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# Psychological Wellbeing Benefits of Simulated Exposure to Five Urban Settings: an Experimental Study From the Pedestrian's Perspective

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## ABSTRACT

The potential health benefits of walking in attractive, predominantly built-up urban settings have not received much attention from scholars, despite the global need to increase walking levels in cities. The current experimental study assessed the affective outcomes associated with several urban walking settings, with a focus on the presence of motor-traffic and architectural styles from different historic periods. We employed a mixed within-between subjects design ( $n = 269$ ) with employees and students from Bristol (UK) and measured relaxation and hedonic tone experiences, perceived restorativeness, and environmental perceptions following exposures to one of five urban settings. Results identified three categories of affective outcomes, rather than the classic dichotomy 'urban vs natural': the simulated walks in areas with greenery rated significantly better than the others; however, the pedestrianised settings were associated with neutral or positive affective outcomes and perceptions, with statistically significant differences with an area with traffic. These results suggest that walking in high-quality urban settings can have positive outcomes, and highlight the negative role of traffic and the potential benefits of historic elements in the affective walking experience. From a policy perspective, the findings strengthen the case for traffic removal, and indicate that exposure to high quality urban design that includes some natural elements can offer the same affective benefits offered by large green spaces.

## 1. Introduction

There is growing consensus on the notion that built environments have an impact on the health and psychological wellbeing of individuals living or working in cities (e.g., Frank et al., 2016; Frumkin, 2003). Research has shown that urban living is associated with increases in mood and anxiety disorders compared to rural living (Gruebner et al., 2017; Peen et al., 2010). The global trend is for populations to urbanise, with 66 percent of the global population likely to live in cities by 2050 (United Nations, 2014). Therefore, understanding how built environments can support psychological wellbeing is a priority for research and practice, and strategies to improve urban dwellers' psychological wellbeing are needed. Walking is an activity that entails psychological wellbeing benefits (Gatrell, 2013; Robertson et al., 2012). Thus, exploring what factors can increasing urban walking could serve as a public health

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strategy that might subsequently have positive implications for the psychological wellbeing of individuals that reside in urban locations.

However, settings vary in the extent to which they support particular activities, and the benefits of walking are moderated by the environments in which this is performed (e.g., [Johansson et al. 2011](#)). In this respect, a rich body of research attested that walking in natural spaces entails psychological wellbeing benefits ([Hartig et al., 2003](#); [Tilley et al., 2017](#); [Van den Berg et al., 2003](#)). Nevertheless, opportunities to visit green spaces during everyday life are limited for urban dwellers, and experiencing nature is a 'rarity' for most, as attested by a British research ([Cox et al., 2017](#)). It is, therefore, increasingly important to explore which characteristics of current built environments support psychological wellbeing in everyday situations, specifically during walking. The current study addresses part of the gap in the literature by comparing experimentally the moderating effect on psychological variables of virtual exposure to five urban walking settings in the city centre of Bristol, UK. The virtual walk experimental methodology is well established in psychological research, with numerous applications in the investigation of the affective benefits of walking in natural settings within psychology and public health research (e.g., [Gatersleben and Andrews, 2013](#); [Van den Berg et al. 2014](#)). However, hitherto it has had limited application in the field of transport studies (with some exceptions: e.g., [Johansson et al., 2016](#)). The experimental virtual walk methodology offers an effective way to study the impact of built environment characteristics on walking experiences and health outcomes. The findings offer practical recommendations for planning and design strategies to improve the affective walking experience in cities.

The affective construct is a specific aspect of the umbrella term psychological wellbeing ([Ekkekakis, 2013](#)), and refers to the so-called hedonic wellbeing ([Ryan and Deci, 2001](#)). Examining immediate wellbeing responses is important because positive affect can be beneficial to long-term health ([Consedine and Moskowitz, 2007](#); [Fredrickson and Branigan, 2005](#)). In addition, affective experiences influence subsequent activities, with two general forms of behaviour elicited: *approach* (desire to stay and explore) or *avoidance* (desire to leave) ([Mehrabian and Russell, 1974](#)). Therefore, examining affective walking experiences produces important implications for the promotion of sustainable transport, as they might influence walking intentions and behaviours ([Gatersleben and Uzzell, 2007](#); [Johansson et al., 2016](#)).

In environmental psychology, Russell's circumplex mode of affect ([Russell, 2003](#); [Russell and Barrett, 1999](#); [Russell and Pratt, 1980](#)) offers theoretical insights on the influence of environments on affective states, and defines core affect as "the most elementary consciously accessible affective feeling" ([Russell and Barrett, 1999](#), p. 806). An environment is automatically perceived in terms of two dimensions: *valence* (degree of pleasantness) and *arousal* (degree of intensity). Core affect can be unconscious and free-floating, or directed at something such that emotions originate ([Russell and Barrett, 1999](#)). Affective and emotional states include, for example, stress, energy, and happiness ([Russell and Barrett, 1999](#)).

In parallel, Ulrich's Stress Recovery Theory (SRT) ([Ulrich, 1983](#); [Ulrich et al., 1991](#)), looks specifically at the stress-relieving and *restorative* properties of environments, hence focusing on stressed individuals. Restorative environments are defined as those settings that contribute to stress recovery and to positive affect in individuals with a depleted mental state. While Russell does not advance a hypothesis on the types of settings that support affect, according to [Ulrich \(1983\)](#), it is exposure to natural settings that promotes restoration, as opposed to exposure to urban environments. This idea is based on the psycho-evolutionary hypothesis that, having evolved over a long period in natural environments, humans have an innate inclination towards natural environments ([Ulrich et al., 1991](#)). SRT is complemented by Kaplan and Kaplan's Attention Restoration Theory (ART) ([Kaplan, 1987](#); [Kaplan and Kaplan, 1989](#)), which rather than looking at affective outcomes focuses on attention fatigue (the depleted capacity to direct attention). ART holds that exposure to natural environments can promote greater cognitive restoration than exposure to built environments. Despite the focus on cognition, measures of perceived attention restoration are generally positively associated with affective restoration (e.g., [Fornara 2011](#); [White et al., 2010](#)); hence, perceptions on cognitive restoration are likely to say something about the affective potential of settings. According to [Kaplan and Kaplan \(1989\)](#), several properties can make an environment restorative, and these include: *being away* (feeling away from routine or demanding activities), *fascination* (being engaged without effort), *compatibility* (good fit between environments and one's purposes), and *scope* (the environment has sufficient content that it can occupy the mind for an extended period).

Building on the theories outlined above, extensive empirical research has assessed the affective benefits of walking in natural areas. This growing body of evidence has confirmed that walking in natural settings supports affect and restoration (e.g., [Hartig et al., 2003](#); [Roe and Aspinall, 2011](#); [Tilley et al., 2017](#)). Studies have also shown that incorporating natural elements in cities elicits affective and restorative outcomes ([White et al., 2010](#); [World Health Organization WHO 2016](#)) and improves perceived restoration of built settings ([Lindal and Hartig, 2015](#); [White et al., 2010](#); [Nordh et al., 2009](#)). Hence, there is general agreement on the notion that natural settings support walking and psychological wellbeing relatively more than built-only settings do. In addition, despite a discussion on the daytime-night time perspective was beyond the scope of the current research, it should be noted that the literature on the affective benefits of walking in natural settings refers to daylight situations, while walking in natural spaces at night time is likely to trigger safety concerns (e.g., [Gatersleben and Andrews, 2013](#)).

However, little attention has been given to the affective potential of walking in the full range of typically encountered non-natural built settings (as noted by [Karmanov and Hamel, 2008](#); [Velarde et al., 2007](#)). Specifically, research studies assessing affective and restorative outcomes of walking in urban settings have tended to select locations with attributes defined negatively in sociocultural terms, e.g., urban *grey settings* such as commercial and industrial areas ([Johansson et al., 2011](#)), urban outskirts ([Hartig et al., 2003](#)), or streets with heavy motor-traffic density ([Kinnafick and Thøgersen-Ntoumani, 2014](#); [Tilley et al., 2017](#); [Van den Berg et al., 2014](#)). Hitherto, and to the best knowledge of the authors, no current experimental study has involved comparing the psychological wellbeing potential of different urban walking settings including a non-green, *non-grey setting*. One exception is the study by [Lindal and Hartig \(2013\)](#), which examined the role of architectural variation and building height in several residential streetscapes on

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