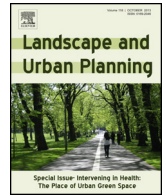




Contents lists available at ScienceDirect

## Landscape and Urban Planning

journal homepage: [www.elsevier.com/locate/landurbplan](http://www.elsevier.com/locate/landurbplan)

## Are accessibility and characteristics of public open spaces associated with a better cardiometabolic health?

Catherine Paquet<sup>a,b,g,\*</sup>, Thomas P. Orschulok<sup>c,g</sup>, Neil T. Coffee<sup>a,g</sup>, Natasha J. Howard<sup>a,g</sup>, Graeme Hugo<sup>d</sup>, Anne W. Taylor<sup>e</sup>, Robert J. Adams<sup>e</sup>, Mark Daniel<sup>a,f,g</sup>

<sup>a</sup> School of Population Health, University of South Australia, Australia

<sup>b</sup> Research Centre of the Douglas Mental Health University Institute, Canada

<sup>c</sup> School of Health Sciences, University of South Australia, Australia

<sup>d</sup> Discipline of Geography, Environment and Population, The University of Adelaide, Australia

<sup>e</sup> Discipline of Medicine, The University of Adelaide, Australia

<sup>f</sup> Department of Medicine, St. Vincent's Hospital, The University of Melbourne, Australia

<sup>g</sup> Social Epidemiology & Evaluation Research Group, Sansom Institute for Health Research, University of South Australia, Australia

### H I G H L I G H T S

- ▶ The cardiometabolic benefits of public open spaces characteristics were examined.
- ▶ Access to public open spaces was not related to cardiometabolic health.
- ▶ Larger, greener, and more active public open spaces were linked to better health.
- ▶ Psychological well-being did not contribute to the relationships.
- ▶ Health benefits of larger open spaces were partly explained by physical activity.

### A R T I C L E I N F O

#### Article history:

Available online 9 January 2013

#### Keywords:

Public open spaces  
Residence characteristics  
Cardiovascular risk factor  
Physical activity  
Well-being  
Geographic Information System

### A B S T R A C T

This study investigated the associations between the accessibility, greenness, size, and type (active vs. passive) of public open spaces (POS) and clinical risk markers for cardiometabolic diseases and whether such associations could be explained (mediated) by physical activity and psychological well-being. Adult participants ( $n = 3754$ ) provided clinical, self-reported, and residential location data. Cardiometabolic risk was defined as the sum of six anthropometric and biochemical risk markers. POS accessibility was defined as the number and proportion of POS within a 1000-m road distance from participants' residences. Greenness, size and type were respectively defined as the median Normalised Difference Vegetation Index, median size, and proportion of POS with a sporting land use for all accessible POS. Physical activity and psychological well-being were self-reported. Associations were tested using Poisson regression models accounting for spatial clustering of observations and participants' age, gender, education, income and area-level socioeconomic disadvantage. The number and proportion of POS were not found to be statistically significantly related to cardiometabolic health; however, greenness, size, and type (active) of available POS were inversely related to cardiometabolic risk. The association between POS and cardiometabolic health was partially mediated by physical activity. Psychological well-being was not implicated in the associations tested. These results suggest that the characteristics, not the number or proportion, of locally accessible POS are related to cardiometabolic health and, to some degree, physical activity. Maintaining or improving the quality of locally available POS might be a more effective urban design strategy to support cardiometabolic health than efforts to increase the accessibility of POS.

© 2012 Elsevier B.V. All rights reserved.

\* Corresponding author at: Sansom Institute for Health Research, City East Campus, University of South Australia, Internal Post Code: CEA-01, GPO Box 2471, Adelaide, South Australia 5001, Australia. Tel.: +61 8 8302 2615; fax: +61 8 8302 2603.

E-mail addresses: [catherine.paquet@unisa.edu.au](mailto:catherine.paquet@unisa.edu.au) (C. Paquet), [orstp001@mymail.unisa.edu.au](mailto:orstp001@mymail.unisa.edu.au) (T.P. Orschulok), [neil.coffee@unisa.edu.au](mailto:neil.coffee@unisa.edu.au) (N.T. Coffee), [natasha.howard@unisa.edu.au](mailto:natasha.howard@unisa.edu.au) (N.J. Howard), [graeme.hugo@adelaide.edu.au](mailto:graeme.hugo@adelaide.edu.au) (G. Hugo), [anne.taylor@adelaide.edu.au](mailto:anne.taylor@adelaide.edu.au) (A.W. Taylor), [robert.adams@adelaide.edu.au](mailto:robert.adams@adelaide.edu.au) (R.J. Adams), [mark.daniel@unisa.edu.au](mailto:mark.daniel@unisa.edu.au) (M. Daniel).

## 1. Introduction

Although the salutogenic property of green spaces has long been recognised (Ward Thompson, 2011), the last decade has seen an increasing interest in neighbourhood public open spaces (POS) and their potential for improving the health and well-being of urban dwellers, with evidence for such benefits cumulating. In particular, POS are considered key environmental features that can help reduce the risk of cardiovascular and metabolic diseases in the population. This claim is supported by a number of studies providing evidence that better access to POS is associated with a more active lifestyle and healthier weight outcomes (for reviews, see Kaczynski & Henderson, 2007; Lachowycz & Jones, 2011), two established protective factors against cardiometabolic diseases. A few studies have linked access to green spaces with lower cardiovascular mortality (Hu, Liebans, & Ranga, 2008) and morbidity (Maas, Verheij, et al., 2009), although mixed results have also been reported (Richardson & Mitchell, 2010; Richardson, Pearce, Mitchell, Day, & Kingham, 2010; Richardson et al., 2012). Examining the effects on intermediate cardiometabolic outcomes, such as clinically measured risk markers, may help shed more light on the associations between POS and cardiometabolic health. Few studies have investigated POS in relation to clinical markers, with the exception of a recent cross-sectional analysis that provided some evidence that the density of school campuses and parks within one's district was related to the odds of having the metabolic syndrome, which represents a combination of clinical risk markers for cardiometabolic diseases (Wang, Hsiao, Hsiao, Liu, & Chien, 2011).

The mixed support for an association between access to POS and mortality mirrors results for physical activity (Kaczynski & Henderson, 2007) and obesity (Lachowycz & Jones, 2011). Inconsistent findings across studies suggest that not all POS may contribute equally to health, highlighting the need to examine POS attributes that can help differentiate POS with greater health impact. One such attribute, POS size, has been linked to greater levels of physical activity. Cohen et al. (2010) measured a number of park characteristics and found that park size and the presence of organised activities to be the strongest correlates of park use. A previous Australian study provided evidence that access to POS was related to walking behaviour, but only when the access measure was adjusted for POS size (Giles-Corti et al., 2005). A methodologically similar study conducted in the United Kingdom did not replicate these results (Hillsdon, Panter, Foster, & Jones, 2006). The aesthetic value of POS, often operationalised as greenness, has also been identified as a key POS characteristic that could have a positive impact on health. Results from a recent study suggests that residents of areas where vacant lots were made greener as part of a community programme reported less stress and exercised more than individuals residing around control lots (Branas et al., 2011). Greenness has also been associated with lower stroke mortality (Hu et al., 2008). Finally, the presence of facilities for sporting activities has also been recognised as an important characteristic to consider in research on the health benefits of POS. In one study, young girls living in proximity of parks with selected sporting amenities were found to be more active than those without such amenities in their immediate environment (Cohen et al., 2006). Another study found that the number of facilities within parks, but not their distance from participants' homes, was positively associated with the use of the park for physical activity (Kaczynski, Potwarka, & Saelens, 2008). In sum, the characteristics of accessible POS seem to predict POS use and the level of physical activity undertaken by local residents. It remains to be determined if these characteristics can also help identify POS with greater cardiometabolic health benefits.

The beneficial impact of POS on cardiometabolic health may be explained by their ability to promote a more active lifestyle for local residents. The protective effect of POS may similarly be

explained by their capacity to promote general feelings of psychological well-being (for a review see, Abraham, Sommerhalder, & Able, 2010), which is known to have a protective effect against cardio-vascular diseases and their risk factors (Boehm, Peterson, Kivimaki, & Kubzansky, 2011; Goldbacher & Matthews, 2007). POS have been postulated to contribute to well-being in a number of ways. First, POS characterised by natural settings have been proposed to promote restoration from mental fatigue due to prolonged directed attention by fostering feelings of "being away" from everyday activities and fascination with nature (Kaplan, 1995), although such effects have not been consistently supported by empirical evidence (reviewed in Bratman, Hamilton, & Daily, 2012). Second, natural POS are also thought to induce more positive moods (Staats, Gatersleben, & Hartig, 1997) and help in recovering from stressful situations, by evoking positive change in emotional states (Ulrich, 1983). This effect has been supported by research suggesting that living in proximity to green areas is associated with lower stress (Nielsen & Hansen, 2007). Another study showed that participants with a greater proportion of green space in a 3-km radius around their residence were more resilient to stressful life events (i.e., reported fewer health complaints and a better general health) than participants with lower exposure to green space (van den Berg, Maas, Verheij, & Groenewegen, 2010). POS can also contribute to well-being by promoting social connectedness. For instance, green open spaces have been shown to facilitate social contacts and promote a sense of community (Kweon, Sullivan, & Wiley, 1998). Green spaces have also been linked to better health through their associations with reduced feelings of shortage of social support and loneliness (Maas, van Dillen, Verheij, & Groenewegen, 2009). Access to park space has also been found to indirectly reduce stress by fostering social support (Fan, Das, & Chen, 2011). The contribution of greater levels of physical activity and/or more positive psychological well-being in explaining any association between POS and cardio-vascular health remains to be determined.

The objectives of the present study were 2-fold. First, we aimed to assess the relationship between POS accessibility, size, greenness and type (i.e., with or without sporting facilities) with clinical measures of risk of cardiometabolic diseases. The second objective was to determine whether any association between the above POS characteristics and cardiometabolic health could be explained (mediated) by greater levels of physical activity and psychological well-being.

## 2. Materials and methods

### 2.1. Context

This research focuses on the northern and western metropolitan regions of Adelaide, the capital city of South Australia (SA). This study region represents 38 percent of the city's population and 28 percent of the SA population (ABS, 2001b). The Adelaide metropolitan area stretches 80 km north-south and 30 km east-west of the city centre providing a distinctive spatial layout for a population of around 1.1 million persons, equating to three quarters of the SA population (ABS, 2008). Early settlement of Adelaide, from 1836, was systematically planned in advance by Colonel William Light (Gibbs, 1990). Most notably, Light envisioned a parklands region around the city square mile. This development is still evident in the urban landscape. The state of SA has a renewed focus in the importance of POS for the design of new communities within the metropolitan area (Department of Planning and Local Government, 2010), at the same time, areas remain with limited local accessibility of POS. These POS include active and passive recreation facilities such as playgrounds, sporting ovals,

Download English Version:

<https://daneshyari.com/en/article/7461898>

Download Persian Version:

<https://daneshyari.com/article/7461898>

[Daneshyari.com](https://daneshyari.com)