Landscape and Urban Planning 171 (2018) 57–67

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Testing spatial measures of public open space planning standards with walking and physical activity health outcomes: Findings from the Australian national liveability study

Paula Hooper[a,*], Bryan Boruff[b], Bridget Beesley[a], Hannah Badland[c], Billie Giles-Corti[c]

[a] Centre for the Built Environment and Health, School of Agriculture & Environment and School of Human Science, The University of Western Australia, 35 Stirling Highway, Crawley WA 6009, Australia
[b] School of Agriculture & Environment, The University of Western Australia, 35 Stirling Highway, Crawley WA 6009, Australia
[c] Healthy Liveable Cities Group, Centre for Urban Research, RMIT University, Melbourne, Australia

ARTICLE INFO

Keywords:
Public open space
Urban planning
Walking
Physical activity
Policy,

ABSTRACT

Green public open spaces (POS) are an important component of healthy, liveable, and sustainable urban environments. Planning policies for POS provision however tend to be evidence-free. A review of Australian state-level POS planning policies and standards was conducted and policy-specific spatial measures generated in GIS. These were linked with health data from the RESIDE survey and relationships examined with weekly walking for recreation and moderate-vigorous physical activity (MVPA). To facilitate the development of a comparable national measure of POS provision, the measures were replicated using a national-level dataset on POS and compared using intra-class correlations.

Sixteen POS policy standards relating to the location, amount, access, and size of POS were identified. Only one POS standard was associated with a health outcome: RESIDE participants living in suburbs where 95% of residents lived within 400 m of a park had a three-fold increased odds of doing weekly MVPA. The national dataset did not appear to align with the types of POS typically addressed by urban POS planning policies and showed a low level of reliability with the finer-grain state layer (ICCs 0.185–0.312).

These findings support existing literature indicating that neighbourhoods with greater access to POS within 400 m are associated with higher odds of physical activity. The current study suggests that not all POS standards are equal, and more research is required to determine whether current planning standards being implemented are achieving their full potential. The development of national evidence-based, policy-relevant POS indicators has the potential to inform future POS planning policies and decisions.

1. Introduction

The provision and availability of green public open spaces (POS) in urban areas is an important component of healthy, liveable and sustainable urban environments and has long been a policy concern of urban planners and policymakers. There are an ever increasing number of biophysical, social and cultural purposes POS is required to fulfil in contemporary urban planning and design (Grose, 2009). This includes provisioning of POS for active and passive recreation; urban water management; biodiversity protection; and reduction of urban heat island effects, to name a few. However, in addition to simple aesthetic value, access to POS such as parks, has been linked to numerous physical, social, and mental health benefits – including increased propensity to engage in physical activity (Giles-Corti et al., 2005; McCormack, Rock, Toohey, & Hignell, 2010), enhancing mental health (Kaplan, 1995; Francis, Wood, Knuiman, & Giles-Corti, 2012), and space for social interaction and cohesion (Francis, Wood et al., 2012; Francis, Giles-Corti, Wood, & Knuiman, 2012).

Despite numerous community benefits associated with the provision of POS, three vital (and still relatively unanswered) questions persist: How much open space should be provided? Of what kind? And where should it be located? (Wilkinson, 1985). Whilst urban planners recognise the complexity involved in answering these questions (Wilkinson, 1985) the use of 'standards' has provided the foundation by which POS planning has progressed in many countries (Wilkinson, 1985; Veal, 2013). These were introduced to ensure a level of consistency and certainty in greenspace planning and to provide a minimum level of service (Veal, 2013). These 'standards' typically

* Corresponding author.
E-mail addresses: paula.hooper@uwa.edu.au (P. Hooper), bryan.boruff@uwa.edu.au (B. Boruff), bridget.beesley@uwa.edu.au (B. Beesley), hannah.badland@rmit.edu.au (H. Badland), billie.giles-corti@rmit.edu.au (B. Giles-Corti).

https://doi.org/10.1016/j.landurbplan.2017.12.001
Received 23 August 2016; Received in revised form 3 December 2017; Accepted 4 December 2017

provide guidance or targets concerning the amount, type and spatial distribution of (or distances to) POS and parks (as a type of POS) based on longstanding assumptions of park use (Veal, 2013). Three frequently used standard types are: 1) Area percentage: A fixed percentage of land to be reserved for POS; 2) Population-ratio: A prescribed level of provision of open space related to the level of population, typically per 1000 population; and 3) Catchment areas: 'Service areas' for different categories of open space, or maximum distances which residents should have to travel to access a POS (e.g., the percentage of households within a specified distance).

A recent review of the historical origins of POS planning guidelines in Australia revealed that 'standards' in general, are not empirically-derived or evidence-based (Veal, 2013), nor have they been empirically evaluated or scientifically tested (Wilkinson, 1985). Rather, they are based on British or American standards, often with little rationale for their application within the Australian context (Veal, 2013). Veal (2013) indicated that *"even when standards were 'in vogue', there appears to have been no attempt to develop a specific Australian standard based on relevant Australian data"* (p. 231) and *"the lack of authoritative testing and evaluation of early standards is most evident"* (Wilkinson, 1985, p.196). This is not a uniquely Australian problem. Internationally, there is a lack of evidence-based urban design approaches for developing POS as well as policies directing the provision of POS (La Rosa, 2014).

Over the last two decades, a considerable body of scholarly work from the active living research field has been established focusing on the relationship between access (proximity and distance) to POS and the number (counts) or amount (total area) of POS within a neighbourhood with active living outcomes (Kaczynski, Potwarka, & Saelens, 2008). However, very few have based their measurement and analysis of the proximity and size of POS against current planning policies (and their standards) that underpinned the provision of these POS (i.e., the amount and spatial arrangement). Further, despite variations in how it has been conceptualised, measured and quantified, the 'quality' or 'attractiveness' of parks has been shown to be an important factor in encouraging walking and positive physical activity behaviours (Giles-Corti et al., 2005). Analytical approaches have typically looked at the number or mix of different features, facilities and amenities within parks and their associations with park use or increased walking and physical activity. These attributes have then been used to create a "Park Index" (Kaczynski et al., 2016), park quality or attractiveness scores (Giles-Corti et al., 2005, Edwards, Hooper, Knuiman, Foster, & Giles-Corti, 2015).

Today there remains a shortage of research assessing how the application and provision of current POS policies and their standards, guidelines or recommendations are delivered on-the-ground, and how they influence or impact the health and wellbeing of residents − using policy specific measures. Important unanswered questions for policy makers and POS planners include: what policy standards should be recommended from a health perspective? And, are current standards or targets within the POS policies sufficient to bring about positive health and wellbeing outcomes? This has resulted in limited understanding of how current POS planning policies influence the health and wellbeing of residents − despite it being frequently stated as a desirable outcome.

This is also an important question because the provision of POS is currently under intense debate in Australia (Grose, 2009, 2010). With an ever-increasing recognition of the need to create liveable and sustainable cities and urban environments that enhance the health and wellbeing of residents (Badland et al., 2014), it is timely and desirable to examine the extent to which POS policy standards are implemented, and the impact these have on healthy behaviours. In an Australian context, this task is made more difficult as different POS policies and standards have been applied across the nation. However, there is increasing interest and pressure to develop comparative federal analysis of POS across Australian states and cities and provide for national benchmarking (State of the Environment 2011 Committee, 2011) as has been achieved in the US through initiatives such as ParkScore (ParkScore.org) by The Trust for Public Land (2016).

This study sought to gain further insights into these issues. It forms part of the Australian National Liveability Study, which aims to identify the urban planning policies and their standards that are associated with healthy, liveable communities (Giles-Corti et al., 2014). It also aims to respond to government interest to develop and validate a national set of spatially-derived liveability indicators of the built environment that impact on non-communicable disease risk behaviours and/or health outcomes and allow for comparisons across Australian cities and urban areas. Access to quality POS has been identified as one of the components of a liveable community, in this instance, defined as *"a community that is safe and socially cohesive; environmentally sustainable; with affordable housing linked via public transport, walking and cycling to employment, public open space, shops and all the services required for daily living (e.g., schools, health and community)"* (Badland et al., 2014). The specific aims of the study presented here within were to inform urban planning policies related to POS provision by:

1) Identifying existing POS planning policy standards across selected Australian states and territories;
2) Creating spatial measures of these policy standards;
3) Examining which, if any, of these policy standards are associated with recreational walking and physical activity in an urban context; and to
4) Comparing the POS measures developed using state spatial data with those developed using national-level spatial information.

2. Methods

2.1. Study context and participants

The Australian National Liveability Study focussed on metropolitan urban settings throughout the country (Arundel et al., 2017). The sub-study presented here focuses on the 'urban' extent of the Perth metropolitan region classified as either 'Major Urban' (geographical areas with population clusters of 100,000 or more) or 'Other Urban' (population clusters of 1000–99,999) by the Australian Bureau of Statistics (ABS) (Australian Bureau of Statistics) (Fig. 1).

The RESIDE Project was a longitudinal natural experiment of participants relocating to 73 new housing developments across Perth, Western Australia. Participants were invited to take part in the study by the state water authority following land transfer transactions (response rate of 33.4%) in 2005. Participants completed a self-report questionnaire before moving to their new home (baseline n = 1813), and on three occasions after relocation at approximately 12, 36 and 84 months respectively. Full details of the RESIDE recruitment protocols and study design are available elsewhere (Giles-Corti et al., 2008). The current study draws on participants who completed the baseline survey. This time point was chosen as participants were located within the largest number of suburbs across the Perth metropolitan area (247 of the 398 suburbs at the 2006 census) representing a diversity of neighbourhood age structures and POS designs. All RESIDE participants who completed a baseline survey and were residents within the urban extent of Perth were included in this study (n = 1777) (Fig. 1).

2.2. Review of Australian POS planning policy and standards

In 2014, a review of current state-level POS policies and their respective 'standards' was conducted for the states and territories participating in the Australian National Liveability Study (Giles-Corti et al., 2014). These included the Australian Capital Territory (ACT), New South Wales (NSW), Queensland (QLD), Victoria (VIC) and Western Australia (WA). For each policy a set of spatial measures were developed for the associated standards (e.g. amount, location, access, size and facilities/functions). The final list of spatial POS policy measures was reviewed for completeness by the Australian National Liveability