come to the city, where do you finish up? There's three stops. There's the Riverside, QUT ----and this side, North Quay. Riverside is a million miles from the shops. QUT is half a million miles from the shops. And north bank, North Quay, you have got a cliff to climb.*

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