



Effect of seasonal changes on usage patterns and behaviours in educational precinct in Melbourne

Salman Shooshtarian^{a,*}, Priyadarsini Rajagopalan^{a,b}, Ron Wakefield^a

^a School of Property, Construction and Project Management, RMIT University, Melbourne, Australia

^b Sustainable Building Innovating (SBI Lab), RMIT University, Melbourne, Australia

ARTICLE INFO

Keywords:

Thermal comfort
Field survey
Thermal conditions
Function of place
Purpose of visit
Seasonal changes

ABSTRACT

Successful urban open spaces can largely contribute to the enhancement of humans' day to day life. Among the determinants of the quality of outdoor environments, high priority is given to ambient climatic conditions. This study is aimed to understand the usage pattern of outdoor spaces in an educational precinct and to discover its linkage to thermal conditions. The target population was the visitors of the main open spaces of an educational precinct selected as the case study in Melbourne, Australia. Three types of data collection methods including questionnaire survey, unobtrusive observation and field measurements were employed to collect information about usage patterns and behaviour in the three consecutive seasons (spring 2014, summer 2015 and autumn 2015). The results shed light on the seasonal usage pattern of the precincts and the role of function of place (place character) on people's presence outdoors. The research findings are expected to inform guidelines on managing outdoor spaces, particularly within university campuses.

1. Introduction

Successful urban open spaces can largely contribute to the enhancement of humans' day to day life. Among the determinants of the quality of outdoor environments, high priority is given to ambient micrometeorological conditions (Mayer and Höppe, 1987). Micrometeorological conditions govern the attendance and the quality of activities performed in an outdoor space. Due to social, environmental, and financial reasons, the study of usage pattern and comfort has become a central agenda in many urban studies (Thorsson et al., 2004b; Nikolopoulou and Lykoudis, 2007; Aljawabra and Nikolopoulou, 2010; De Montigny et al., 2011; Lin et al., 2012; Lin et al., 2013a). Some researchers have found that there is a direct and strong relationship between micrometeorological conditions and use of outdoor spaces (Zacharias et al., 2004; Gaitani et al., 2007; Nikolopoulou and Lykoudis, 2007; Aljawabra and Nikolopoulou, 2010; Lin et al., 2013b; Chen et al., 2015; Martinelli et al., 2015). For instance, Gaitani et al. (2007) argued that micrometeorological conditions through people's thermal perceptions determine attendance and human activities in outdoor spaces and the level of activities hinges on the extent of satisfaction under the given thermal conditions. De Montigny et al. (2011) observed that pedestrians of nine cities across the world had an increased walking rate in association with desirable micrometeorological conditions. Thorsson et al. (2004a) observed that individuals in a public park had a tendency of longer stay (19–21 min on average) when their thermal sensations fell within the comfort range compared to conditions in which their thermal sensations were beyond this zone (11 min on average). In some other studies, micrometeorological conditions were found to explain 27% to 69% of total attendance in different urban settings (Lin et al., 2013b; Zeng and Dong, 2015; Huang et al., 2016; Li et al., 2016).

* Corresponding author.

E-mail address: salman.shooshtarian@rmit.edu.au (S. Shooshtarian).

Several studies have suggested that seasonal changes cause variations in micrometeorological conditions and to some extent people's psychological status are responsible for adjusting usage and behaviour in relation to outdoor weather conditions (Tucker and Gilliland, 2007; Huang et al., 2015; Chen et al., 2015). In a systematic review on 37 primary studies Tucker and Gilliland (2007) concluded that the levels of physical activity vary with seasonal changes, and poor weather conditions in certain seasons (e.g. wet and cold seasons) is a barrier to participation in physical activity. The results of a study conducted in 2007 showed that the time of maximum attendance was transited from evening in summer towards noon as the season progressed to winter (Nikolopoulou and Lykoudis, 2007); it was also demonstrated that the maximum attendance in autumn and winter was respectively 3 and 4 times larger than it was in summer. Huang et al. (2015) verified seasonal behavioural differences in a public plaza. The authors observed that in a hot season people continued to visit the plaza despite elevated temperature values, however, their attendance was largely affected by micrometeorological conditions in a cool season. The authors linked this behavioural difference to people's adaptability to hot local meteorological conditions. In another study it was suggested that even between the two cool seasons (i.e. autumn and winter) the influence of micrometeorological conditions on number of visitors is different (Chen et al., 2015); while it was totally independent of weather conditions in autumn, weather conditions significantly impacted on visitors' attendance in winter.

In contrast, some studies have proved the independence of micrometeorological conditions on usage pattern (Thorsson et al., 2007a; Zeng and Dong, 2015), where the use of certain public places was found to be less influenced by micrometeorological. In this regard, Lin (2009) stated that “...simple thermal environmental factors or thermal comfort indices cannot fully explain the influence of the thermal environment on the number of people using public spaces and other non-thermal factors ought to be taken into account” (p. 2025). The extent of the influence of micrometeorological conditions varies in different contexts depending on place (Zacharias et al., 2004; Thorsson et al., 2007a), cultural (Knez and Thorsson, 2006), social (Wilson et al., 2007) and economic differences (Aljawabra and Nikolopoulou, 2010; Maras et al., 2014).

Therefore, this study is aimed to understand the characteristics of usage pattern in outdoor spaces in an educational precinct in Australia emphasising the relationship with seasonal changes. Urban precincts are suggested as appropriate options for the Australian capital cities to develop new smart and sustainable spaces (Randolph, 2004; Forster, 2006; Yigitcanlar et al., 2008). A precinct is an outdoor space surrounded by the walls or other boundaries of particular built environments, or by an arbitrary and imaginary line drawn in the vicinity of it (Hussain, 2009). With the land shortage in the city centre of Australian capital cities and a considerable growth in the number of university and Vocational Education and Training (VET) students from all around the world, educational precincts are most likely to be the future form of the development in educational built environments in Australia (Yigitcanlar et al., 2008; Wild-River, 2013). Furthermore, the successful experience of the university-centred knowledge precincts, along with other urban precincts across Australia (Yigitcanlar et al., 2008), provides further impetus for the development of such urban spaces.

Investigation of thermal comfort and usage pattern in educational precincts has been the focus of several studies (Abu-Ghazze, 1999; Xi et al., 2012; Nastos and Matzarakis, 2013; Middel et al., 2016; Zhao et al., 2016). These studies emphasised the importance of visiting open spaces of university campuses by students and staff. Attending open spaces provides opportunities for students to do physical activity, socialise, relax or change the environment. After identifying the factors influencing seasonal comfort requirements and usage patterns of visitors of studied open spaces, these studies concluded that the obtained information must underpin effective urban designs and planning. Hence, the results of this study are expected to serve to develop initiatives that ensure maximum usage of open spaces located in educational precincts.

2. Methodology

2.1. Study sites and target population

This study was conducted in Melbourne, which has an oceanic temperate climate (Cfb). Melbourne is known for its unpredictable weather conditions where one may experience totally different micrometeorological conditions from one day to the next (Peel et al., 2007). Three sites (described below), which are the premises of the RMIT University City Campus (RUCC), an educational precinct, were selected as the case studies (Fig. 1).

The three selected sites have different spatial and functional characteristics. Below is the description of study sites. A summary of their physical features is presented in Table 1.

- Site 1: University Lawn which was used as a recreational space by university students and staff. Due to its compact design, a relatively prevalent form in Melbourne's built up areas, this space was an appropriate symbol of inner city Melbourne's recreational outdoor spaces. This site has a 1473 m² area and contained several urban elements including shading device in a café, timber deck and benches, water features, natural green space, and an artificially turfed area which generated varying micro-meteorological conditions. The café served visitors both inside and outside and it was fitted with shading devices.
- Site 2: Ellis Court at RUCC was used for different purposes: as the main passage way to other parts of the campus, and a venue for outdoor activities and social events. This site has a 1302 m² area and accommodated a range of urban settings (e.g. large patches of artificial grass, trees and small garden beds), which potentially created an outdoor space with varying local micro-meteorological conditions. The full description of different covering materials and the extent of their usage in the three sites was presented before (Shooshtarian and Rajagopalan, 2018). Like Site 1, this site had buildings that were heritage listed by the Heritage Council of Victoria. Due to its particular location, this site was largely frequented by students and staff during teaching hours; it was also partly occupied by them in break times. Many on-campus events are conducted at the Bowen Street. Some visitors from neighbouring offices routinely used the space to relax, eat or drink, or walk through to reach other streets.

Download English Version:

<https://daneshyari.com/en/article/9951777>

Download Persian Version:

<https://daneshyari.com/article/9951777>

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