IMPORTANCE OF THE RESIDENTIAL FRONT YARD FOR SOCIAL SUSTAINABILITY: COMPARING SENSE OF COMMUNITY LEVELS IN SEMI-PRIVATE-PUBLIC OPEN SPACES

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ABSTRACT

Sustainable design is emerging as an increasingly important concern for the global urban population. Usually sustainable design is associated with economic, ecological and social aspects with the importance of the physical environment often ignored, particularly in the social sciences. However, the physical and social dimensions should be inseparable in the sustainable development agenda. Increasingly, urban designers are emphasizing the link between physical design and sense of community in public open spaces, but there is limited research on the importance of residential streets and associated semi-open public spaces, such as verges, and private spaces, like the front yard. Using the case study method, including observation and a survey in the suburb of Subiaco in Perth, Western Australia, this article explores the significance of residential streets and the space typology of front yards in comparison to other outdoor open space types. The analysis of the front yard's contribution to the street and community can inform designers, developers, planners, policy makers and residents to achieve a more attractive inner city living environment.

KEYWORDS

outdoor open space, front yard, community building, quality of life, built form typology, sustainability, physical accessibility, visual accessibility, interaction, communication

INTRODUCTION

With the majority of the global population now living in urban environments, neighbourhood designs, including streets and adjacent open public, semi-open and private spaces are increasingly defining the quality of life in the city. They are contributing to establishing a sense of community, encouraging social interactions and improving people's experiences in urban environments. It is not surprising that the UN Sustainable Development Goal 11 which aims

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at making urban spaces more inclusive, safe, resilient and sustainable (Sustainable Development Knowledge Platform 2017), specifically focusses on providing safe quality access to public open spaces. Whilst there is increasing understanding about the importance of parks, gardens and green reserves for the health and well-being of urban populations, there is limited research about the role of the front yard in residential streets for establishing a sense of community and contributing to social interactions and sustainability. This study addresses this issue using a case study from Western Australia.

The paper is structured as follows. First, the link between sustainability and sense of community is discussed, including definitions and related theories. Then the classification of urban outdoor spaces is examined in relation to their links to street life and community well-being. The Subiaco case study is presented which allows for a typology and inventory of outdoor spaces to be developed. Finally, the importance of the front yard in human-urban environment interactions is investigated. The study concludes that the front yard acts as a semi-private-public space where people enjoy important activities and its physical design should accommodate for the need of social interactions, identity creation and the development of a sense of community.

SUSTAINABIITY AND URBAN DESIGN

Sustainable design (McLennan 2004) refers to designing the built environment to comply with the principles of integrating social, economic and ecological sustainability. The Hannover Principles (McDonough and Braungart 1992) consider the spiritual and material relationships between different human settlement aspects, such as community and dwelling, and the liability of design decisions on human well-being. In 1993, the American Institute of Architects and the International Union of Architects embraced these principles by signing a declaration that included social sustainability as one of the main concerns which could improve the existing environment to sustainable design standards—a commitment endorsed later on as "sustainable by design" (IUA 2009).

Furthermore, the Interprofessional Council on Environmental Design (ICED) was established to reaffirm the allegiance by many professionals, including architects, landscape architects and engineers, to a common vision for achieving a sustainable future. As these professions contribute towards improving people's living standards in urban settings, they link design to sustainability in a very practical way with a high focus on delivering social improvements. Social sustainability is defined as a process that fosters socially interactive vibrant communities for present and future generations to enjoy a good quality of life (Anand and Sen 1996; McKenzie 2004; Sen 2013). It aims at supporting public needs through a combined effort of creating physical and social environments (Woodcraft et al. 2011) where design plays a major role. Quality of life is an important characteristic of social sustainability which includes many aspects of housing in urban settings (Anand and Sen 1996; Sen 2013) as well as community-driven social interactions by local residents (Holtzman 2014).

The link between sustainability and design is felt particularly strongly when it comes to life in the city. According to the UN (2014), 54% of the world population was urban in 2014 and this is estimated to inflate to 66% by 2050. This means the primary living space for human beings is the human-made built environment rather than the natural ecosystems (Lewin 2012) with sustainability becoming a significant framework in architecture, planning and urban design during the last decades (Williams and Dair 2007). Sustainable design is expected to contribute

to a sense of community, including its major element of sense of place, in urban environments and counteract against negative aspects of city life (Pretty et al. 2003).

Before exploring how design facilitates the sense of community using an Australian case study, some definitions and theoretical interpretation need to be clarified. This allows a focus on urban public spaces and the ability to explore their classification and importance for sustainability.

Sense of community: definitions and domains

Sense of community, which has attracted research attention since the 1950s, is a crucial element of the quality of life concept and experience. According to Gusfield (1975), community refers to a territorially determined group of people, such as a neighbourhood, town or city, as well as a relational experience which may or may not be linked to a locality, such as a virtual community or community of practice. The sense of community, however, is a relational experience as it is by definition a feeling (Davison and Rowden 2012) of belonging and of individuals being important to each other. It is also described as a shared faith that the needs of the people forming the community will be valued and "met through their commitment to being together" (McMillan and Chavis 1986, p.9). Although many of the aspects of sense of community apply equally to territorially defined and territorially unrestricted communities, this study focusses on geographically determined neighbourhoods and explores the role of physical design and its contribution to the feeling of belonging. This is particularly relevant as many claims have been made that urban developments that have taken place since the late 1990s are missing a sense of community.

There are no universally accepted ways to define the elements of a sense of community or instruments to measure its manifestation. Many disciplines, ranging from psychology and sociology to urban planning and sustainability policy are offering insights into understanding this complex phenomenon. McMillan and Chavis (1986, see also McMillan 2011), for example, defined sense of community with four elements, namely: (1) membership—a feeling of belonging, (2) influence—a reciprocal sense of mattering or making a difference, (3) reinforcement—integration and fulfilment of needs, and (4) shared emotional connection—mainly through similar experiences. They claimed that these elements provide the basis for planners and urban designers to preserve and strengthen communities. Although all elements relate to a particular defined neighbourhood, the various components of the physical design—streets, open public spaces, verges, houses and yards, make a different contribution to how people feel about a place. The Sense of Community Scale (Doolittle and MacDonald 1978; Tropman 1969) has been used to measure people's relationships, sentiments and reactions based on five interconnected factors: (1) informal interaction with neighbours, (2) safety, (3) pro-urbanism, (4) preference for frequent neighbour interaction, and (5) localism (desire to participate in neighbourhood affairs). Many other similar instruments have been devised and the analysis by Kim (2007, p.20), covering "233 questions exhibiting considerable similarity and overlap," groups them into four domains, namely: (1) community attachment, (2) social interaction, (3) community identity and (4) pedestrianism.

It is impossible to establish a consensus as to what is the best way to describe or measure a sense of community given the fact that ultimately this is a very subjective feeling. On the other hand, urban planners need to be aware of the importance put by people on the different elements and aspects of the city landscape when designing the physical environment that represents the foundations for a community life.

The neighbourhood is the smallest geographically identified component or spatial unit of an urban environment where people dwell. In fact, Mumford (1954) described neighbourhoods as a natural phenomenon rather than a subjective judgement as socially people tend to congregate. Hence, neighbourhoods are simply based on proximity of dwelling. They generally include some level of pedestrianism, although in automobile-dependent cities this could be very limited. In line with Kim (2007), four aspects play a major role in identifying the sense of community from a neighbourhood perspective:

- boundaries, including membership
- interactions, including socialising
- emotional connections, including safety
- walkability.

They are discussed in more detail below.

Boundaries determine spatially the neighbourhood and implicitly define its membership, that is the people who belong to this particular geographical area. Associated with membership are desires to identify and present yourself as belonging to the neighbourhood as well as contributing to its identity and endorsing its common symbol system. Examples of common symbol system manifestation are maintaining lawns, keeping front yards and sidewalks tidy (Kearns and Forrest 2000). Also, when people endeavour to make their front yard distinctive, they similarly gravitate towards displaying their membership of a group (Gregory 1986; McMillan and Chavis 1986).

When people take part in common events (rituals, festivals or doing something together), the sense of community increases. *Interactions*—planned or unplanned, formal or informal (Kim 2007), describe the contact and engagement between people in a neighbourhood. The more the interaction, the closer the relationships within a community (Festinger 1950, 1953; Sherif et al. 1955; Wilson and Miller 1961; Allan and Allan 1971). Furthermore, the more the successful, positive contact, the higher the social cohesion (Cook 1969), whilst ambiguous interactions keep residents isolated from the community (Hamblin 1958; Mann 1959). One of the answers sought in the case to follow is to appropriate residential outdoor spaces (Holtzman 2014) that promote better socialising at a neighbourhood scale.

The *emotional connection* to a neighbourhood creates the sense of belonging, safety, familiarity, comfort and willingness to make personal investment—be it time, effort, creativity, materials or other resources. According to Doolittle & MacDonald (1978), there is a reverse connection between the sense of safety and privacy. In other words, quality public open spaces play a very important role in creating the feeling of safety and stimulate people's emotional attachment to a neighbourhood. An untidy front yard can affect the sense of attachment (Kasarda and Janowitz 1974; Nash and Christie 2003). This might also bring negative impact on the sense of safety and on social interaction (Dempsey et al. 2011).

Walkability, a term similar to pedestrianism, reflects the extent to which a neighbourhood is designed for walking and fostering street-side activities that characterise a given physical environment (Kim 2007). Matan (2017, p.32) describes walkability as "encouraging physical activity by minimising the need and distances required to travel" and depicts the outcome of neighbourhoods designed for pedestrians as being pleasant, interesting, with access to nature and providing necessary services.

Open spaces: theoretical background

A lot of work has been done on the importance of open spaces in the urban environment. Jane Jacobs (1961) acknowledged the importance of the relationship between urban design and human behaviour. Advocates of user-focused urban design like Whyte (1980) and Gehl (1987) have highlighted the place of open space, physical design and their direct relationship to sense of community. There are implicit suppositions that improved urban form would lead to a better quality of life (Rudlin and Falk 1999; Raman 2010).

Mark Francis (2003) identified two types of urban open space, namely traditional and innovative. Traditional open spaces are public parks, neighbourhood public parks, playgrounds, pedestrian malls and plazas. Innovative open spaces are community based and often encroached by housing, such as neighbourhood open spaces, schoolyards, streets (most freely accessible spaces in cities), transit malls, farmers' markets using existing parks, streets or parking spaces, town trails (integrating streets and opens spaces), vacant/undeveloped open spaces, waterfronts and found spaces, such as street corners, sidewalks, passages/paths connecting buildings, bus stands, steps at public building entrances and so on.

The majority of the urban open spaces are either public or with easy public access whilst residential open spaces, such as yards, driveways, patios, verandas and balconies, are predominantly private. Increasingly, though, the distinction between public and private for creating a sense of community is becoming blurred with ease of access and outdoor exposure being the main characteristics that identify open space. In addition to the traditional public open spaces, some privately owned areas are in reality becoming semi-public places because of the ease of access and activities occurring there. In many neighbourhoods people are opening their premises, particularly the yards, for holding community events, festivals, art shows, celebrations, establishing community gardens or native flora conservation areas. For example, the annual Kitchener's Festival of Neighbourhoods in Ontario, Canada (Creative City Network of Canada 2005) contributes to the building of community identity and pride facilitating social cohesion. Furthermore, semi-open spaces, such as courtyards provide transition between indoor and outdoor in different contexts (Guimaraes 2012) and are increasingly becoming central socialising spaces in a neighbourhood (Scott 2006). According to Bay (2010), the interactions in the semi-open space contribute strongly to strengthening social sustainability.

Within a neighbourhood, the streets identify its boundaries and fabrics while the urban and residential open spaces, including streets, allow for social interactions to occur. Together they contribute to the development of emotional connections and physical experiences through their walkability.

Streets are now being considered as an innovative open space but historically their use was basically for regular public access (Rudofsky 1969; Lofland 1973) and everyday needs, such as shopping and meeting with others. Although some of these needs have moved to the residential, virtual or parochial public spaces in contemporary societies (Brill 1989a, 1989b; Chidister 1989; Rybczynski 1993; Banerjee 2001), there is recent evidence that leisure activities are returning to the public realm. Streets, sidewalks and bordering paths are common open spaces (Mehta 2009) and areas significant as informal public realm (Carmona et al. 2010) accommodating various public-private interaction.

Traditional urban open spaces are present in most neighbourhoods, and they contribute significantly to the environmental, economic and social quality of life there (Monday 2006; Pacione 2012a). In general, natural open spaces are environmentally, socially and psychologically

beneficial for the well-being of residents by purifying air and water, filtering noise and air pollution and mitigating microclimate. The use of urban green space helps relieve stress (Ulrich 1981), increases the sense of peacefulness, thoughtfulness and refreshes citizens (Kaplan 1985). Natural spaces improve mental and physical health (Schroeder 1991; Godbey et al. 1992; Conway 2000). Green common spaces, such as grassed lawns, can promote social interaction, enhance relaxation and reduce impatience among neighbours (Kuo et al.1998; Bambrick et al. 2011). Moreover, these natural commons might be used for privacy, intimacy, visual impression and historic consistency (Chiesura and de Groot 2003). Some empirical studies also claim that encircling greener spaces mitigates sense of fear, aggressiveness, violence and antisocial behaviours (Kuo and Sullivan 2001).

Providing recreation for people is a major important function of open spaces (Chiesura 2004). Socialising with family and friends within the community is considered a regular source for attachment to place (Mesch and Manor 1998; Warde et al. 2005) which contributes to the feeling of belonging. Accessibility to outdoor green spaces enhances residents' sense of community (Nasar and Julian 1995).

Residential open spaces, including front yards, backyards, side yards, swimming pool areas and even driveways, also allow for social interactions and contribute to building a sense of community (Bay and Lehmann 2017). They are often a place of encounter, conversation, partying and other ways of socialising within the neighbourhood but have received very little research attention. The front yard in particular provides the transition and connection to the street and the rest of the neighbourhood. Although technically part of the residential open space, in reality because of its relatively high ease of access, the front yard sits on the cusp between the private and public domain. Nevertheless, very little is known as to what its role and contribution to the sense of community are. Therefore, the case study to follow explicitly examines the importance of the front yard.

Designing sustainable neighbourhoods: intentions and challenges

When planning or redeveloping neighbourhoods, making them more sustainable and creating a sense of community is now a widely accepted aim. This is seen at the core of the new urbanism (Kim and Kaplan 2004). Though community building is considered in planning policies, it often fails to meet this aim. For instance, the suburban models of Vauban and solarCity Linz emerged as new sustainable housing developments embodying complex design goals, including creating community in space (Schroepfer and Hee 2008). Although incorporating many sustainability features, these neighbourhood developments are criticised as representing "showcases" rather than being truly interactive and having "the glue to the tenable sustainable communities" (Schroepfer and Hee 2008, p.75).

It is evident that people have benefitted in various ways from open spaces that continue to be important for the social formation of neighbourhood housing development (Binti Omar et al. 2015). False hope of community building is echoed in developments where public spaces, such as streets, are privatised (Sorkin 2001). Public space has become a consumer product to be purchased from the property market, where streets are owned by a property management company and the former public town centre becomes private property (Kohn 2004). Such attempts put even the right of speech in public spaces into question and are criticised as producing imaginary rather than real communities. Urban forms have been decried for not promoting social interaction on the residential streets due to little exposure at house fronts (Schroepfer and Hee 2008). This is limiting the residents' freedom of choice to alter their precinct and thus

affect the sense of ownership, which is an important element of sense of community (McMillan and Chavis 1986; McMillan 2011).

Several programs and tools have been developed to measure the evidence for sustainable development, including Building Environmental Assessment (BEA), Environmental Impact Assessment (EIA), Environmental Footprinting (EF) and Ecologically Sustainable Design (ESD). They all have limitations, particularly in relation to sense of community—BEA is too elaborate and building-focussed; EIA and EF are mainly ecology oriented and do not address social and economic issues (Schroepfer and Hee 2008); ESD is an engineering-oriented system which is limited and needs further development (Bay 2010). Others like Life Cycle Cost Analysis (LCCA), Life Cycle Assessment (LCA) and Leadership in Energy and Environmental Design (LEED) (Holzer and Lockrem 2011; Lewin 2013) are also limited in assessing social and economic sustainability (Lewin 2012; Valentin and Bogus 2015).

New simulation models have also emerged and are being tested, such as Integrated Land Use Transportation Environment (ILUTE) (Salvini and Miller 2005; Beykaei and Miller 2017), Integrated Urban Metabolism Analysis Tool (IUMAT) (Mostafavi et al. 2014) and CitySim (Miller et al. 2018). These are important first steps to include social and economic parameters in an integrated sustainability analysis of the built environment, however more work is required.

In fact, social sustainability, which is the framework for endorsing the importance of sense of community, is the least developed aspect of sustainability. According to Allen and Shonnard (2011), social sustainability addresses the physical environment to meet human needs. The first principle of social sustainability is about improving the quality of human life (Hill and Bowen 1997). The Green Urbanism principles also advocate for social sustainability and include the importance of liveability, healthy community and diversity (Lehmann 2011). Public perception and opinion are similarly extremely important in formulating social sustainability principles (Valentin and Bogus 2015) and in impacting people's attitudes and lived realities in a neighbourhood.

Typology and sense of community: emergence, importance and criticism

With the lack of any distinctive tools for measuring social sustainability in neighbourhood design, one possible way to analyse the sense of community is through creating a typology of the places which people perceive as contributing. Typologies—classifications of places and buildings in reference to various criteria, such as location (e.g. rural or urban), age (e.g. old or new) or use (e.g. agricultural, commercial, residential, medical, educational, government, industrial, non-building etc.) are commonly used in urban planning and architecture. For example, a building typology can refer to the learning which has occurred around the building form (e.g. physical dimensions and orientation), specific formal expression (bungalow, row house, homestead, residential premises etc.) or differences in materials used, longevity, building practice and technology (Kelbaugh 1996; Firley and Stahl 2009). Normally, building types are identified by their basic form, surroundings or scale but not by their architectural style or use (Caniggia and Maffei 2001). The assembly of indoor and outdoor space types helps form a physical language of architecture by organising public-private zoning to achieve the desired architectural experience (Scott 2006).

In general, architects and urban planners develop a common typology for their work guided by standard considerations, such as dimensions, bulks, sites or circulations. This enables them to point out particular design aspects related to orientation, structure, size or materials (Scheer 2010). An Italian school of thought founded by Saverio Muratori identified that

typology is able to maintain continuity in the cityscape (Caniggia and Maffei 2001). They acknowledged the role of types in modern architecture about how to incorporate upcoming developments without mimicking the historic expressions and styles emerged in the course of time (Moudon 1989). A Form-Based Code (FBC) is currently used to preserve historical type developments and urban artefacts (Parolek et al. 2008). New urbanists recognise typology as a vital means to further define user-friendly places (Conzen 1960; Caniggia and Maffei 2001).

Moudon (1989) identified blocks, lots and street patterns as essential for typological consistency and this is particularly relevant to neighbourhood design. Normally, neighbourhood streets and lots are readymade infrastructures to accommodate common types and are like the 'building blocks' for the city. In the pre-design phase, the common urban tissue patterns—a combination of types, streets, lots or public open spaces, is identified to inter-relate and form the neighbourhood. This urban fabric is the one which provides the physical environment and surroundings for the sense of community to emerge and make neighbourhood areas socially sustainable.

Front yards and sense of community

Front yards are an often-neglected aspect of residential neighbourhoods. They are generally privately-owned but have the high potential to act as a public space. Though the front yard is physically private, if visible from the street, it is considered as public (Carmona 2010a; Holtzman 2014). That means, the front yard has high potential to accommodate mixed activities (Capon and Blakely 2007). Moreover, residents' perception (Carmona 2010a) about the front yard's usability can influence the activity pattern criteria. Such socialising activities involve the users with the space and are able to contribute for enhanced sense of community. Thus, the front yard promotes community building and social sustainability.

The front yard is also a transition to the residential street which is an innovative outdoor space and a new frontier in sustainability research. Most mixed-use studies in a residential neighbourhood context examine the street for its commercial functions, such as retail, work, cultural and light industrial uses (Mehta 2009). Not much attention has been given to residential streets. By linking the front yard to the street, this research is able to fill some of this gap.

Social science studies commonly ignore the physical environment and only a few empirical investigations address the stationary and social behaviour of people in urban open public spaces (Mehta 2009). Most of research examining social interactions has been on plazas (Joardar and Neill 1978; Miles et al. 1978; Share 1978; Whyte 1980; Loukaitou-Sederis and Banerjee 1993; Marcus and Francis 1997) with only a few studies focused on residential streets and spaces (Appleyard 1980; Eubank-Ahrens 1987; Skjœveland 2001; Sullivan et al. 2004). Australia's National Strategy on Ecologically Sustainable Development originally excluded the social dimensions, research however shows that the physical and social aspects are an integral part of any sustainability agenda (McKenzie 2004).

According to Mehta (2009), research generally separates the study of the physical features of the environment from the land uses and does not care about the operations and management of the street spaces (Joardar and Neill 1978; Hass-Klau et al. 1999). Urban designers and planners however realise that "it remains difficult to isolate physical features from social and economic activities that bring value to our experiences" (Jacobs 1993, p. 270). According to Chua (1995), community building tends to develop where familiarisation through seeing, meeting and greeting takes place in common spaces, such as corridors or walkways (Capon and Blakely 2007). The residents' routine lifestyle is an opportunity for planners to facilitate

social familiarity, with the physical route becoming also the route to each other (Chua 1995). Social interactions in the front yard break the barriers not only between the private and the public space but also between the house and the street contributing towards local engagement, familiarity and creating a sense of belonging.

Using one particular case study—a neighbourhood in the Subiaco suburb of Perth, Western Australia, what the remainder of this paper does is create and explore a typology of the places for social interactions. Given that the boundaries are well-defined as they spatially position the studied neighbourhood, social interactions become a crucial aspect for creating a sense of community allowing for emotional connections to develop and encouraging walkability. As a preferred place for social interaction, the front yard is then analysed.

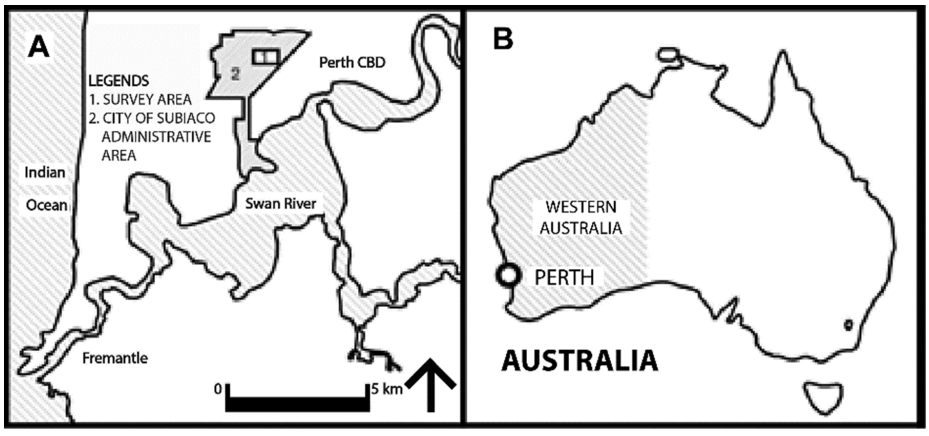
CASE STUDY AND METHODOLOGY

The case study for this analysis is a neighbourhood in Subiaco—a suburb situated at the immediate west of the central business district of Western Australia's capital city of Perth. Geographically, it is five kilometres east of the Indian Ocean, 12 km north-east of the port of Fremantle, and is situated north of the Swan River (see Figure 1). According to the Australian Bureau of Statistics, the 2016 resident population of Subiaco is 16,234 (City of Subiaco 2016), with a density of 31 persons per hectare over a total land area of 562 hectares (6 square kilometres). The number of people above 15 years of age who have an income earning capacity is 13,762. It is a relatively wealthy suburb with a 2016 median annual personal income of A$59,592 compared to A$37,648 for Western Australia and AUS$34,424 for Australia (ABS 2016).

Established in the 1880s as part of the Swan Colony (Howe and Strauss 2009), Subiaco was a working-class suburb in the early 20th century (Spillman 1985 in Davison and Rowden 2012). However, in the 1990s it emerged as a culturally vibrant centre attracting a student and academic population because of the proximity to the University of Western Australia. Close to half (i.e. 49.8%) of its residents aged above 15 have a university education compared to only 20.5% for Western Australia and 22% for Australia (ABS 2016).

The aim of the study is to analyse the contribution of the various neighbourhood physical building blocks to creating a sense of community. A mixed method approach (Lynch 1960; Groat and Wang 2013) is applied which combines:

FIGURE 1. Map of Australia (A) and Perth (B).



1. Detailed observation (Whyte 1980; Gehl 1986, Mehta 2009; Gehl and Svarre 2013), particularly of streets and front yards;
2. Survey (Drever 1995; Harrel and Bradley 2009);
3. Case neighbourhood selection (Yin 2013);
4. Interviews (Drever 1995; Harrel and Bradley 2009).

Before the approach is presented in further detail (see Figure 2), Table 1 summarises the theoretical frameworks that link social interactions with sense of community and describes the methods used for theory testing. They all point to the importance of open and outdoor places, with Bay (2010) also emphasising the role of semi-open space. This justifies the need to first explore a typology of outdoor places for Subiaco.

Detailed observation

People prefer various outdoor spaces for meeting others within or outside their neighbourhood, particularly in the Australian cites that enjoy a mild Mediterranean climate. Outdoor spaces in a suburb fall under private or public ownership and are represented by a long list of categories: local park, shopping mall, coffee shop, stadium, swimming pool, community club, street, footpath, walkway, parking area, front yard, backyard, veranda, balcony, terrace, stoop, stair, steps etc. In order to develop a typology of places which people visit for outing, meeting and gathering for socialising in Subiaco, detailed observation was used for the suburb. It provided the categories to be included in the survey of Subiaco residents. Detailed observation was later used also for analysing the selected neighbourhood within Subiaco.

Survey

Informed by the detailed observation of Subiaco's outdoor spaces, a quantitative survey was conducted of 140 residents. With the lack of previous research in this area, the original intention

TABLE 1. Key Theories.

Theorist	Theory	Method used
William Hollingsworth Whyte (1980)	Improved physical space can promote better social cohesion to achieve economic gain.	Observation Interview Filming
Jan Gehl (1986)	Prolonged outdoor stay can promote enhanced social interaction. Various social dimensions affect human perceptions during socialisation.	Observation Survey
Joo Hwa Bay (2010)	Semi-open space promotes social interactions.	Observation Survey
Matthew Carmona (2011)	Public space typology is an important planning measure for better management of urban outdoor spaces.	Literature review
David W. McMillan and David W. Chavis (1986); David W. McMillan (2011)	Sense of community is a feeling of belonging that individuals feel for each other and for the group or community; this helps to live in coherence by fulfilling each other's need.	Literature review

for the survey was to be exploratory (Shields and Rangarajan 2013) and search for insights. Notwithstanding this, the high response rate and willingness of the residents to engage with the topic of the survey allowed a good statistical representation of Subiaco—a confidence interval width of 8% at 95% confidence level.

The survey questions asked the respondents to assign importance to the various outdoor spaces for socialising and creating a sense of community. Out of all options, the analysis of the survey results showed the front yard being identified as the most important and commonly used place. It was then appropriate to focus the attention to the front yard which also appears to be an under-researched field in relation to social sustainability. To do so, the lens of analysis needed to shift to a neighbourhood area.

Case neighbourhood area

The selected neighbourhood for the case study is a traditional inner-city part of Subiaco. It is representative of the original area which has stood up and adapted to the challenges of time. On Figure 3, it is marked as "survey area." Figure 3 also shows the main outdoor spaces and socialising places in Subiaco which include several parks and playgrounds, community centres, coffee shops and sports and recreation venues. The residents of the case neighbourhood have access to all of these places. Convenience was the main reason for selecting this particular neighbourhood. It also seemed relatively well-defined and unobstructed or divided by public open spaces making it distinctively local.

FIGURE 2. Research approach.

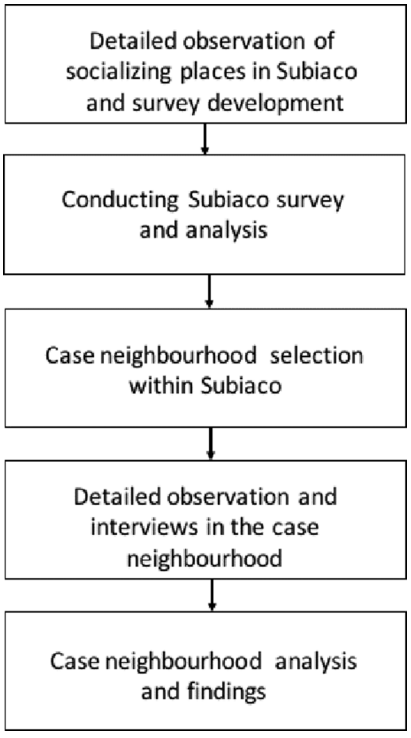
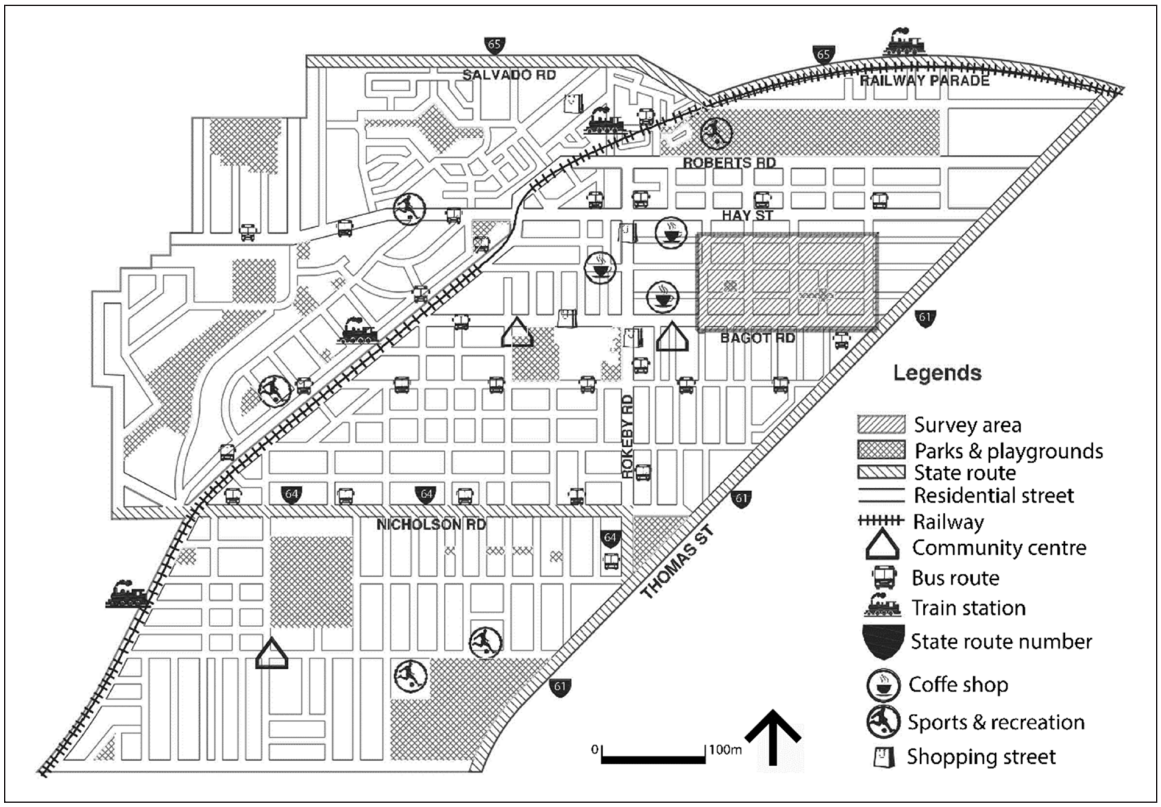


FIGURE 3. Outdoor spaces for local residents and visitors in Subiaco.



Interviews

Using a semi-structured questionnaire, 61 interviews were conducted with residents in the selected neighbourhood. The questionnaire canvassed demographic information (such as age and profession), opinions (on a Likert scale) and contained open-ended questions (comments, suggestions, recommendations etc.) for local residents. This allowed for the front yard—the most significant residential outdoor space, to be analysed from various viewpoints.

To find a new typology that enhances socialising in the front yard, three concepts are categorised to build a set of matrix. These are: (a) Accessibility pattern (Kohn 2004) based on physical condition (e.g. level of physical accessibility and visual connectivity); (b) Activity pattern based on interaction and communication (Kohn 2004); and (c) Ownership pattern (Kohn 2004; Carmona 2010a).

Case neighbourhood analysis and findings

Quantitative, graphic and qualitative analysis was carried out in order to describe the findings from the neighbourhood analysis. The results are presented below based on the four sense of community neighbourhood aspects identified above.

SUBIACO CASE STUDY: FINDINGS AND DISCUSSION

William W. Whyte (1980) and Jan Gehl (1987, see also Gehl and Svarre, 2013) observed the behaviour of ordinary people on the streets mainly based on chance encounter. It is however

clear that the chance of meeting a familiar face in a public place is rare. On the other hand, residential public places like streets, sidewalks and passages are common meeting places for residents to build up long-term familiarity. People are meeting each other while participating in daily life activities, such as bringing children to school, going to and coming back from work, regular trips to the grocery shop/mall, walking dogs, taking children to the park/playground, cleaning the front yard/sidewalk, rolling the rubbish and recycling bins out to the verge and so on. Regular daily life activities are predictable and thus have higher organising potentiality to be considered by urban designers, planners and policy makers (Chua 1995). It is possible to regulate these known routes based on residents' behaviour patterns to reflect the planning codes. Predictable residential public streets and semi-public sidewalks (Chua 1995) are an integral part of residential areas and are intensely interactive with semi-private front yards. Residential front parts are a fruitful ground to promote successful interaction. Streets, sidewalks, alleys and parks are able to acquire a sense of "collective-symbolic ownership" (Hester 1984; Skjœveland 2001).

Subiaco pattern of interaction in outdoor spaces

Subiaco residents were asked questions related to their favourable outdoor spaces where they prefer to meet people—neighbours, friends, relatives and other familiar persons. The detailed observation was organised to explore the available open outdoor spaces in the Subiaco area. Residents use outdoor open spaces mainly for regular and recreational activities. The type of activities they do include outings for coffee, breakfast, lunch, afternoon tea, baked goods, dinner, fancy trips, live music and late-night dancing, street front alfresco eating (with private courtyards), garden bars, cinemas, art and craft, shopping, buying accessories, gifts, homewares, visiting bookshops, second-hand shops, antique shops, boutiques, music shops and many more.

People use the same outdoor space for different purposes. Though Rokeby Road is the favourite shopping street for residents and visitors, people love to have an evening stroll while enjoying the crowd, or just choosing a path on the way to the supermarket. Various outdoor destinations on the streets of Subiaco are cafés (with outdoor sitting), kebab and pizza places (also with outdoor sitting), bars (outdoor sitting on footpaths often shaded and with safety railings), bookshops (outdoor books/cards display as street exhibition), ice-cream shops (front stall open for take-away without any sitting arrangement), bakery (linear sitting with benches along the front stall), fish and chips shop (sitting on footpath for at least 25 customers) and so on. Other prime outdoor destinations are the Subi Farmers' Market on Bagot Road, Earthwise Community Club (with outdoor sitting) on Bagot Road, Subiaco Arts Centre on Hamersley Road, dog walking areas, parks and open green areas.

A list of the open spaces available in the Subiaco case neighbourhood is presented in Table 2. It shows that irrespective of the ownership, many have public character because of their visibility and exposure.

In total, an inventory of 13 outdoor open spaces classified as mostly of interest was identified following the detailed observation (see Figure 4). The survey based on this inventory included four questions (see Table 3) and took on average 5 minutes to complete. It was easy to address people on the streets (even in rush hours), sidewalks and parks. A total of 140 residents willingly responded. In the first question respondents were asked about their favourite place for socialising, where they meet people in general. The second question was about planned (for meeting or get-together) locations. Question 3 explored the preferred place for activities or meetings for which residents do not need prior preparation based on Gehl's (1987) concept of chance encounters. Finally, the fourth question explored the relationship between outdoor

TABLE 2. Urban Open Spaces in Subiaco Case Neighbourhood.

Open space type	Description	Character
Back lane	Often provided with carport/s, suitable for informal encounters between neighbours during maintenance of car, motorcycle or bicycle	semi-public/public
Balcony	Projected outdoor platform usually above the ground floor	private
Children playground	Outdoor area included in the neighbourhood park designed for children to play, allows natural surveillance	public
Front garden	A space at the immediate front of the house, articulated mainly for aesthetic or ornamental purposes, or non-commercial food production, or flora and fauna	semi-public
Front yard	Space between the front facade of the house and a sidewalk or street	semi-private/ semi-public
Hedge	A boundary-forming bushes or shrubs grown along streets or paths, can be interrupted or uninterrupted	public
Neighbourhood green space	Small green space (grass-covered, trees and shrubs) used by local residents	semi-public/public
Neighbourhood park	Piece of land maintained by local council with trees, shrubs and lawns, incorporated with seating and children play equipment	public
Pocket park/green	Very small park area around and between buildings, planted with ornamental trees and shrubs, full public access, in close proximity to houses, streets and sidewalks	public
Tree alley	A narrow passage or lane along streets, sidewalks or edges of front yards planted with trees or bushes often in rows or solitary	private/ semi-public/public
Verge	Ground by the side of the street, often with or without trees, mainly grassy or shrubby	public

space and frequency of socialisation within Subiaco. The respondents were asked to rank the 13 types of outdoor spaces from the most to the least preferred (allocating a rank of 1, 2, 3, … ,13). Their responses were accumulated in accordance with the stated importance to obtain the averages for all four questions. Table 3 and Figure 4 present the survey results.

The outdoor space with the highest potential for socialising identified in the Subiaco survey is the front yard (with 29% overall importance for socialising). All outdoor spaces were categorised in three levels, namely with high potential—front yard, footpath/walkway/verge, street and park/public space, medium potential—coffee shop, parking area and shopping street/ mall, and low potential—back lane and balcony. Swimming pools and backyards are not considered as they provide limited links to public open spaces. The stadium was also excluded as it does not provide free public access. Following the front yard (at 29%), sidewalks (15%) and

TABLE 3. Comparison between Outdoor Spaces in Subiaco.

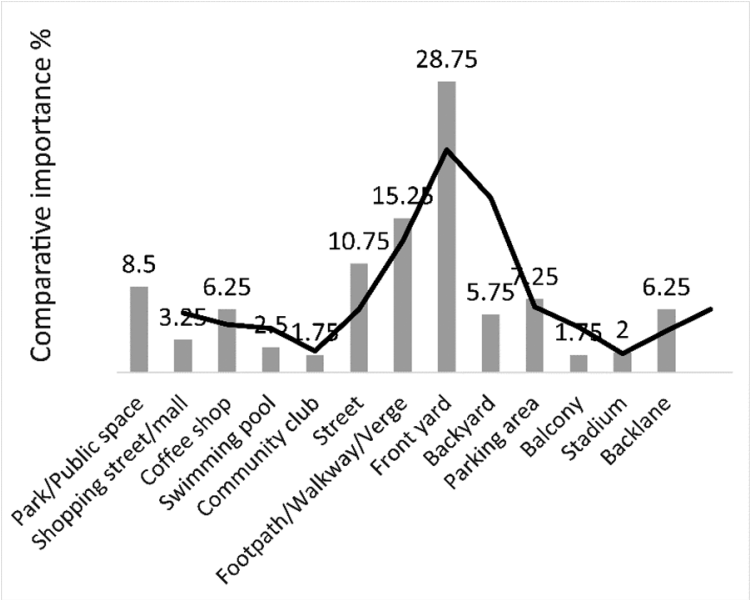
	Question 1. In a comfortable weather condition, in which outdoor spaces do you most get to know other people within your neighborhood?	Question 2. In a comfortable weather condition, in which neighbourhood outdoor spaces do you meet people most in a pre-planned manner?	Question 3. In a comfortable weather condition, in which neighbourhood outdoor spaces do you meet people most in an unplanned manner?	Question 4. Which outdoor space helps you most involve in socialising and thus enhancing the sense of community within your neighborhood?	Average importance of the space for social interaction
	%	%	%	%	%
1. Front yard	**40**	**19**	**29**	**27**	**28.75**
2. Footpath/ Walkway/ Verge	19	7	20	15	**15.25**
3. Street	12	5	14	12	**10.75**
4. Park/Public space	11	6	9	8	8.5
5. Parking area	5	4	11	9	7.25
6. Coffee shop	2	19	3	1	6.25
7. Back lane	4	4	5	12	6.25
8. Backyard	2	13	3	5	5.75
9. Shopping street/mall	2	7	2	2	3.25
10. Swimming pool	2	5	1	2	2.5
11. Stadium	0	6	0	2	2
12. Balcony	1	1	1	4	1.75
13. Community club	0	4	2	1	1.75
TOTAL	100	100	100	100	100

streets (11%) were identified as the most significant outdoor open spaces of interest to Subiaco residents with high potential to contribute for community building.

Neighbourhood study of the front yard

Given the high importance assigned to the front yard, a detailed observation survey was conducted in the selected neighbourhood area to explore the accessibility (physical and visual) and activity (interaction and communication) patterns in the front yards of its streets. The

FIGURE 4. Social interaction and community connection.



boundaries defining the selected surveyed area include seven streets of Subiaco, namely Axon Street, Townshend Road, Olive Street, Bedford Avenue, Barker Road, Park Street and Bagot Road (see Figure 5). In the selected surveyed area, each street has house front yards in a face-to-face and side-by-side manner. The survey area is outside any commercial or industrial enterprises.

FIGURE 5. Surveyed area in Subiaco.

Each house has a front yard and is surrounded by other houses on the same street and across the street. This ensures probabilities for social interaction between neighbours within their intimate vicinity.

In the neighbourhood area, 61 interviews were conducted with residents on a door-to-door basis and in residential streets during the spring and summer seasons of 2016 in different daytimes of weekdays and weekends. The questionnaire took 15 minutes on average to complete and not more than 25 minutes. Most of the respondents found it easy to visualise the answers to the questions while standing in their front yard, front deck or stoop. A few residents were comfortable to respond in the nearby sidewalks, parks and street corners. Their responses are summarised in Table 4.

TABLE 4. Survey Results on Accessibility, Activity and Ownership.

Question	Agree	Description	Characteristic
1. Overall the physical condition of my front yard helps me socialising.	67%	Physical	Accessibility
2. My front yard as an extended living area for socialising with neighbours or guests.	60%	Physical	
3. My front yard is visible enough from the street to communicate with neighbours in the adjacent walkways or streets which helps me engage with neighbours for socialising.	67%	Visual	
4. I am consciousness about the visibility of my front yard from the street.	80%	Visual	
5. My front yard has its own distinct 'personal expression' which contributes to the physical or visual characteristics of the street.	64%	Visual	
6. My front yard works as a part of the street helping me maintain a good relationship between the public and private domains.	64%	Interaction communication	Activity
7. During weekdays, I like to spend at least 1 hour in my front yard.	48%	Interaction	
8. During weekends, I like to spend 2 to 5 hours in my front yard.	52%	Interaction	
9. I feel a strong sense of ownership and sense of belonging in the front yard of my house which help me engage with my neighbourhood community.	77%	Sense of belonging	Ownership
10. I feel safe using my front yard while participating in daytime activities.	97%	Sense of safety	
11. I feel safe using my front yard while participating in activities after dark.	74%	Sense of safety	

The perception study of the Subiaco neighbourhood residents referred to various characteristics of their front yards and how they impact on socialising activities and ***interactions***. As shown in Table 4, the majority of respondents—67%, think that the physical condition of their front yard helps them socialise. About 60% are of the opinion that the front yard works as an extension of the living area for socialising with their neighbours. The respondents were overwhelmingly conscious about the visual accessibility of their front yards with 80% being aware of this. Many—67%, expressed an opinion that the front yards are visible enough from the streets to help them communicate and socialise with neighbours in the adjacent walkways, sidewalks or streets and 64% saw the front yard as a distinct personal expression. These visual and physical characteristics of the front yards help create a sense of community. Most respondents—64%, are actively maintaining an interactive public-private relationship during communication with their neighbours. About 48% of the participants are spending at least 1 hour a day during weekdays and 52%—2 to 5 hours a day during weekends in the front yard. This means that the front yard is a frequently used immediate semi-public space that maintains a balance between public-private interactions. A significant share of residents—77%, feel a strong sense of ownership and belonging in their front yard; almost all—97%, feel safe during daytime and two quarters (74%) after dark.

The Subiaco neighbourhood analysis supports most theoretical concepts related to sense of community. To make a city liveable, urban public place is essential and quality urban spaces foster sense of safety, sense of belonging, increased consciousness, diverse activity, self-esteem and interest in the living environment (Crowhurst-Lennard and Lennard 1995). Collective representations like symbols, myths, customs, faiths, conventions, ceremonies, vacations (McMillan and Chavis 1986), stories, music and other symbolic expressions (McMillan 2011) foster a sense of community and trigger stronger integration. A heterogeneous modern community, such as the one of Subiaco, needs to have a common symbol system to function properly (McMillan and Chavis 1986). For instance, collectively practicing rules related to usage of common paths, dress codes, street etiquette or noise restrictions is common in neighbourhood groups of society. On a neighbourhood scale, the front yard also becomes such a symbol.

On Subiaco residential streets, the boundary design (high wall, low wall), fencing style (material, design and transparency), front yard orientation, veranda design are clear symbols attributed to various activities and behaviours of the local residents (see Figure 6). The majority (64%) of Subiaco residents (see Table 4) think that the personal expression of their front yard is able to contribute to the physical and visual characteristics of the streetscape and thus to the sense of community. Architecturally, front yards—a small-scale built form type with distinct characteristics, help shape the overall streetscape (city scale built form typology) and thus assist maintain the entire street typology through a process of continuous evolution (Moudon 1989; Caniggia and Maffei 2001; Scheer 2010).

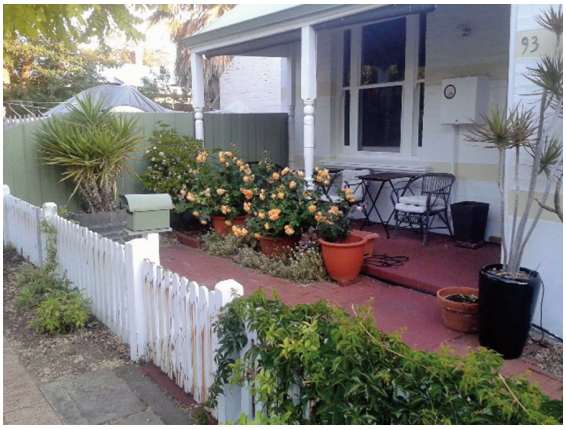
Shared emotional connections are concerned with history, common place, time together and similar experience. There are important characteristics of shared emotional connections, such as: (1) the contact hypothesis—enhanced social interaction brings people closer (Festinger 1950; Sherif et al. 1955; Wilson and Miller 1961; Allan and Allan 1971); (2) quality of interaction—enhanced positive interaction and relationships make the bonding stronger (Cook 1969); (3) closure to events—anonymous interactions leave community issues unattended and thus hinder group cohesion; (4) investment increases the importance of members' position and status in the group—for instance, homeowners who invest time and energy will experience more intense emotional involvement; and intimacy is a kind of investment (Aronson and Mills

FIGURE 6. Snapshots of Subiaco case neighbourhood.
(A) Barker Road view shows an easily accessible front yard, low height boundary wall, veranda and parking; (B) Bedford Avenue view shows front yard with play equipment, veranda with sitting arrangements, vegetation, gardening and a fence-less boundary wall facilitating easy access to the streets; (C) Olive Street view shows variation in style, orientation and material but an unchanged scale and proportion—a clear representation of common symbol system; (D) Park Street view shows a tiny front yard full of activities like sitting, flowers and plant pots.

(A)

(B)

(C)



(D)

1959; Peterson and Martens 1972); and (5) spiritual bond is common in each community. All of these characteristics of emotional connection were present in the analysed Subiaco neighbourhood area.

The entire neighbourhood area encourages ***walkability***, including its links to the rest of the Subiaco suburb and its open public places, facilities and transportation opportunities. Starting from the front yard, residents are encouraged to walk to their neighbours and meet others in the streets, walkways and sidewalks. An important aspect of walkability are the street features which make the pedestrian slow down or stop (Matan 2017). With their visibility, individuality, attractive presentation and being a place for socialising, the front yards strongly encourage walkability.

CONCLUSION

Social sustainability remains the most challenging aspect of any integrated holistic research of the urban built environment. This study approached this task through the lens of outdoor spaces and their importance in community building using one particular case. Methodologically, this study shows coherent positive outcomes in two tiers of analysis. First, the selected case study identified the significance of outdoor spaces of interest in the suburb of Subiaco. Second, the perception study of the front yard in the neighbourhood area validated the importance of sense of community.

With social elements being more suitable than environmental features to measure a sense of community (Moustafa 2009), this study endorses the quality of the front yard as an interactive outdoor space type with high social potential to promote community building, resilience and sustainability. Among all residential outdoor spaces, the front yard has significant potential to become a key space for socialising, bringing people together, and creating a sense of belonging. Such resilient communities are able to add value to the quality of life of their residents (Pacione 2012b) and thus ensure a sustainable future.

Front yard: A neglected issue in academic research and practice

Researchers and planners acknowledged the importance of fostering a sense of community (Putnam 2001; Florida 2012; Grodach and Loukaitou-Sideris 2007; Soja 2010). In contrast, anti-suburban critique (Gilbert 1988) condemned Australian suburbs for being isolated from real life, lack of community and being a one-dimensional consumer culture.

Most of the available studies looking at the relationship between the built form and sense of community focus on public spaces and plazas in commercial areas. There is very limited research on the relationships in residential streets. This study helped bridge this gap by examining the relationship between physical settings and people's sense of community in residential areas. Perceptions of built environment on the sense of community need further development (Foster et al. 2010). The study added some insights about the relationships between physical form and sense of community within the context of a specific residential environment. This knowledge can help guide designers, developers, consumers, residents and policy makers in creating more attractive city living environments.

Front yard: Blurring the boundaries between public and private spaces

Advocates of public places (Gehl 1987, 2011, 2013; Madanipour 2003; Carmona 2010a, 2010b) have realised that the front yard is a highly potential private space which could perform publicly. Even being physically private, the front yard performs as a public place if watched from the street (Carmona 2010b) and also when used for social interactions. This allows the front yard to be identified as a semi-public open space. In most cases it is privately owned, but publicly visible, offering easy access. This semi-public nature of the front yard facilitates the development of a sense of community. In architecture, buffer space is required to ensure gradual and smooth transformation between the private and the public, termed as semi-public. The front yard is thus defined as such semi-private-public space that is capable to equally satisfy both private and public uses. Thus, this magnificent space has tremendous potential to enhance the quality of sense of community and promote community building in the neighbourhood.

This study is in line with research on semi-public open spaces in the residential context that encourages enhanced socialising between neighbours (Kim and Kaplan 2004; Talen 1999). It

opens up further exploration of accessibility (Swapan et al. 2018a), visual permeability (Swapan et al 2018a) and distance-based social interaction (Swapan et al. 2018b).

The importance of the front yard is neglected in local laws except for some setback rules. Further research is required to understand the front yard types to maintain the homogeneity reflected in the local planning policy objectives (City of Subiaco, Planning Policy No. 4.8). There seems to be a desire for creating residential privacy as reflected in the local building regulations (see clause 7.1 Visual Privacy, in R-Codes, Residential Design Codes of Western Australia, p.59) which could be fulfilled in back yards and outdoor private domains. Based on the observation results and expressed people's preferences, this study indicates that the front yard should be a focused device to maintain interactive relationships between the private and public domain. Hence, the role and place of the front yard should be considered in any new or revised planning policies and regulations.

Despite a lot of attention to improve public open spaces, many maintain their characteristics of being impersonal and anonymous (Arendt 2013; Lofland 2017). By contrast, the front yard works as a public space (Carmona 2010a) where people do not lose their personal identity. Moreover, activities in and around the semi-private-public front yard can be enjoyable even without taking part in them. This is the beauty of this amazing intermediate space where people can enjoy their full freedom of choice to participate in activities and create emotional connections. The semi-private-public front yard thus accommodates various social activities without losing its distinct physical identity.

By highlighting the importance of the front yard as a connecting space within a residential neighbourhood, this study emphasised the fact that the sense of community sits outside the formal frameworks which juxtapose private to public places. The front yard acts as a semi-private-public territory which welcomes social interactions and offers personal identity. Its significance in creating social sustainability should not be underestimated. It allows residents to engage with each other and establish unique bonds, relationships and feelings of care that define a sense of community and make places sustainable. It is hoped that the findings from this study can help guide designers, developers, planners, residents and policy makers in creating more attractive and resilient city living environments that contribute to social sustainability.

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