



Public open space, physical activity, urban design and public health: Concepts, methods and research agenda



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ABSTRACT

Public open spaces such as parks and green spaces are key built environment elements within neighbourhoods for encouraging a variety of physical activity behaviours. Over the past decade, there has been a burgeoning number of active living research studies examining the influence of public open space on physical activity. However, the evidence shows mixed associations between different aspects of public open space (e.g., proximity, size, quality) and physical activity. These inconsistencies hinder the development of specific evidence-based guidelines for urban designers and policy-makers for (re)designing public open space to encourage physical activity. This paper aims to move this research agenda forward, by identifying key conceptual and methodological issues that may contribute to inconsistencies in research examining relations between public open space and physical activity.

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1. Introduction

There have been declines in physical activity in many countries over the past few decades (Brownson et al., 2005; Ng and Popkin, 2012). Given the limited success of individually-based approaches to behaviour change, public health researchers have increasingly used socio-ecological models to further understand determinants of physical activity (Sallis et al., 2008). Such conceptual frameworks suggest that the built environment is one important level of influence, as it can facilitate or inhibit participation in physical activity (Sallis et al., 2012, 2008). Indeed, public open spaces, such

as parks and green spaces, appear to be key built environment settings that provide opportunities for a variety of physical activity behaviours, such as recreational walking and playing sports (Bedimo-Rung et al., 2005; Kaczynski and Henderson, 2007).

A growing body of literature has examined how different aspects of public open space, such as access to, size and design features, are associated with physical activity participation. A review of 50 quantitative studies (Kaczynski and Henderson, 2007) found proximity to parks and recreational settings to be generally associated with greater physical activity. Qualitative evidence further shows that public open space safety, aesthetics, amenities, maintenance, and proximity are important attributes for supporting physical activity (McCormack et al., 2010). Despite the increasing number of studies in this field, there are some inconsistencies in the evidence base. For example, a review by Lachowycz and Jones (2011) shows that among studies examining the relationships between access-related measures of local green spaces and physical activity, only 40% found significant associations.

These inconsistencies are confusing to urban designers and policy-makers and prevent the development of clear evidence-based guidelines for (re)designing public open space to encourage physical activity. It is possible that variations in studies are contextual

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or cultural, and context-specific evidence-based guidelines are required. However, it is also plausible that these mixed results may be caused by diverse ways employed in past studies to conceptualise and operationalise relevant constructs involved in this research. We sought to move this research agenda forward, by identifying key conceptual and methodological issues that might enhance public open space and physical activity studies.

2. Conceptual issues

2.1. Variability in definitions of public open space

There is a lack of consensus in definition of public open space within the broader built environment literature. Within active living research, public open space is mainly conceptualised as park and green space, with less focus on other types of public open space (e.g., public plazas, nature reserves, greenways). For example, within urban design research, public open space is defined as ‘managed open space, typically green and available and open to all, even if temporally controlled’ (Carmona, 2010). Yet, in active living research, public open space definitions are usually narrower. For example, Edwards et al. (2013) who work with planning policy-makers and practitioners focus only on green spaces and natural environments defining public open space as ‘spaces reserved for the provision of green space and natural environments, accessible to the general public free of charge’. In contrast, another definition made in public health does not necessitate public open space to be green, but does require that the intended purpose of the space is for amenity or recreation purposes: “spaces within the urban environment that are readily and freely accessible to the wider community, regardless of size, design or physical features and are intended primarily for amenity or recreation purposes—whether active or passive” (National Heart Foundation of Australia, 2014).

The definition of public open space in studies examining relationships between public open space and physical activity is important for two reasons. First, the absence of a universally-accepted definition of public open space introduces difficulties in comparing and collating evidence across different studies. Second, while urban designers consider public open space to be broadly defined and include such elements as beaches and shared public areas, active living researchers have tended to define public open space as parks and green space. This means that active living researchers are potentially missing out on opportunities to study different types of public open space required to improve physical activity. While there is a lack of research into the influence different types of public open space have on physical activity, there is some evidence that non-park public open space might be important for physical activity. For example, several studies showed the positive influence of walking trails on walking (Brownson et al., 2001, 2000). As such, there might be specific design requirements for designing a walking trail to accommodate a wide range of physical activities within a small linear place compared with a park. Hence, we argue that future studies within active living research should include a broader range of public open space beyond parks and green spaces.

2.2. Moving towards causal relationships

The majority of studies examining public open space and physical activity have been cross-sectional in design, and unable to address the issue of ‘self-selection’ (Cao et al., 2006, 2009). Within the built environment and active living body of research, self-selection refers to ‘the tendency of people to choose locations based on their travel abilities, needs and preferences’ (Litman, 2011). For example, people who prefer to walk to and within public open space for recreation may choose to live in neighbourhoods that have more public open

space available. Therefore, these people may have certain characteristics that confound any associations, and could potentially lead to misleading findings. Kaczynski and Mowen (2011) found significant associations between public open space availability and physical activity accounting for self-selection issue. Nevertheless, if a study does not control for self-selection issue, observed associations between public open space and physical activity might be biased. Furthermore, if the study design is cross-sectional, a causal relationship between public open space and physical activity cannot be assumed. Research on public open space and physical activity would benefit from longitudinal research designs, including experimental studies that measure behaviours before and after the introduction of new public open space or renovation of existing public open space (e.g., Veitch et al., 2014).

Specific public open space attributes may have distinctive effects on the initiation or maintenance of physical activity, yet few studies have distinguished between the two behaviours (Cleland et al., 2008; Sugiyama et al., 2013). For example, a recent study in Australia (Sugiyama et al., 2013) found no associations between initiation of walking and public open space presence, quality, and proximity; however, the presence of public open space, perceived proximity and size of the largest public open space were associated with maintenance of walking over four years. Another study of people who relocated from one neighbourhood to another, found that gaining access to three different types of public open space (i.e., a park, a sports field or a beach) increased walking by 18–21 min for each type of public open space gained (Giles-Corti et al., 2013). Further evidence from studies with longitudinal research designs are needed to confirm these associations and explore how public open space influences physical activity over the long-term.

2.3. Public open space in non-residential contexts

Previous studies have primarily focused on public open space in residential contexts; however, the extent to which public open space in other settings (e.g., around workplaces or schools) may influence people’s physical activity has been largely ignored. It is possible that having a public open space next to workplaces may encourage workers to walk within that public open space during their break times. However, to date no study has examined the relationship between public open space and physical activity in non-residential contexts. A few recent studies in the broader built environment literature have examined how other (non-public open space) environmental attributes influence physical activity in settings frequented by children and adults (Dalton et al., 2013; Karusisi et al., 2014; Panter et al., 2013). For example, Karusisi et al. (2014) found that the number of supermarkets around workplaces was associated with walking for transport among workers. Another study found that active travel to work was negatively associated with the availability of free car parking at workplaces (Dalton et al., 2013), while Badland et al. (2014) found that the odds of commuting to work by transit rose to over 16 when participant had proximate transit stops both near home and work. Future research should identify the relevant attributes of public open spaces to support physical activity in a number of settings outside residential contexts.

3. Research methodologies to better understand public open space/physical activity relationships

3.1. Measuring public open space-related physical activity

The majority of previous studies have applied context-free measures of physical activity (Giles-Corti et al., 2005b), such as

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