The influence of city centre environments on the affective walking experience

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Abstract

The current PhD thesis explores the influence of the built environment on the affective walking experience. In fact, while urbanisation trends are increasing, levels of walking in urban settings are decreasing, despite the important health, social, and environmental benefits of walking. However, while there is a rich body of research indicating that walking in natural spaces supports psychological wellbeing, there is a general lack of literature on the potential benefits of walking in urban settings specifically.

A novel theoretical framework is applied, combining two main disciplines: environmental psychology literature on environmental affect and restoration, and geographical literature on walking and mobilities. The following questions are addressed:

- In what ways can walking in urban environments support affect? What is the role of motor traffic and architectural styles on the affective walking experience?
- What are enablers and barriers to a positive affective walking experience in urban contexts other than presence of natural elements?
- To what extent does the affective walking experience influence walking intentions?

A mixed-methods strategy was adopted. First, an online experiment with residents of Bristol (UK) (n=384) compared affective outcomes of walking in five settings in Bristol city centre following a video-simulated walk. Second, a sub-sample of 14 participants was involved in photo and video-elicited interviews based on a real walk.

Quantitative results showed that simulated walks in pedestrianised areas without green elements were associated with affective benefits, as opposed to a commercial area with traffic. Building on these findings, the qualitative phase showed that motor traffic, poor aesthetics, and city busyness have a negative impact on affect. On the other hand, presence of nature and a connection with place supported affect. Specifically, it emerged that such connection is enabled by personal associations, historic elements, and sense of community.

This thesis offers the following main contributions. First, it offers a novel empirical assessment of the affective outcomes of walking in different urban settings and reveals that some urban walking settings support psychological wellbeing. Second, it offers a systematic, empirically-based characterisation of barriers and enablers of a positive affective walking experience in built settings. Finally, it shows how theories of environmental affect can inform active travel policies by revealing that a positive affective and restorative walking experience can encourage walking.

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LIST OF ACRONYMS

ANOVA	Analysis of Variance
ART	Attention Restoration Theory
CommTraf	Commercial Road with Traffic condition (The Horsefair) – see Chapter 4
DfT	Department for Transport
Park	Inner urban park condition (Castle Park) – see Chapter 4
PedHist	Pedestrianised Historic Environment condition (Corn Street) – see Chapter 4
PedMixed	Pedestrianised Mixed green-historic Environment condition (Deanery Street in College Green) – see Chapter 4
PedMod	Pedestrianised Modern Environment condition (Millennium Promenade) – see Chapter 4
PRS	Perceived Restorativeness Scale
R^2_{Adj}	Adjusted R2
RIBA	Royal Institute of British Architects
RQ	Research Question
SPSS	Statistical Package for the Social Science
SRT	Stress Recovery Theory
TIB	Theory of Interpersonal Behaviour
TFL	Transport for London
UWIST MACL	University of Wales Institute of Science and Technology Mood Adjective Check List
WHO	World Health Organisation

CHAPTER 1

1. INTRODUCTION

1.1 Context and Rationale

1.1.1 City environments and psychological wellbeing

The psychological wellbeing of individuals living in cities is nowadays one of the major public health challenges worldwide. Research has shown that compared to rural living, urban living is associated with increases in mood disorders (up to 39%) and anxiety disorders (up to 21%) (Peen *et al.*, 2010). A 2017 review has confirmed that living in cities is associated with higher risk for some major mental illnesses (e.g*.,* anxiety, psychotic, mood, or addictive disorders) (Gruebner *et al.*, 2017). These data are even more relevant considering current and future trends of urban living. In fact, in 2011, 81.5 per cent of population of England and Wales within the UK lived in urban areas (ONS, 2013), and in 2015 72.4 percent of the European Union's population lived in built-up areas (Eurostat, 2015). Furthermore, urbanisation trends are growing, with the UN estimating that more than half of the global population will be living in cities by 2060 (UN, 2014).

According to the Centre for Urban Design and Mental Health (UDMH, 2017), the association between urban living and poor psychological wellbeing can be partially explained by pre-existing risk or social factors. However, environmental factors also deserve great attention (UDMH, 2017). In fact, environmental factors are increasingly recognised as predictors of human health, with Norman Sartorius, former director of the World Health Organisation, defining health as "a state of balance, an equilibrium that an individual has established within himself and between himself and his social and physical environment" (Sartorius, 2006, p. 662). The overarching aim of the current PhD thesis is to contribute to the debate on the role of physical environments and psychological wellbeing in urban contexts and add knowledge and

recommendations on how physical environments can support psychological wellbeing.

The field of environmental psychology advances that environments have the capacity to moderate our psychological wellbeing (e.g., Fleury-Bahi, Pol and Navarro, 2016; Gifford, 2007; Mehrabian and Russell, 1974). Building on this idea, a rich body of research from environmental psychology and health-related disciplines has explored the benefits of nature contact on psychological wellbeing. Nature exposure has been shown to have positive effects on affective states and cognition (e.g., Cox *et al.*, 2017a; Cox *et al.*, 2017b; White *et al.*, 2017; McMahan and Estes, 2015; Thompson Coon *et al.*, 2011; Bowler *et al.*, 2010 – see Chapter 2 for extensive review). Hence, scholars largely agree on the notion that incorporating nature within cities is a successful strategy to improve urban dwellers' psychological wellbeing. However, due to factors such as financial and/or practical constraints, incorporating nature elements in cities not always possible. In addition, recent research has attested that opportunities to visit natural areas are limited for most urban dwellers, with 75% of time spent in nature experienced by just a third of the British urban population (Cox *et al.*, 2017a). Therefore, further strategies to improve the suitability of built environments to support psychological wellbeing are needed. The current PhD thesis focuses on one particular aspect of psychological wellbeing, which is the affective construct, and the next section introduces the concept.

1.1.2 Psychological wellbeing and affect

The term wellbeing refers to "optimal psychological functioning and experience" (Ryan and Deci, 2001, p. 142). Wellbeing refers not only to the absence of disease, but to a positive dimension of mental health (WHO, 2014; Ryan and Deci, 2001). In fact, according to Ryan and Deci (2001) since the 1960s there has been a policy focus towards prevention, rather than curing an illness.

There exists a fuzzy set of uses and misuses of the term wellbeing in literature (Dodge *et al.*, 2012), with two main perspectives dominating the literature: the eudamonic view and the hedonic view (Ryan and Deci, 2001). The eudamonic view focuses on meaning and self-actualisation; the hedonic view, which builds on the Greek

philosophical tradition of hedonism, tends to equate wellbeing with hedonic pleasure and happiness (Ryan and Deci, 2001). The current research focuses on the hedonic view of wellbeing, and defines psychological wellbeing as the presence of positive affect and the absence of negative affect (Ekkekakis, 2013; Russell, 2003; Ekkekakis and Petruzzello, 2000; Russell, 1980). Affective state is defined as "a neurophysiological state that is consciously accessible as a simple, nonreflective feeling that is an integral blend of hedonic (pleasure–displeasure) and arousal (sleepy–activated) values" (Russell, 2003, p. 145), hence referring to feeling good or bad, energized or enervated. These states are at the heart of emotions, that are short and intense reactions to something (Russell, 2003) (for further discussion on this, see Chapter 2).

Research has shown that there exists a link between hedonic wellbeing (e.g., short-term affective states) and long-term psychological wellbeing, and the notion that positive feelings can be beneficial to long-term health has received extensive attention by scholars (e.g., Consedine and Moskowitz, 2007; Fredrickson and Branigan, 2005; Fredrickson, 2001). For example, Fredrickson's (2001) *broaden-and-build* theory of emotions proposes that positive emotions have long-term benefits on individuals, in that they broaden thought–action repertoires, build psychological resilience and enhance psychological wellbeing. Also, according to a review of empirical evidence by Consedine and Moskowitz (2007), positive emotions are related to lower mortality, lower cardiovascular arousal and general improved health. In addition, these ideas have influenced academic social research and also non-academic fields. In fact, the so-called "affective turn" in the social sciences has given new emphasis to the role of affect and emotions in influencing human behaviour, performance, and even rationality (Schreuder *et al.*, 2016; Damasio, 1994). This shift conceives individuals as *affective* subjects, and suggests that emotions are essential to rational thinking (Damasio, 1994) and psychological wellbeing (Leyden, Goldberg and Michelbach, 2011), thus challenging the traditional rationality principles of economics. Along these lines, happiness and wellbeing are being acknowledged as important indicators of the success of nations (Helliwell, Huang, and Wang, 2017; Leyden, Goldberg and Michelbach, 2011), and policy makers

have recently called for a broader range of measures of wealth next to financial measures such as the GDP. For example, the UN have recently released the fifth edition of the World Happiness Report (Helliwell, Huang, and Wang, 2017), which proposes happiness as indicator to inform policy decisions.

Therefore, the current research examines immediate affective states and considers them as proxy of psychological wellbeing. The next section illustrates how walking, which is the policy focus of the current thesis, can entail affective benefits.

1.1.3 Walking

A further successful strategy to promote psychological wellbeing, other than designing health-supportive physical environments, is to encourage physical activity. The current research focuses on walking, an activity which entails social, environmental, economic, and health benefits (Gatrell, 2013; Robertson *et al.*, 2012; Sinnett *et al.*, 2011). In fact, despite the fact that it is a less vigorous form of exercise than most others (e.g., running), research indicates that walking has a positive impact on affective states. For example, it has been shown that walking can reduce stress (Roe and Aspinall 2011), increase energy (Ekkekakis *et al.* 2008), and elevate engagement levels (e.g., effortless attention triggered by aesthetics of the environment: Johansson *et al.* 2011). In 2012, a systematic review by Robertson *et al.* also showed that walking has a significant and large effect on the long-term symptoms of depression. According to scholars, the psychological wellbeing benefits of walking can be explained by several factors, including the physiological action of endorphins, increased social contacts, and psychological effects related to engaging with surroundings (Gatrell, 2013; Robertson et al, 2012). The current thesis focuses on the third aspect.

In addition, active forms of transportation such as walking and cycling are associated with psychological wellbeing as opposed to car commuting (Martin, Goryakin and Suhrcke, 2014) and with higher levels of satisfaction than using a car, bus, and/or metro (St-Louis *et al.*, 2014; Gatersleben and Uzzell, 2007). Shifting from vehicular to walking modes would also reduce car dominance, thus reducing air and noise pollution, which are additional elements associated with poor health in cities (Evans,

2003). Considering that walking is an inexpensive, relatively low-skilled mode of travelling that can be incorporated into daily routines, increasing walking levels is a priority for the urban sustainability agenda.

However, looking at the English context, people walk less compared to past decades. Levels of walking in England have dropped by 30% since 1995/97 (DfT, 2014a), and while walking is still the most popular mode for trips under one mile, less than 20% of trips between 1 and 5 miles involve walking (DfT, 2014a). In response to this, the DfT has set out a cycling and walking investment strategy that aims "to make cycling and walking the natural choices for shorter journeys, or as part of a longer journey" (DfT, 2017, p. 6). While the literature indicates that the affective walking experience varies depending on settings (e.g., Roe and Aspinall, 2011; van den Berg, Koole and van der Wulp, 2003), it is not clear whether the affective quality of walking also influences walking levels. This research also aimed to explore the association between the affective walking experience and walking intentions.

Therefore, given the context and rationale presented above, the current PhD research aims to explore how different characteristics of built environments can contribute to psychological wellbeing – in terms of affect – during walking. Specifically, the current research examined the effects of walking on affective variables in response to environmental exposure, and as a distinct phenomenon to the psychophysiological benefits of walking as physical exercise (see Chapter 4). In addition, another goal was to assess whether and how walking intentions are influenced by psychological wellbeing outcomes of walking. The central argument of the current thesis is that certain characteristics, such as motor traffic and architectural style, can influence the affective walking experience negatively and positively respectively, and also influence walking intentions (see Chapters 2 and 3).

1.2 Theoretical Context

The current research draws from two main theoretical contexts: theories of environmental affect within psychology, and the mobilities paradigm within geography. These two sets of literature from these largely distinct disciplines complement one another in the exploration and understanding of how urban settings

can support psychological wellbeing during walking and eventually encourage walking. The two sets of theories are critically analysed in Chapters 2 and 3 respectively, but a brief introduction is presented immediately below to enable contextualisation of the thesis topic.

First, this research is informed by Russell's (2003, 1988, 1980) *theory of environmental affect* and Ulrich's (Ulrich *et al.*, 1991; Ulrich, 1983) S*tress Recovery Theory (SRT),* both popular in the field of environmental psychology (for detailed discussion of these see Chapter 2). Both theories posit that environments elicit affective responses in individuals, and such responses subsequently influence behaviours. In particular, SRT has contributed to the emergence of *restorativeness* research, a field which focuses on the *restorative* properties of natural environments to support recovery from depleted affective states. The framework is complemented by Kaplan and Kaplan's (1989) Attention Restoration Theory (ART), which looks at the capacity of natural settings to aid cognitive recovery.

The second framework is the mobilities paradigm within geography (Urry, 2007; Sheller and Urry, 2006), which explores meanings and experiences of different types of journeys, from global mobility to everyday trips (see Chapter 3). The field is relevant for two reasons. First, because it proposes a focus on the travel experience per se, and looks at practices, performances, use of travel time, and emotional experiences of travel – with the latter being especially relevant for the current research. Second, because it considers environments as *places*, rather than mere physical contexts. Hence it examines them as the result of the relationship between individuals, movements, and environments (Tuan, 1977; Relph, 1976). According to Relph, the ways individuals experience physical space define place (1976).

It becomes clear that there exists a tension between the epistemological assumptions of the two disciplines (see Chapters 2 and 3 for an extensive discussion). The first set of theories (environmental affect and SRT) stand on the positivist assumption that there is one reality, and this is objective, measurable, and observable. With this regard, discourses on affect and restoration are based on physical properties of the environments – mainly the presence of green and blue elements – and on the psycho-evolutionary assumption that humans have an innate preference for natural settings

(Kaplan and Kaplan, 1989; Ulrich, 1983). Based on these ideas, the literature tends to *assess* the affective and restorative potential of settings – even though Russell's theory of environmental affect argues that affective appraisals are influenced by previous experiences, thus allowing a degree of individuality in the way settings affect humans (Russell and Lanius, 1984).

On the other hand, the mobilities field assumes that multiple realities exist, and these are constructed by individuals. Hence, the goal of much research within this field is to *explain* individual experiences and processes. However, by focusing attention on "practices, performances, politics, and poetics of walking", the field has tended to romanticise walking (Gatrell, 2013, p. 99). As a consequence, the wellbeing aspect of walking has largely been overlooked, as noted by Gatrell (2013), and opportunities for practical applicability seem to remain limited.

Therefore, the current PhD research aimed to bridge the gap between the two approaches. First, it aimed to offer to the field of affective and *restorativeness* research within environmental psychology a more constructivist approach that examines contextual and individual factors that might influence environmental affect and restoration. With this regard, some environmental psychologists have recently started to explore whether and how personal memories, attachments, and associations with environments contribute to restorative benefits (e.g*.,* Ratcliffe and Korpela, 2016). Therefore, the current thesis proposes that the mobilities literature can offer a valuable contribution to the field of affective and restorative experiences, especially to this emerging body of literature.

Second, the current research aimed to propose to the mobilities literature a way to *assess* the wellbeing benefits of walking, rather than critically *describing* them. Gatrell has argued that "the time is right to draw together elements of the mobilities literature, and elements of the well-being literature, in order to illuminate the ways in which mobilities can sustain health and wellbeing" (2013, p. 104). Hence, this thesis is an attempt to answer to Gatrell's call; this research draws together elements of the mobilities literature and elements of the environmental psychology literature on environmental affect to examine affective walking experiences in urbans settings. It is argued that combining theoretical and methodological approaches from

environmental psychology and geography offers a more detailed insight on the ways environments impact wellbeing and affect during walking.

1.3 Research Design

1.3.1 Aims and objectives

The overarching aim of this research is to explore *how city centre environments influence the affective walking experience*. More specifically, this thesis addresses three aims. First, it aims to assess the affective and restorative potential of walking in several built settings (RQ1). In fact, while the effects of walking in natural environments, either rural or urban, have received extensive attention from scholars (e.g., Roe and Aspinall, 2011; van den Berg, Koole and van der Wulp, 2003), there is a substantial lack of literature on the affective and restorative benefits of walking in built settings, as already noted by some scholars (e.g., Fornara, 2011; Karmanov and Hamel, 2008). Second, the current thesis aims to explore the processes behind affective and restorative outcomes, thus exploring why some settings might offer affective benefits and identifying barriers and enablers of a positive affective walking experience (RQ2). Third, it aims to assess the association between affective walking experience and walking intentions (RQ3). The three initial research questions are outlined in Box 1.1 and these will be developed in more detail in Chapters 2 and 3.

RQ1: To what extent can different urban environments support positive affective outcomes?

RQ2: What are the barriers and enablers of a positive affective walking experience in city centre environments?

RQ3: To what extent does the affective and restorative walking experience influence walking intentions within city centre environments?

Box 1.1: Initial research questions

1.3.2 Overview of the methodology

This research adopted a critical realist approach that builds on the strengths of two disciplines (Robson, 2011), mobilities *geography* and environmental *psychology* (see Chapter 4), with a mixed methods strategy addressing the research questions. The methodology was driven by the research questions, in line with the critical realist approach. Such a methodological approach was suited to linking the two main disciplines that informed this research, whilst enabling the combination of different epistemological, theoretical, and methodological backgrounds.

The methodological strategy comprised of a two-phase sequential explanatory design (Cresswell and Plano Clarke, 2011): a quantitative, experimental study with a population of Bristol city centre walking users (Phase 1) and a qualitative interview phase with a sub-sample of participants based on individual actual walks (Phase 2). Specifically, the population included two sub-groups: undergraduate psychology students and non-students (referred to as employees hereafter) who work within Bristol city centre. As student samples are popular in the psychology literature concerning studies of affective restorative experiences of walking (e.g*.,* van den Berg, Jorgensen and Wilson, 2014; Johansson, Hartig and Staats, 2011; Karmanov and Hamel, 2008; van den Berg, Koole and van der Wulp, 2003), the current research employed an additional sample of non-students in order to counter-balance this disproportion in the literature and to attempt to verify whether there are difference in the ways the two groups experience walking in terms of affect (see Chapter 2).

The experiment addressed RQ1 and aimed to quantify the affective walking experience in different environments. Specifically, in order to assess the effects of walking on affective variables in response to environmental exposure, a virtual experiment was performed, as it allowed controlling for the psychophysiological effects of walking. The interview phase aimed to consider the processes and mechanisms behind the quantitative findings, thus addressing RQ2. This consisted in a photo-elicited interview that followed an individual walk. Finally, RQ3 was addressed with Phases 1 and 2, thus with both quantitative and qualitative research, and aimed to explore whether and how walking intentions are influenced by the affective walking experience.

1.4 Thesis Structure

This thesis is structured into 8 chapters, which are briefly outlined below (also see Figure 1.1). Chapters 2 and 3 illustrate the literature review that informed the current research. Chapter 2 presents theories on environmental affect and related empirical evidence. Russell's theory of environmental affect and Ulrich's Stress Recovery Theory are outlined. The chapter also reviews empirical evidence of the affective and restorative outcomes of walking in urban settings, thus partially addressing RQ1.

Chapter 3 sets out the second theoretical pillar of this research, which is the mobilities paradigm within geography. This chapter critically analyses the contributions of the mobilities field to the current work: first, it illustrates the role of the affective aspects of walking; second, it reviews how engaging with place can have psychological wellbeing benefits. The chapter also illustrates how affective walking experiences might influence walking intentions. Following these points, the research questions are presented, setting the context for the discussion of the methodology in Chapter 4.

Chapter 4 sets out the research methodology and this is informed by the theoretical perspective and epistemological position of this research. Specifics of the methodological strategy are then presented. The research design and administration are then illustrated for Phase 1 and 2 of research, including the rationale, data collection strategy, recruitment procedures and analysis strategy related to each phase.

Chapters 5, 6, and 7 present findings related to research questions 1, 2, and 3 respectively, and discuss them in relation to the literature. Chapter 5 outlines results from the online experiment and addresses RQ1 (*To what extent can different city centre environments support positive affective outcomes?*). Chapter 6 presents and discusses the qualitative findings from the qualitative study relative to RQ2 of the study (*What are the barriers and enablers of the positive affective walking experience in city centre environments?*). Finally, Chapter 7 draws on both phases 1 and 2 and addresses RQ3 (*To what extent does the urban affective walking experience influence*

walking intentions within city centre environments?) with a mix of quantitative and qualitative research methods and analyses.

Finally, Chapter 8 sets out the conclusion of the current research. The chapter includes an integrated discussion which highlights the novel findings of the thesis, and illustrates the theoretical and practical contributions of this research. Suggestions for future research are also identified.

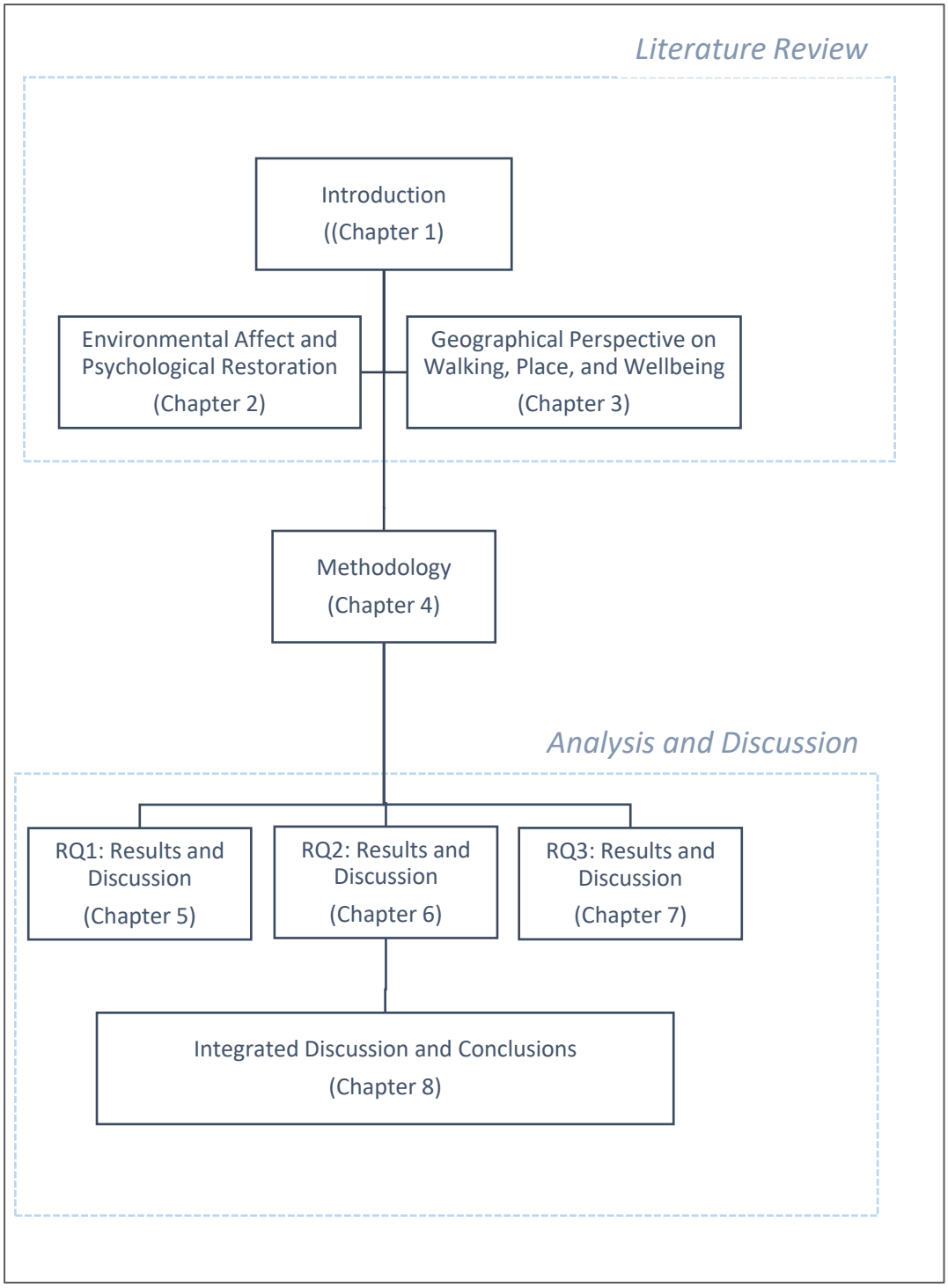

Figure 1-1: Thesis structure

CHAPTER 2

2. ENVIRONMENTAL AFFECT AND RESTORATION DURING WALKING[1]

2.1 Introduction

This chapter outlines the first set of theoretical frameworks that informed the current thesis and related empirical evidence. Specifically, Russell's (Russell, 2009, 2003, 1980; Russell and Barrett, 1999; Russell and Lanius, 1984; Russell and Pratt, 1980) *Theory of Environmental Affect* and Ulrich's (Ulrich *et al.*, 1991; Ulrich, 1984) *Stress Recovery Theory (SRT)*. These are popular in the field of environmental psychology, which involves the study of interactions between individuals and their physical settings (Fleury-Bahi, Pol and Navarro, 2016; Gifford, 2007; Mehrabian and Russell, 1974). Russell and Ulrich claim that environments elicit affective responses in individuals, and such responses subsequently influence behaviours. While both theories examine environmental affect, SRT focuses on the properties of some environments – specifically natural – to support recovery from depleted affective states.

The chapter also reviews the evidence on the possible moderating role of different settings on environmental affect. Whilst there is a rich literature documenting the benefits of nature contact on affect during walking, the affective and restorative potential of walking in urban settings have not received much attention from scholars. However, as illustrated in the introduction of the current thesis (Chapter 1), assessing the possible benefits of walking in urban settings has the potential to reveal important policy implications. Hence, the current chapter aims to establish the basis

[1] Part of this chapter is based on Bornioli, Parkhurst, and Morgan, 2018. With permission from authors, Psychological wellbeing benefits of simulated exposure to five urban settings: an experimental study from the pedestrian's perspective, Journal of Transport and Health, in press, Elsevier, 2018.

for the rest of the thesis by outlining and critically discussing theories and evidence on affective and restorative experiences of urban settings.

The chapter is structured as follows. Section 2.2 illustrates Russell's framework of environmental affect (2009; 2003; 1980) and Ulrich's SRT (Ulrich *et al.*, 1991; Ulrich, 1983). The limited evidence on the moderating role of different settings on affective states is reviewed in Section 2.3, with a particular focus on affect and restoration during walking. Building on such a review, Section 2.4 illustrates the factors that might contribute to environmental affect in urban settings. A critical synthesis is also presented at the end of the chapter (Section 2.5).

2.2 Theoretical Perspectives on the Moderating Role of Settings

2.2.1 Environmental affect

The first theoretical framework that informed the current PhD thesis is Russell's theory of affect (Russell, 2009, 2003, 1980; Russell and Barrett, 1999; Russell and Lanius, 1984; Russell and Pratt, 1980). Russell proposed that the key to understanding people's response to the physical environments is through affect, and that places are interpreted by individuals in terms of affect:

> *Objects, events, and places (real, imagined, remembered, or anticipated) enter consciousness affectively interpreted (Russell, 2003,* p*. 149).*

According to Russell (1980), environmental affect is the influence of the physical environment on affective states. The way individuals perceive physical settings through affect influences subsequent reactions, activities, and behaviours. Specifically, affective responses elicit two general forms of behaviour: *approach* (desire to stay and explore) or *avoidance* (desire to leave) (Mehrabian and Russell, 1974). Positive affect elicits approach behaviours and negative affect triggers avoidance.

Russell's theory of affect is also influenced by Helson's (1964, quoted in Russell and Lanius, 1984) idea of adaptation, which asserts that "judgments about a stimulus are always relative to the context of judgment, including peripheral and previously

encountered stimuli" (Russell and Lanius, 1984, p. 121). Hence, affective appraisals are influenced by previous experiences. For instance, and according to Russell and Lanius (1984), individuals that migrate to cities from rural areas are likely to evaluate urban settings as noisier and more polluted than dwellers who have spent more time residing in cities (1984). In this sense, affective appraisals are considered relative and subjective, as they are influenced by previous experience, judgements, and previously encountered places (Russell and Lanius, 1984; Mehrabian and Russell, 1974).

Russell (1980) proposed a circumplex model of affect as a theoretical context to underpin environmental affect (Figure 2.1). An environment is automatically perceived in terms of two dimensions: valence (degree of pleasantness) and arousal (degree of intensity). In Figure 2.1, positive affect lies on the right of the x-axis, and negative affect on the left; active affective states lie at the top of the y-axis, while inactive affective states lie at the bottom. These two dimensions (valence and arousal) characterise core affect at any point. Therefore, affective states such as 'happy', 'gloomy', 'stressed', 'relaxed', etc. are located at specific points in the two-dimensional space. For instance, 'stress' is a combination of activation and unpleasant. Therefore, affective states vary in intensity and pleasantness, but core affect is a flow that is always present.

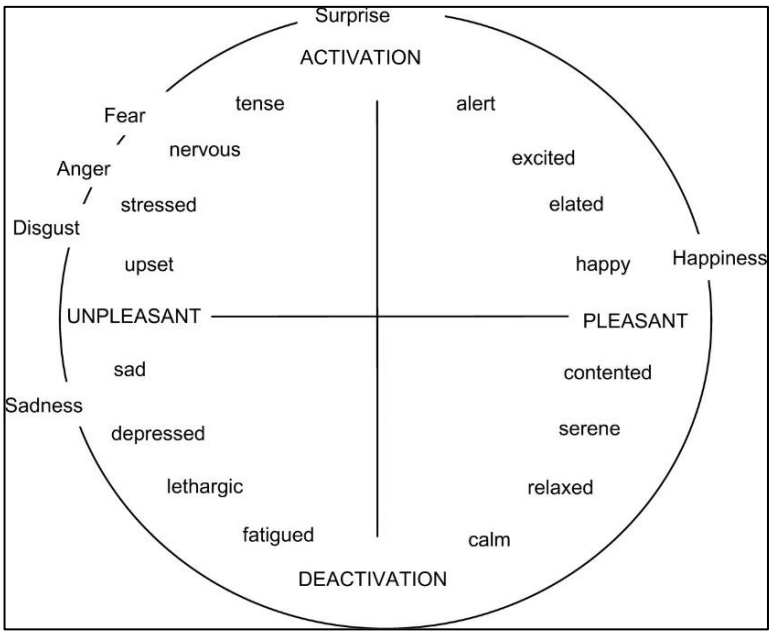

Figure 2-1: The Circumplex Model of Affect (Russell and Barrett, 1999).

Note. The inner circle shows core affective states. The outer circle shows prototypical emotional episodes. From "Core affect, prototypical emotional episodes, and other things called emotion: dissecting the elephant." by J.A Russell and L.F. Barrett,1999, Journal of Personality and Social Psychology, 76(5), 805-819. Copyright 1999 by American Psychological Association. No permission required for reprint.

The intensity of core affect also depends on external stimuli. Core affect can be unconscious and free-floating, or directed at something. When unconscious, it can still be very intense – such as in the case of feeling tense at the end of a stressful day – and is still related to events or elements. When it has a conscious object, it becomes an emotion – using Russell and Barrett's terminology, a "prototypical emotional episode" (1999, p. 806).

Emotions are a subset of core affect, in the sense that they involve affect. While core affect is "the most elementary consciously accessible affective feeling" (Russell and Barrett, 1999, p. 805), emotional episodes are short and intense reactions to something (e.g., getting angry *with* someone, experiencing fear *towards* something). Examples of prototypical emotional episodes are fear, anger, disgust, awe, shame – represented in the outer circle in Figure 2.1 (Russell and Barrett, 1999). They last for a specific amount of time that lasts from "seconds to minutes" (Ekkekakis, 2013, p. 47). Emotions entail four components: 1) core affect, 2) a cognitive appraisal of the object, 3) physiological reactions – facial expressions, change of heart rate, etc., and 4) a behaviour related to the object (Russell, 2003).

A third affective construct that is used in the literature is mood (Ekkekakis, 2013). Mood refers to a long-term status that can last hours or days. The intensity is lower than that of an emotion but generally higher than that of core affect. Similarly to core affect, an object is not necessary to experience mood. Examples are euphoria, grumpiness, and clinical conditions such as depression are also considered to invoke mood states. Hence, while affect refers to the generic valence response, both mood and emotion point towards a cognitive appraisal process. Whereas mood describes a long-term status, emotion refers to a short-term, intense reaction resulting from a specific event.

However, definitions of affect and emotions are not universally accepted (Ekkekakis, 2013; Ekkekakis *et al.*, 2008). Despite different conceptualisations of affect, mood, and emotion exist, the terminology within existing studies is inconsistent, with some

scholars defining ‘stress’ as a mood state (e.g., Roe and Aspinall, 2011; Van den Berg, Koole and van der Wulp, 2003), even though within Russell’s framework stress is conceived as an affective state (Russell, 2003). The current thesis argues that the walking experience involves both core affect and emotions. Specifically, appraisals related to physical settings can be unconscious and mild, hence involving core affect, or intense and directed to specific objects, hence triggering emotions. By referring to the affective walking experience, the current PhD research aims to explore both its affective and emotional aspects (see also Chapter 4 for methodological issues related to measurement of core affect).

Russell and Lanius (1984) also distinguish between affective appraisals and affective/emotional experiences. Affective evaluations are defined as judgments “[…] about the ability of the place to alter emotional feelings” (1984, p. 119). For instance, individuals attribute affective qualities to a place when they state that 'a place is gloomy, arousing', etc. On the other hand, the affective and emotional experience is a “short-term state that is directly related to the environmental stimuli” that can be “either observed consciously (feeling aroused, pleasant in a specific environment) or unconsciously processed” (Schreuder *et al.*, 2016, p. 3). Hence, while affective appraisals do not necessarily involve actual emotions, affective and emotional experiences refer to the actual emotional state of individuals (‘I feel aroused’) in a place.

In this regard, Schreuder *et al.* (2016) recently elaborated on the methodological difference between assessing affective appraisals and actual affective reactions. When producing affective appraisal, individuals are evaluating the ‘external’ emotional potential of an object, but may not experience the emotion while looking at the scene. Conversely, the assessment of actual affective states entails individuals to experience ‘internal’ emotions. Despite the methodological differences, in reviewing studies on the emotional effects of multisensory stimulation, according to Schreuder *et al.* (2016) there is a relationship between affective appraisals and actual responses, and affective appraisals can be considered a proxy for affective experiences. In fact, on one hand affective evaluations are influenced by past affective experience; in this sense, when an individual makes an affective appraisal,

he/she will be likely to base his/her appraisal on actual emotional reactions that took place in the past. On the other hand, affective appraisals can automatically increase levels of arousals, thus triggering an emotional episode (Schreuder *et al.*, 2016). Importantly, authors have also attested that both affective appraisals and experiences produce behaviours (Damasio, 1994; Russell and Lanius, 1984; Mehrabian and Russell, 1974). Specifically, positive affective appraisals and experiences elicit approach behaviours, while negative appraisals and experiences elicit avoidance behaviours. The difference relies on the fact that an emotion is a more potent driver of decision making, hence it can trigger irrational behaviour, while an affective appraisal is likely to elicit rational behaviour (Schreuder *et al.*, 2016). The current thesis focuses on affective experiences, rather than on appraisals, and methodological implications will be discussed in Chapter 4.

To sum up, this section has provided a discussion of Russell's conceptualisation of environmental affect. This seems to offer an excellent conceptual and methodological framework to assess the influence of environments on individuals' wellbeing and behaviours. However, the framework does not posit specific hypothesis on the types of environments, nor on specific characteristics, that might support affect. In contrast, Ulrich's SRT is based on the assumption that natural environments, as opposed to built settings, support positive affect. SRT is illustrated in the next section.

2.2.2 Restoration Theories

The second framework of environmental affect that informed the current thesis is Ulrich's Stress Recovery Theory (SRT), also referred to as theory of restorative environments (Ulrich *et al.*, 1991; Ulrich, 1983). Ulrich defines restorative environments as those settings that contribute to stress recovery and increase positive affect. Therefore, and differently from Russell, Ulrich's theory specifically considers the stress-relieving and affect-enhancing properties of environments, hence focusing on stressed individuals.

Ulrich considers affect as precognitive, hence innate and cross-cultural. Affective responses are guided by "survival requirements", and therefore they are quick and

"independent of recognition", and are based on "very little information" (1983, p. 89). According to Ulrich (1983), affect also guides behaviour: while an initial feeling of interest and pleasantness will produce a positive behaviour (approach or exploration), an initial negative feeling of fear or anxiety will produce avoidance or flight. Similarly to Russell (2003), Ulrich acknowledges that personal experiences, memories, and imagination can accompany cognitive evaluations of settings (1983) (e.g., see also Ratcliffe and Korpela, 2016; Ratcliffe, Gatersleben and Sowden, 2013). However, he tends to exclude that cultural factors have an influence (Ulrich *et al.*, 1991).

While Russell does not appear to advance hypotheses on the type of setting that elicits positive affect, according to Ulrich, it is exposure to natural settings that promotes greater restoration than contacts with urban environments (Ulrich *et al.*, 1991). This idea is based on the psycho-evolutionary hypothesis, which argues that individuals have an innate inclination towards natural environments due to the fact that humans evolved over a long period in natural environments (1991, p. 205). Ulrich claims that exposure to natural settings elicits positive affect and stress recovery specifically when individuals are experiencing stress or anxiety (1983). However, restoration includes not only stress recovery but also the recuperation from negative states, either under-stimulation or low arousal (Ulrich, 1983).

Ulrich's framework is also complemented by Kaplan and Kaplan's theory of restorative environments Attention Restoration Theory (ART) (Kaplan and Kaplan, 1989; Kaplan, 1987). The two frameworks are considered complementary rather than competing, as they both conceptualise restorative environments as those settings that facilitate recovery from a depleted physical or psychological status (Herzog *et al.*, 2003). However, ART conceptualises restoration as the capacity of some settings to support recovery of cognitive attention, rather than affective states. Authors of both frameworks argue that nature contact elicits restoration; however, according to ART, any setting can potentially support restoration if one or more restorative properties are present (Kaplan and Kaplan, 1989). These include: *being away* (being mentally removed from routine or demanding activities), *fascination* (being engaged without attentional effort), *compatibility* (providing a good fit with one's activities or

inclinations), and *scope* (the environment has sufficient content and structure that it can occupy the mind for an extended period). The perspective adopted by these theories (SRT and ART) is also supportive of the Biophilia hypothesis, which proposes that humans have an innate inclination towards nature (Kellert and Calabrese, 2015), and that exposure to natural environments is beneficial to wellbeing.

Table 2.1 summarises the characteristics and differences between Russell's model of environmental affect and Ulrich's SRT. As shown in Table 2.1, both models target affect; however, SRT focuses on stressed individuals and looks at the capacity of environments to contribute to recovery from depleted mental states. Both models conceive affect as pre-cognitive and as an approach-avoidance response and frame affect as innate. However, Russell's framework allows a certain degree of subjectivity, also based on the idea of adaptation – i.e., that previous experience influences affective responses. Conversely, SRT excludes cultural influences, even though it recognises the secondary role of memories and personal associations. Finally, one of the most important differences is that while Russell does not advance hypothesis on the type of settings that can support affect, SRT posits that it is natural settings that can support affect.

Table 2.1: Summary of features of Circumplex Model of Affect and Stress Recovery Theory

	Affective construct	Approach - avoidance	Cognition	Influences	Adaptatio-nal	Type of settings
Circumplex Model of Affect (Russell)	Affect	Yes	Pre-cognitive	Based on survival instinct but subjective	Yes (subjecti-ve)	No specific hypothesis
Stress Recovery Theory (Ulrich)	Affect in stressed indivi-duals	Yes	Pre-cognitive	Innate; secondary role of memories and imaginatio n	No (tends to be cross-cultural)	Natural settings support stress recovery

The next section involves a review the evidence on affective and restorative outcomes to walking in urban settings. Kaplan's ART is not the focus of this thesis; hence the review within Section 2.3 does not explicitly focus on cognitive restoration. However, as measures of perceived restoration are generally positively associated

with affective restoration (e.g., White *et al.*, 2010; Fornara 2011), perceptions on restoration are likely to say something about the affective potential of settings. For this reason, the evidence on perceived restoration that is considered relevant to this thesis is also reviewed.

2.3 Evidence Regarding Environmental Affect and SRT

2.3.1 The 'urban versus built' dichotomy

As discussed above, Russell does not advance hypotheses on the specific characteristics of environments that can trigger positive affect. Despite the partial subjectivity of environmental affect, he argues that it is still possible to ascertain an average affective appraisal from a group of individuals relative to a particular environment (Russell, 1980). Differently from Russell's circumplex model of affect, both ART and SRT argue that it is exposure to natural environments, as opposed to built environments, that can promote restoration (Ulrich *et al.*, 1991).

An extensive body of research has been based on theories of environmental affect advanced by Russell and Ulrich. For example, the fields of physical activity studies and environmental psychology have made extensive use of Russell's framework and Ulrich's SRT to assess the moderating role of different settings on physical activity. However, the attention of scholars within these fields has focused almost entirely on the added affective and cognitive benefits of nature exposure during walking. Three reviews have recently confirmed the added benefits of nature exposure compared to exposure to built settings. First, Thompson Coon *et al.*, (2011) conducted a systematic review on the affective benefits of doing exercise in natural settings as opposed to indoor environments. The authors found that the former is related to additional positive effects on mood, including benefits on revitalisation, engagement, enjoyment and vitality. Second, another systematic review critically evaluated the 'added benefits' of exposure to nature and built environments (Bowler *et al.*, 2010). The evidence confirmed that nature exposure enhances the positive benefits of walking and running, compared to physical activity in a built setting. Specifically, according to Bowler and colleagues, nature settings, compared to the synthetic

environment, positively contribute to recovery of anger, fatigue, sadness, and energy. Third, similar conclusions have been reached by McMahan and Estes (2015), who conducted a meta-analysis on the effects of nature contact on affect. Results indicated that there is strong evidence on the benefits of exposure to natural environments on positive affect, with a smaller, yet consistent, association with decrease in negative affect relative to comparison conditions – built settings. However, despite these reviews indicating that walking in natural settings supports affect more than walking in built settings does, it becomes clear that these findings say little about the impacts of urban walking on affective variables.

In addition, studies have shown that also incorporating natural elements in cities can improve the affective and restorative potential of built environments. For example, a very recent research report found that neighbourhoods with more birds, shrubs and trees are associated with lower risks of suffering from depression, anxiety and stress (Cox *et al.*, 2017b). These findings support and confirm previous work from the area of environmental psychology that has indicated that urban parks, including small parks, offer restorative experiences (Nordh *et al.*, 2009). According to Nordh *et al.* (2009), park size is the most important predictor of restoration, with presence of grass, bushes, and trees also contributing to it. Looking at the effects of street vegetation, Lindal and Hartig (2015) found that street trees and flowers were found to increase perceived restoration. White and Gatersleben (2011) have also attested that building-integrated vegetation is associated with higher preference, attractiveness, restoration, and affect compared to buildings without vegetation. Research has also investigated the role of 'blue elements' (canals, rivers, ponds, and fountains) in affective and restorative outcomes in both natural and built scenes (White *et al.*, 2010). Results have shown that the affective potential of built scenes containing water is comparable to the affective evaluation of green-only scenes.

Hence, there is general agreement on the notion that natural settings, including built settings with natural elements, provide more opportunities to restore and support mental health than built-only settings do (e.g., MacMahan and Estes, 2015; Thompson Coon *et al.*, 2011; Bowler *et al.*, 2010). However, the current PhD research argues that such comparisons do not necessarily imply that walking in built settings

entails negative effects on affective variables; arguably, the affective potential of urban settings might be positive, even though lower than the benefits of nature exposure. In fact, recent studies have attested that exposure to and activities in some urban settings can trigger affective and restorative benefits, thus confirming Kaplan and Kaplan's idea that any setting can potentially support restoration from stress (Kaplan and Kaplan 1989). Among these, several studies have found for example, that visiting a shopping centre elicits perceived restoration (Rosenbaum, Otalora and Ramírez, 2016) and positive affect (Fornara, 2011). Also spending time in a café was judged as restorative (Staats *et al.*, 2016). Finally, some scholars attested that visiting museums (Packer, 2013; Packer and Bond, 2010; Kaplan, Bardwell and Slakter, 1993), houses of worship (Herzog *et al.*, 2010) and a monastery (Ouellette, Kaplan and Kaplan, 2005) can reduce stress and is perceived as restorative. These findings also echo previous research by Hartig *et al.* (1996) and Scopelliti and Giuliani (2004), which assessed participants' descriptions of their everyday restorative experiences across the lifespan. In fact, these two studies attested that also built settings offer restorative experiences.

Nevertheless, little attention has been given to the study of the affective potential of *walking* in built settings. In fact, within the experimental studies reviewed, the affective walking experience in cities was examined exclusively as part of a comparison between walking in nature and in built settings, and no study to date seems to have compared affective benefits of walking in different urban settings. As Chapter 1 outlined, it is argued that examining environmental outcomes of walking in urban settings would have important policy implications, which are related to the psychological wellbeing of urban dwellers and to the decreasing levels of walking in cities. The next section aims to fill this gap by reviewing the limited evidence, based on experimental approaches, on the affective outcomes of walking in urban settings.

2.3.2 A review of the affective outcomes of walking in urban settings

This section presents a review of the evidence on affective outcomes of walking in built environments. Only studies satisfying the conditions below were considered for the review:

1. Studies that evaluated the outcomes of walking on psychological wellbeing in at least one outdoor built setting.
2. Studies that included a quantitative measure of affect expressed with psychometric scales (physiological measures are not considered here). In particular, only those studies that included affect, mood and emotions scales were considered.
3. Studies examining leisure walking, hence excluding those analysing exercise, running, jogging etc.

Section 2.3.2.1 illustrates the characteristics of the studies and summarises the findings (see also Table 2.2). The following Section 2.3.2.2 outlines a critical appraisal of the studies and discusses the implications for the current thesis.

Table 2.2: Reviewed studies on affective outcomes of walking in urban settings

Authors	Participants Mean age (% female)	Location	Experiment type	Walk type	Urban area description	Affect scales	Results
Berman, Jonides and Kaplan, 2008	38 students 22.6 (61%)	Ann Arbor, Michigan (USA)	Field	50-minute individual walk following attention manipulation	Downtown area on traffic-heavy street. University and office buildings.	Positive and Negative Affect Schedule (PANAS)	No pre-post changes presented. Only between-setting comparisons presented.
Gidlow *et al.*, 2016	38 adults 40.9 (35%)	West Midlands (UK)	Field	30-min walk, no stressor	Residential area with low motor traffic	Brunel Mood Scale (BRUMS, Profile of Mood Scale (POMS)	Mood improved ($p < .05$).
Hartig and Staats, 2006	103 students 24 (52.4%)	Stockholm (Sweden)	Lab	12 min slideshow following a stressful lecture	Urban, densely built. Several streets: area of office buildings and hotels, outdoor market, another is a major thoroughfare. Relatively low levels of pedestrians and traffic. Buildings are predominantly modern high-rise. Some plants and trees are visible.	Attitude toward walk; Likelihood of restoration	City walk related to low likelihood of restoration in both fatigue and not fatigued conditions.
Hartig *et al.*, 1991 Study 2	102 college students Na (50%)	Santa Ana, California (USA)	Field	40-minute individual walk following stressor	Well-kept mixed residential-commercial area near the centre	Zuckerman Inventory of Personal Reactions (ZIPERS)	No pre-post changes presented. Only between-setting comparisons presented.

Table 2.2: Reviewed studies on affective outcomes of walking in urban settings

Authors	Participants Mean age (% female)	Location	Experiment type	Walk type	Urban area description	Affect scales	Results
						Overall happiness scale	
Hartig *et al.*, 2003	112 students 20.8 (50%)	Orange (USA)	Field	50-min walk following attention manipulation	Industrial, outskirt area	ZIPERS	Positive affect decreased (p <.05). anger and depression increased (p < .01)
Johansson, Hartig and Staats, 2011	20 students 23 (50%)	Sweden	Field	40-mins individual walk, no stressor used	Commercial area with heavy traffic	Exercise-induced Feeling Inventory (EFI)	Tranquillity decreased (p < .10)
Karmanov and Hamel, 2008	85 students 21.8 (63.5%)	Amsterdam (The Netherlands)	Lab	10-minute simulated walk with video, no stressor used	Modern development by Amsterdam docks – canal	POMS	Improvement in depression, anger, tension (p < .05)
Kinnafick and Thøgersen-Ntoumani, 2014 Study 1	40 physically inactive students and staff 23.8 (80%)	Northampton (UK)	Lab on treadmill with video	15 min walk with video on treadmill, no stressor used	Busy commercially dominant area with crossings	PANAS, Activation-Deactivation Adjective Check List (ADACL) Feeling Scale (FS)	Positive affect increased (p < .01) Negative Affect increased (p < .05) tiredness decreased (urban; p < .05)

Table 2.2: Reviewed studies on affective outcomes of walking in urban settings

Authors	Participants Mean age (% female)	Location	Experiment type	Walk type	Urban area description	Affect scales	Results
							calmness decreased ($p < .01$) pleasure improved ($p < .01$) energy increased
Kinnafick and Thøgersen-Ntoumani, 2014 Study 2a – walking condition	30 physically inactive students and staff 25.8 (60%)	Northampton (UK)	Field	15-min individual walk, no stressor used	Busy commercially dominant area with crossings	PANAS ADACL FS	Positive affect increased (*ns*), negative affect decreased (ns), energy increased ($p < .01$) tiredness decreased ($p < .01$) pleasure increased ($p <. 01$)
Roe and Aspinall, 2011 (Good mental health group)	24 adults with poor and good mental health 46 (64%)	Stirling (UK)	Field	1-hour group walk, no stressor used	Stirling town centre with some greenery and some historic interest	UWIST MACL	Hedonic tone, stress improved ($p < .05$)

Table 2.2: Reviewed studies on affective outcomes of walking in urban settings

Authors	Participants Mean age (% female)	Location	Experiment type	Walk type	Urban area description	Affect scales	Results
Roe and Aspinall, 2011 (Poor mental health group)	46 adults with good mental health (64%)	Stirling (UK)	Field	1-hour group walk, no stressor used	Stirling town centre with some greenery and some historic interest	UWIST MACL	Non-significant hedonic tone and stress improvement;
Tilley *et al.*, 2017	8 older individuals NA (NA)	Edinburgh (UK)	Lab	15 min video of walk that participants took previously, no stressor used	Urban busy road with narrow pavements, high buildings, shops, supermarket, and traffic	Visual analogue scale (VAS)	High excitement (direct attention) – but in green was higher High engagement (arousal) but green was higher Low frustration (negative valence) but in green was lower
Tsunetsugu *et al.*, 2007	12 university students 22 (0%)	Nigata (Japan)	Field walks, repeated	Several 15-minute walks following stressor	Central area with traffic	Stress–Refresh feeling test	Decrease in feelings of comfort ($p < .05$) "Comfortable" feeling lowered ($p < .01$).

Table 2.2: Reviewed studies on affective outcomes of walking in urban settings

Authors	Participants Mean age (% female)	Location	Experiment type	Walk type	Urban area description	Affect scales	Results
							Decrease in feeling refreshed ($p < .05$)
Tyrväinen *et al.*, 2014	77 employees healthy, non-smoking 47.6 (92%)	Helsinki (Finland)	Field walk	30 minutes group walk led by researcher following stress manipulation	City centre, with few urban trees. Passed shopping and traffic centre and back	Positive and Negative Affect Schedule (PANAS), Vitality Scale	Positive affect, high energy level, full concentration and pleasurable engagement) decreased (*ns*); Negative affect, distress, nervousness, anger, guilt decreased (*ns*)
Ulrich *et al.*, 1991	120 students NA (50%)	Texas (USA)	Lab	10-minute video (no walk task) following stress manipulation	Traffic condition: commercial street with heavy to light traffic. two way street; Pedestrianised condition: outdoor shopping mall with varying levels of pedestrians	ZIPERS	Fear, sadness, attention decreased. Anger and positive affect increased in pedestrian. No difference traffic-pedestrianised

Table 2.2: Reviewed studies on affective outcomes of walking in urban settings

Authors	Participants Mean age (% female)	Location	Experiment type	Walk type	Urban area description	Affect scales	Results
							(except for anger recovery stronger in traffic condition).
Van den Berg, Jorgensen and Wilson, 2014	102 students 22.2 (55%)	Sheffield (UK)	Lab	6 minute simulated walk (photo/ video) following stress manipulation	Sequence of streets, alleys and open spaces in an historic part of the city of Sheffield. Virtually no vegetation, but had a well-defined sense of enclosure provided by the buildings and streetscape	POMS	Negative mood recovered (*ns*) Vitality decreased ($p < .001$)
van den Berg, Koole and van der Wulp, 2003	114 students 21.9 (67.9%)	Netherlands	Lab	7 minutes simulated walk with video following stress manipulation	Two walks accorpated: 1: walk through a street along a canal, with houses and shops on the other side of the street. 2: Walk through a nearby street with houses and shops on both sides of the street, without views of the canal. People and traffic were visible and audible	POMS	Depression, anger, tension, overall stress decreased ($p < .05$). No effects on overall happiness and overall stress, both $p > .10$)

2.3.2.1 Descriptive summary of studies included in review

Seventeen studies were identified. Eight studies involved laboratory experiments (Karmanov and Hamel, 2008; van den Berg, Koole and van der Wulp, 2003) and nine involved field experiments (e.g., Johansson, Hartig, and Staats, 2011; Hartig *et al.*, 2003), thus highlighting a fairly balanced methodological choice.

Study populations were university students in 64% of cases – 11 out of 17 studies (e.g., Van den Berg, Jorgensen and Wilson, 2014; Johansson, Hartig, and Staats, 2011; Berman, Jonides and Kaplan, 2008; Hartig *et al.*, 1991), non-student adults in five cases (e.g., Tyrväinen *et al.* 2014; Roe and Aspinall, 2011 – both samples), or a mix of the two sample types (Kinnafick and Thøgersen-Ntoumani, 2014 – study 1 and 2). Mean age was lower than 26-years in 14 cases, between 40 and 47 in three cases, and not reported in three studies; this finding highlights a disproportion which will be further discussed in Section 2.4.2. Gender of participants was fairly balanced, with a greater proportion of female participants in ten studies (e.g*.,* Gidlow *et al.*, 2016) (see Section 2.4.2 for extensive discussion).

Turning to setting characteristics, experimental urban settings were unattractive commercial or peripheral areas with motor traffic in 10 cases (e.g., Tilley et al, 2017; Tyrväinen *et al.*, 2014; Kinnafick and Thøgersen-Ntoumani, 2014 - study 1 and 2; Johansson, Hartig, and Staats, 2011; Hartig *et al.*, 2003; Ulrich *et al.*, 1991;). In the remaining seven studies, settings were city centre or residential areas with reportedly low levels of traffic and some aesthetic quality (e.g., Van den Berg, Jorgensen and Wilson, 2014; Karmanov and Hamel, 2008; van den Berg, Koole and van der Wulp, 2003). Hence, it becomes clear that selected locations are mainly areas defined negatively in socio-cultural terms (see Section 2.3.2.2).

Field experiments involved either group walks (e.g., Roe and Aspinall, 2011 – both samples) or individual walks, with walking pace set by each participant (e.g., Johansson, Hartig, and Staats, 2011). Laboratory experiments were based on photographs slideshows (e.g., Van den Berg, Jorgensen and Wilson, 2014; Hartig and Staats, 2006; Staats *et al.*, 2003) or videos of simulated walks (e.g., Karmanov and Hamel, 2008; Ulrich *et al.*, 1991) (see Chapter 4 for methodological implications related to these).

Turning to results, five studies found that walking in urban settings triggered positive affect (Gidlow *et al.*, 2016; Kinnafick and Thøgersen-Ntoumani, 2014 - Study 2; Roe and Aspinall, 2011 – poor mental health group; Karmanov and Hamel 2008; Van den Berg, Koole and van der Wulp, 2003). Seven studies reached the opposite conclusion (Tilley *et al.*, 2017; Van den Berg, Jorgensen and Wilson, 2014; Johansson, Hartig, and Staats, 2011; Tsunetsugu *et al.*, 2007; Hartig and Staats, 2006; Hartig *et al.*, 2003; Staats *et al.*, 2003). Finally, four studies reported non-significant or mixed results (e.g., Kinnafick and Thøgersen-Ntoumani, 2014 - Study 1; Roe and Aspinall, 2011 – good mental health group). The remaining studies did not report significance levels of pre to post-test changes (e.g., Ulrich *et al.*, 1991; Hartig *et al.*, 1991), with some studies also not reporting descriptive statistics for pre to post-tests (Hartig *et al.*, 1991; Berman, Jonides and Kaplan, 2008). This is possibly due to the fact that in most cases, the research aim was to compare affective recovery between green and built settings, rather than assessing the pre and post-test change in each setting, thus confirming the general lack of attention given to the affective potential of urban settings.

Among the studies detecting positive affective benefits of walking there are both laboratory and field experiments. In particular, it was concluded within two laboratory studies that walking in urban areas led to a significant recovery of affect. These included a simulated, short walk in a city centre which decreased levels of depression, anger, tension, and overall stress in a group of university students (van den Berg, Koole and van der Wulp, 2003) and a simulated walk along city docks that led to improvements in depression, anger, and tension in a group of university students (Karmanov and Hamel, 2008). Similarly, three field experiments detected a positive effect of walking on affective states. First, a city centre walk led to stress recovery and hedonic tone improvement in a group of adults with poor mental health (Roe and Aspinall, 2011). Second, a walk in a residential area with light motor traffic improved mood in a group of adults (Gidlow *et al.*, 2016). Third, a walk in a busy area was related to energy and pleasure increase and decrease in tiredness in a group of physically inactive students and adults (Kinnafick and Thøgersen-Ntoumani, 2014, Study 2a).

Contrarily, seven studies concluded that walking in urban settings led to negative affective responses (e.g., Hartig *et al.*, 2003; Johansson, Hartig, and Staats, 2011; Tsunetsugu *et al.*, 2007; Van den Berg, Jorgensen and Wilson, 2014). Among these, four

were field experiments: first, a 50-minute walk in an industrial area decreased positive affect and increased anger and depression in a group of university students (Hartig *et al.*, 2003). Second, tranquillity decreased in a group of university students after a walk in a commercial area with traffic (Johansson, Hartig, and Staats, 2011). Third, in Tsunetsugu and colleagues' study (2007), participants reported a decrease in feelings of being comfortable and refreshed following several short walks in a traffic-congested area. Fourth, Tilley *et al.* (2017) found that a walk in an urban busy road was associated with high attentional fatigue, arousal, and frustration in a group of older individuals. Negative affective outcomes were also found within three laboratory experiments. First, a simulated walk in a city centre led to a decrease in vitality in a group of students (Van den Berg, Jorgensen and Wilson, 2014). Second, Hartig and Staats (2006) attested that two groups of fatigued students attributed low affective and restorative potential to two simulated walks in urban, commercial areas. Third, a simulated walk along a canal led to a decrease in vitality in a group of 102 university students (Van den Berg, Jorgensen and Wilson, 2014).

Therefore, it becomes evident that results are contrasting and interpretation is not straightforward. In addition, while the benefits of the field walks may be partially attributed to the physical activity involved, the benefits related to the simulated walks can be attributed solely to the environmental exposure (see Chapter 4 for methodological implications). The next section critically examines these results and discusses the implications for the current research.

2.3.2.2 Critical appraisal of studies within the review and implications for the current thesis

The review highlighted two aspects that are relevant for the aims of the current research. First, it was revealed that most studies on affective and restorative outcomes of walking are based on young student populations (in 64% of cases). Such disproportion was also detected by past reviews on the affective benefits of nature exposure (McMahan and Estes, 2015; Bowler *et al.*, 2010). Whether this prevalence has any effect on results is unclear and requires further study. As noted by Bowler *et al.*, students "are not representative of all subsets of the human population" (2010, p. 7). In fact, student samples' mean age is low – e.g., 26-years of age or lower in most cases, confirming the

age range of 20–28.5 years identified by McMahan and Estes' (2015) review. This aspect will be discussed in Section 2.4.2.

Second, the review highlighted a prevalence of studies performed in built settings defined negatively in socio-cultural terms, such as areas with heavy motor traffic or industrial areas. Importantly, one element that emerges is the role of setting qualities, with general attractiveness of settings appearing as crucial factor in the affective and restorative walking experience. In fact, the affective outcome was negative when walks took place in unattractive urban settings, including a Swedish commercial area with heavy traffic (Johansson, Hartig, and Staats, 2011), an industrial area in urban outskirts (Hartig *et al.* 2003), a traffic-congested area (Tsunetsugu *et al.*, 2007), a busy commercial area with traffic (Kinnafick and Thøgersen-Ntoumani, 2014), and an urban busy road with shops and high buildings (Tilley *et al.*, 2017). Conversely, walks in moderately attractive settings led to positive or uncertain results, and these included streets along a canal (Karmanov and Hamel, 2008; Van den Berg, Koole and van der Wulp, 2003), an attractive residential area with low motor traffic (Gidlow *et al.*, 2016), and a town centre with some greenery and some historic interest (Roe and Aspinall, 2011). Therefore, the current research argues that by selecting unattractive urban places such as commercial and industrial areas, urban outskirts, or streets with heavy motor traffic, the potential for some urban environments also to offer restoration was downplayed. In fact, scholars have recently noted that a busy urban street is not representative of the restorative potential of urban settings (Staats *et al.*, 2016). However, as previous research has pointed out, there is a substantial lack of literature assessing the impact of 'attractive' urban places on affective variables (Fornara, 2011; Hartig *et al.*, 2003).

Hence, it seems that urban settings other than busy roads with motor traffic may support affective and restorative outcomes. This claim is also supported by a research study by Galindo and Hidalgo (2005). These authors established categories of urban landscapes based on users' aesthetic judgements and assessed how perceived restorative potential relates to aesthetic evaluations. Findings showed that 'attractive places' were perceived as both of high aesthetic and restorative quality; authors concluded that the restorative potential is characteristic of those places perceived as attractive. Similarly, a recent study explored the relationship between psychological wellbeing and "*scenicness*" – measured by users of a web platform on a Likert scale of

1-10 (Seresinhe *et al.* 2015). It was attested that living in scenic locations is related to better psychological wellbeing, independently of the type of location (either natural or urban) (Seresinhe *et al.* 2015); thus, urban 'scenicness' seems to support psychological wellbeing, despite the absence of nature.

However, the question of which specific elements related to the built environment can contribute to affect remains unanswered. The next section explores the potential factors related to built settings that might contribute to environmental affect.

2.3.3 What factors might contribute to positive affective outcomes in urban settings?

The review within Section 2.3.2 does not clarify which specific characteristics related to built environments are likely to influence affective responses. Importantly, it emerged that no previous study proposed a comparison of affective walking experiences in different urban settings, as only built versus nature settings comparisons were proposed. Arguably, this has limited the understanding of the affective and restorative potential of walking in urban settings. A further issue which has limited such investigation is that previous studies selected urban areas with a mix of elements (e.g., traffic and pedestrianised areas, different architectural styles, residential and leisure areas), rather than homogeneous areas. For instance, Hartig and Staats' (2006) urban condition was constituted by streets with "different characters: one passes through an area of office buildings and hotels, another passes beside an outdoor market, another is a major thoroughfare [with] high pedestrian and/or vehicular traffic flow rates" (2006, p. 218). In this sense, it becomes challenging to determine which specific elements caused the positive or negative affective outcome.

This section builds on the review presented in Section 2.3.2 and proposes that two factors – motor traffic and architectural style – might contribute to positive affective experiences in urban settings.

2.3.3.1 Motor traffic

One element that has emerged from the review within Section 2.3.2 is motor traffic, and this tends to be related to negative affective responses. In fact, studies performed in

areas with medium to heavy traffic detected a negative affective outcome of walking (e.g., Johansson, Hartig, and Staats, 2011; Tsunetsugu *et al.*, 2007; Hartig *et al.*, 2003).

According to scholars, traffic congestion is one of the most severe environmental stressors of contemporary urban life, thus often associated with negative affective outcomes (Van den Berg, Joye, and DeVries, 2013). Several observational studies attested the negative effect of traffic on affective variables in the long or medium-term. For instance, a recent study has assessed the role of motor traffic in perceived urban stress, and found that pedestrianised streets and areas with light motor traffic are negatively associated with stress levels (Knöll *et al.* 2017). Turning to the residential context, traffic exposure is related to increased depressive symptoms (Gee and Takeuchi, 2004) and less daytime relaxation (Öhrström *et al.* 2006). Several studies have also assessed the role of traffic on affective and restorative outcomes experimentally, thus looking at the immediate effects of motor traffic exposure on affect. However, these scholars have mainly focused their attention on one specific aspect of traffic, that is its sonic dimension. A 2015 study compared restorative effects of listening to birdsongs and traffic sounds in a group of adult participants (Ratcliffe, 2015). Exposure to traffic sound resulted in a significant decrease of positive affect – even though the same outcome was detected in the bird sound condition. Similarly, Benfield *et al.* (2014) found that traffic noise decreased participants' levels of serenity and increased hostility. Hence, these results suggest that exposure to motor traffic sound is likely to elicit immediate negative affective outcomes.

However, turning to overall exposure to traffic during walking – e.g., visual, sonic, and sensory exposure elements – the effects of motor traffic on affective variables have not received much attention. Ulrich *et al.*'s (1991) seems to be the only study that assessed stress recovery in several urban areas during walking, and the only one that compared areas with and without motor traffic. These were respectively a commercial street with heavy to light traffic and a pedestrianised outdoor shopping mall with varying levels of pedestrians, and were presented as videos of simulated walks to a group of undergraduate students. Results showed that feelings of fear, sadness, and attentiveness decreased in both settings, but no significant differences were detected between the two conditions. Ulrich *et al.* (1991) also reported that, against expectations, the walk in the setting with motor traffic produced more recuperation in anger than in

the pedestrian mall. Therefore, despite evidence from observational studies generally indicates that motor traffic exposure has negative effect on health, it is not clear whether motor traffic negatively contributes to immediate affect and stress recovery during walking, as the evidence is limited. Hence, the current research aims to fill this knowledge gap and investigate the role of motor traffic in the affective walking experience.

2.3.3.2 Architectural style

A second element that might contribute to environmental affect in urban settings in architectural style. In evaluating studies that detected a positive affective outcome of walking, it is not clear which specific elements of the urban realm might contribute to a positive affective experience, as studies tend not to offer detailed descriptions of the urban walks. It is argued that historic[2] styles could have a positive impact on environmental affect.

In fact, a Spanish research study attested that historic places are perceived as both attractive and restorative (Galindo and Hidalgo, 2005). More recently, Fornara (2011) assessed affective and restorative qualities of several urban settings, and found that a historic-panoramic place in an Italian city was perceived as restorative as an urban park, and more relaxing, pleasant, and restorative than a shopping mall. Along the same lines, Roe and Aspinall (2011) found that an urban walk elicited affective recovery in a group of individuals with poor mental health, and have speculated that the historic character of the area might have triggered this effect. Similar patterns emerged among studies exploring characteristics of hospital care and rest homes that contribute to positive affect. Cerina, Fornara and Manca (2016) attested that 'traditional architecture' rest homes are preferred over standard architectures, and associated with lower 'broken

[2] The use of the term "historic" in the current thesis is based on previous research from environmental psychology. The quoted works (e.g., Galindo and Hidalgo, 2005; Fornara, 2011; Roe and Aspinall, 2011) do not offer a definition of the term historic, and taken together they seem to refer to an array of styles, rather than referring to a specific historic époque. Similarly, the current thesis, when using the term historic is not referring to a specific era, but refers to architectural styles that are not Modernist, e.g., built pre 1932, as defined by the Royal Institute of British Architects: "Modernism is […] associated with an analytical approach to the function of buildings, a strictly rational use of (often new) materials, an openness to structural innovation and the elimination of ornament […]. The style is characterised by: asymmetrical compositions, use of general cubic or cylindrical shapes, flat roofs, use of reinforced concrete, metal and glass frameworks often resulting in large windows in horizontal bands, an absence of ornament or mouldings, a tendency for white or cream, Rectangular or cubist shapes, minimal or no ornamentation, steel and or reinforced concrete, large windows, open plan" (RIBA, 2017).

attachments'. Fornara and colleagues suggest that the positive effect of historic architectural styles on affect and restoration is related to the fact that 'traditional architectures' reflect individuals' place identity (Cerina, Fornara, and Manca, 2016; Fornara, 2011) (see also Section 2.4.2 and Chapter 3).

Hence, in relation to the general aim of this thesis, these studies seem to indicate that historic architectural styles might support affect, thus identifying a second element of the built realm that might impact the affective walking experience.

2.4 Personal Characteristics and Affective Experiences

Section 2.3.3 has illustrated the features related to physical settings characteristics that can influence affective experiences. The present section describes how personal characteristics might affect such experiences. In fact, other than environmental features, personal characteristics might influence affective and restorative outcomes. Russell's framework acknowledges that affective outcomes are influenced by past experiences, personal judgements, and previously encountered places, even though it is possible to identify patterns. Conversely, both SRT and ART are based on the evolutionary hypothesis that individuals have an innate preference towards nature. Therefore, the influence of personal characteristics on restorative outcomes has not received much attention from scholars. Nevertheless, an essay by Joye and Van den Berg (2011) has critically evaluated the evolutionary assumptions in restorative environments research, concluding that such assumptions are problematic. In fact, "neither empirical evidence nor conceptual arguments provide any strong support' for the hypothesis that nature restoration is based on innate predispositions" (2011, p. 261). Therefore, there are additional factors related to individuals' characteristics that can potentially explain affective experiences. The limited evidence is reviewed below.

2.4.1 Need for restoration

In addition to the hypothesised evolutionary tendency for nature, scholars agree on the notion that the need to restore (e.g., initial stress levels) enhances nature preferences (Hartig and Staats, 2006; Staats, Kieviet and Hartig, 2003; van den Berg, Koole and van der Wulp, 2003; Ulrich, 1983). Research has found that individuals experiencing stress,

cognitive fatigue, and poor mental health are those that benefit the most from nature contact (Hartig and Staats, 2006; Staats, Kieviet, and Hartig, 2003).

With reference to exposure to urban settings and the effects on affective variables, the evidence is limited. In two similar studies, Hartig and Staats found that greater initial stress is associated with less positive attitudes towards a walk in an unattractive urban setting (Hartig and Staats, 2006; Staats, Kieviet, and Hartig, 2003). Specifically, attitudes towards urban walking are generally positive when in a good mental state, but become negative when mental state is negative (Staats, Kieviet, and Hartig, 2003). More recently, the same authors looked at how levels of initial fatigue influence perceived restoration in different urban settings (Staats *et al.*, 2016). It was confirmed that fatigue increases preference for walking in parks compared to spending time in a café and to visiting a shopping mall; however, preferences for walks in the park over a busy street were not affected by initial levels of mental fatigue. Staats *et al.* (2016) have hypothesised that this is related to the poor quality of the urban street, which was likely to very strongly unattractive even for non-stressed participants.

2.4.2 Socio-demographics and other personal characteristics

The role of socio-demographics and personal factors, namely gender, age, and familiarity, in affective and restorative experiences has received moderate attention from scholars. First, previous research generally indicates that there are no gender differences in affective and restorative experiences of nature (White *et al.*, 2013; Hartig *et al.* 2003). On the other hand, some scholars have suggested that women can have more safety concerns than men about walking in public spaces (e.g*.,* Foster, Hillsdon and Thorogood, 2004), but have a higher preference for shopping malls than men (Staats *et al.*, 2016). In Staats *et al.*'s (2016) study, women also had a lower preference for a street with traffic than men.

Second, scholars have suggested that age might play a role (e.g*.,* Greenwood and Gatersleben, 2016). Specifically, younger groups seem to benefit less from nature than older groups do (e.g., Berto, 2007). Scopelliti and Giuliani (2004) assessed restorative experiences across the lifespan and noted that different age groups experience restoration differently, with young individuals valuing excitement more than older people do; conversely, young people seem to give less importance to relaxation

compared to adults and older individuals. However, the role of age and gender in the affective walking experience specifically in urban settings seems understudied.

Third, research has also shown that factors such as familiarity, personal attitudes, and past experiences related to places can influence affective and restorative experiences, thus confirming Russell's idea of adaptation. For example, Pretty (2004) has claimed that familiarity and associations related to green environments can relate to nature restoration. He suggests that "some environments may be green and beneficial, but anonymous, whereas others may evoke pleasant memories as well" (2004, p. 72). Hartig and Staats (2006) looked at the role of familiarity in perceptions of restorativeness and detected a positive association between familiarity and, respectively, environmental rating and perceived restoration likelihood. Taking a step forward, the framework of favourite places brings research on place identity into restorativeness enquiry; in fact, in Korpela and Hartig's research (1996), places perceived to be restorative also score high on place attachment. Therefore, Korpela and Hartig have suggested that restorative places afford restorative experiences through construction of place identity.

Partially building on the framework of 'favourite places', the role of familiarity has recently received more attention from scholars. In the last decade, scholars have called for a person-centred approach to restorativeness research, arguing that affective and restorative outcomes also result from individual preferences, attitudes, and cognitions (Ratcliffe and Korpela, 2016; Payne, 2013; Ratcliffe, Gatersleben and Sowden, 2013). This body of research considers the individual as an active interpreter that bases his/her perceptions on his/her preferences and attitudes, rather than a passive receiver of environmental, objective information (Payne, 2013). For example, in examining the restorative potential of listening to bird sounds with qualitative research, Ratcliffe, Gatersleben, and Sowden (2013) showed that memories and prior knowledge related to birdsongs also contribute to restoration. In a more recent study, the same author assessed that place memories and place attachment are related to greater perceived restoration (Ratcliffe and Korpela, 2016). Similarly, recent mixed-methods research on the affective benefits of walking among older individuals has found that familiar places and landmarks, personal memories related to places, and social interactions during walking contribute to feelings of happiness and pleasures (Tilley *et al.*, 2017).

Taken together, the evidence above suggests that personal characteristics and associations might have an influence on affective experiences. The next section summarises the gaps of knowledge and introduces the idea that the geographical literature can contribute to the debate on the affective walking experience.

2.5 Synthesis of Knowledge Gaps

This chapter has set out to illustrate two theories of environmental affect that usefully inform the aims of the current thesis. First, Russell's (2009, 2003, 1980) conceptualisation of environmental affect argues that affective evaluations and experiences are adaptational and subjective – even though a pattern can be identified. Importantly, it was established that Russell argues that environmental affect triggers approach or avoidance behaviours. Second, Ulrich's (1983; Ulrich *et al.*, 1991) Stress Recovery Theory argues that exposure to natural settings trigger restoration, as opposed to exposure to built settings. This theory is based on the evolutionary hypothesis that humans have an innate preference for nature, hence conceives environmental affect mainly as result of innate inclinations.

The evidence on the moderating role of settings during walking has also been reviewed, with a specific focus on urban settings. The review has highlighted that there is a substantial lack of research assessing affective and restorative outcomes of walking in attractive urban settings. Importantly, it also emerged that there is a lack of studies comparing affective and restorative experiences among urban walking settings. Also, several elements related to the built environment that might influence such outcomes were identified, and these include presence of motor traffic and architectural style. The review of psychology literatures has identified a gap on the affective and restorative potential of walking in urban settings, and RQ1 aims to address this by investigating whether and to what extent some settings can support affective outcomes, with a specific focus on the role of motor traffic and architectural style.

In addition, it emerged that personal characteristics such as socio-demographics and personal experiences and attitudes can influence such outcomes, thus confirming Russell's idea of adaptation and subjectivity of affective outcomes, and partially arguing Ulrich's evolutionary hypothesis. Therefore, it seems important to examine more fully the role of socio-demographics and personal characteristics of participants, especially

looking at past experiences, memories, and attitudes, as already noted by scholars (Ratcliffe and Korpela, 2016, 2017; Ratcliffe, 2015). However, as highlighted by the review (Section 2.3.2) and by existing reviews of the evidence (MacMahan and Estes, 2015; Bowler *et al.*, 2010), previous research was heavily based on student participants. Arguably, this group has specific socio-demographic characteristics and, potentially, a specific set of values, attitudes, and experiences, thus not allowing a deep analysis of the role of personal characteristics on affective experiences. In fact, the present chapter has also highlighted that personal experiences might influence affective and restorative outcomes. Authors have shown that familiarity, individual preferences, and memories are positively associated with affective and restorative outcomes (Ratcliffe and Korpela, 2016; Payne, 2013; Ratcliffe, Gatersleben, and Sowden, 2013). Therefore, RQ1 also aims to explore whether different populations experience walking differently (RQ1c). With this regard, the next chapter illustrates aims to explore how a geographical idea of place, conceived within a mobile perspective, can contribute to the research on the affective and restorative benefits of walking, specifically in urban settings (RQ1a). Box 2.1 below shows the first research question of the current PhD research.

Research Question 1:

To what extent can different city centre environments support positive affective outcomes?

a. How can the mobilities and environmental psychology literatures be integrated to inform a critical realist study of the affective benefits of walking in city centre environments?
b. What is the role of motor traffic and architectural style?
c. To what extent do the affective outcomes of walking in city centre environments differ between a student and employee population?

Box 2-1: Research Question 1

CHAPTER 3

3. A GEOGRAPHICAL PERSPECTIVE ON WALKING, PLACE, AND AFFECT

3.1 Introduction

Chapter 2 outlined that there is a limited psychological literature on the affective benefits of walking in urban settings and identified several elements related to the built environment that might elicit positive affect. It also emerged that while environmental psychology traditionally considers physical environments as mere contexts, more recently the attention has shifted towards the ways individuals interact with and relate to settings (Ratcliffe and Korpela, 2016; Ratcliffe, 2015). Central to the current chapter is the proposition that research within geography and the New Mobilities Paradigm (Cresswell and Merriman, 2011; Hannam, Sheller and Urry, 2006; Sheller and Urry, 2006) represents an insightful platform to study the impact of built environments on affective walking experiences. Specifically, the new mobilities paradigm within geography has informed the current PhD research through two insights. First, by proposing a focus on the travel experience per se, hence examining *how* walking takes place, is experienced, and produces outcomes (Section 3.2). Second, building on human geography ideas of place, the mobilities literature considers place as resulting from the relationship between individuals, movements, and environments, rather than mere physical contexts (Section 3.3). Hence, this conceptualisation enables the exploration of *how* places are produced and experienced.

Finally, building on these ideas, together with the review presented in Chapter 2, the current chapter illustrates whether and, if so, how affective walking experiences might influence walking intentions (Section 3.4). The evidence shows that some settings – namely natural areas and 'good' urban settings – contribute to a positive walking experience, while other settings elicit negative affect. Two questions arising are then considered: how does this relate to walking intentions and actual levels of walking? Does the affective and restorative walking experience influence walking intentions? In

attempting to answer these questions, Section 3.4 reviews the evidence on the association between the affective walking experience and walking intentions, with the final aim of exploring the relevance of the evidence on affective walking experience for policies of sustainable urban mobility. The chapter concludes by presenting the research questions of the PhD research (Section 3.5).

3.2 The New Mobilities Paradigm and Affective Walking Experience

3.2.1 The new mobilities paradigm

The mobilities paradigm emerged in the 2000s as a reaction to the increasing relevance of *movement* within social phenomena at different geographical scales, from increasing trends of global migration and increasing daily mobility, to the new technological possibilities and the *movement* of information (Sheller and Urry, 2006). The paradigm has a broad scope, with the communality of seeking to understand the multiple consequences and dimensions of mobilities, including sociological, geographical, and anthropological aspects. The aspect that made it particularly relevant for this research is that this paradigm is interested in the meaning of movement. In fact, according to Sheller and Urry (2006, p. 213) previous approaches have distinguished "between travel and activities", with transport geography having overlooked the travel aspect in favour of a focus on the destination (Cresswell and Merriman, 2011). In contrast, within the mobilities paradigm the travelling experience is a phenomenon in itself, and the activities occurring on the move deserve attention (Cresswell and Merriman, 2011; Sheller and Urry, 2006). These include aspects such as practices, performances, use of travel time, and emotional experiences of travel. Scholars have examined journeys not only as instrumental to reach a destination, but also as an activity per se, with journey time seen as more than travel time. Research has looked at activities, feelings, practices that take place on the move (Cresswell and Merriman, 2011) and at the value of travel time, conceived as a gift, rather than wasted time (Jain and Lyons, 2008).

The current thesis focuses on one line of enquiry of the mobilities literature, which is the affective aspect of walking. However, according to Gatrell (2013) while the mobilities literature has given extensive attention to "practices, performances, politics, and poetics of walking", the wellbeing aspect of walking has been largely neglected (2013,

p. 99). According to the same author, research studies to date have failed to explore how practices, performances, politics, and poetics of walking affect wellbeing. For example, previous research has uncovered the sensory and kinaesthetic – the tactile sensation of movement – aspects of walking (e.g., Edensor, 2010, 2000; Middleton, 2010). Taylor (2003) has explored the multisensory experience of urban walking, which involves sight, hearing, and smell. The importance of rhythm was also described: the slowness of walking enables reflexivity and awareness of the self, "particularly the body and the senses" (Edensor, 2000, p. 82), with the walking flow enabling individuals to feel completely absorbed (Crust *et al.*, 2011). However, the wellbeing outcomes related to the sensory and kinaesthetic aspects of walking were not fully explored. As argued by Gatrell (2013), previous works have romanticised the act of walking by assuming that walking is generally 'good' for wellbeing, but failed to address practical and realistic aspects that enable wellbeing and positive affective outcomes. Hence, the limited evidence on the wellbeing benefits of travelling and walking experiences is critically evaluated in the next section, with a specific focus on the affective benefits.

3.2.2 Travel modes and affective experiences

Existing literature on the affective experience of travelling address "the feelings evoked by travelling, such as stress, excitement, pleasure, boredom and control" (Anable and Gatersleben, 2005, p. 164). Different travel modes provide different affective experiences. Extensive research has investigated the affective experience of automobile travel, and has generally found that the chance to enjoy a variety of landscapes, the opportunity to perform driving skills, and the sensation of speed all contribute to a positive affective experience (Steg, 2005; Ory and Mokhtarian, 2005; Ellaway *et al.*, 2003). Fewer studies have looked at the affective outcomes of active travel modes. In different studies, Anable, Gatersleben, and Uzzell have compared affective appraisals across different travel modes, (Gatersleben and Uzzell, 2007; Anable and Gatersleben, 2005). In particular, Gatersleben and Uzzell (2007) conducted a questionnaire with university employees comparing affective appraisals of different travel modes of commuting to work and exploring the associations between affective appraisals, travel modes, attitudes towards the journey, perceived behavioural control, and future intentions. The results revealed that active travel modes (e.g., walking and cycling) elicit

more positive affective experiences compared to driving and using public transit. Walking scored relatively highly on relaxation, interestingness, and pleasantness compared to car trips.

These findings echo the evidence presented in Chapter 2 on the affective benefits of walking in terms of relaxation (e.g., Ekkekakis, 2011; Roe and Aspinall, 2011) and on long-term depression (Robertson *et al.*, 2012). In addition to quantitative accounts, a body of qualitative research from geography and health areas, even though limited, has similarly highlighted that walking creates time to relax. This body of literature has also uncovered that part of the stress-relieving benefits are related to the fact that walking gives time to reflect, thus building on the research on travel time use (Jain and Lyons, 2008). In 2007, Darker, Larkin and French employed a phenomenological approach to explore experiences of walking and outlined that walking can be therapeutic, as it enables individuals to take a mental break, relax, and reflect. More recently, Crust *et al.*'s phenomenological study (2011) examined the benefits of long-distance rural walking through the lens of positive psychology, highlighting that rural walking triggers pleasure and relaxation.

However, it is interesting to note that the works by Darker, Larking, and French (2007) and by Crust *et al. (*2011) come from the fields of health and psychology, rather than from the mobilities field, with authors not explicitly – or consciously – referring to the mobilities approach. In fact, the mobilities literature has given very little attention to the wellbeing benefits of walking. In exploring routines, decisions, and meanings related to everyday walking, Middleton hints at the idea that rhythmicity can favour relaxation and enjoyment of walking, even though there is not an explicit reflection on these benefits (2009). More recently, a study has contributed to filling this gap by exploring the psychological and emotional benefits of the urban pedestrian experience from a mobilities perspective (Calvert, 2015). Urban walking is conceptualised "as a triangle of relationships between the physical aspect of movement, the inner worlds of the walker, and the outer world, the experienced city" (2015, p. 108); both physical walking and immersion in the inner world of the pedestrian aid deeper states of mind and reflection.

Due to the limited evidence, the mechanisms that enable affective benefits during walking remain unclear. With this regard, Gatrell (2013) identifies three aspects of walking that positively contribute to wellbeing and health, and these can explain the

affective benefits of walking: first, physical activity entailed during walking and the physiological benefits related to it; second, social interactions that occur during and thanks to walking; third, the engagement with place. The present thesis focuses on the third aspect, which is the ways in which physical settings contribute to the affective benefits of walking. While Chapter 2 has outlined the evidence on the moderating role of urban and natural settings during walking, the following section (Section 3.3) presents the evidence from the geographical and mobilities perspectives with its focus on the ways engagement with place positively influences affect during walking.

3.3 Walking and Engagement with Place

3.3.1 The geographical idea of place

A second idea from the mobilities perspective that informed this research is the conceptualisation of physical settings as not mere contexts, but rather containers of experiences (Hayden, 1997) and centres of meanings (Tuan, 1977, 1974; Relph, 1976). Mobilities research claims that "there is a complex relationality of places and persons connected through performances" (Sheller and Urry, 2006, p. 214), and this idea builds on conceptualisations of place from the field of human geography. Within human geography, the 1970s saw geographers Yi-Fu Tuan (1977; 1974) and Edward Relph (1976) proposing a phenomenological shift to the study of place, thus radically expanding the scope of geography towards a humanistic perspective (Gold, Stock and Relph, 2000). Relph and Tuan conceive place as a centre of meaning, rather than mere locations or spatial units:

> *[Places] are defined less by unique locations, landscape, and communities than by the focusing of experiences and intentions onto particular settings. (Relph, 1976,* p*. 141)*

Hence, personal associations and experiences feed into the ways individuals perceive and define place. In this regard, Tuan (1977) explicitly elaborates on the difference between space and place, with place originating when humans give meaning to physical space. In fact, it is the way individuals experience space that defines place; involvements and relationships define individuals' attachments and meanings to place. Tuan's term *topophilia* denotes a love of place, a rootedness that develops with living in a location for an extended length of time (1974). Hence, it is acknowledged that the same physical

space can accommodate different forms of place for different people and at different times.

However, while Tuan highlights the importance of pauses in defining place ("Each pause in movement makes it possible for location to be transformed into place", 1977, p. 6), the new mobilities paradigm adds *movement* to these classic conceptualisations. According to Cresswell, as the world has become more mobile, places are produced through mobilities (2014). In line with geographical ideas on place, the mobilities perspective entails spaces as actively produced by movements, rather than mere contexts (Cresswell and Merriman, 2011, p. 20). Building on these conceptualisations, the current research defines environments as result of the relationship between individuals, movements, and physical settings. The next section evaluates how places can influence wellbeing during mobility.

3.3.2 Walking, engagement with place, and wellbeing

Despite the fact that scholars within mobilities research have given extensive relevance to the exploration of place during walking, a very limited number of scholars have addressed the wellbeing and affective outcomes of the interaction between walkers and physical settings. In line with the mobilities perspective, Edensor (2010) asserts that walking produces place. Especially daily, routine walking produces a "sense of mobile place" through the speed, rhythm, slowness, and periodicity of walking (2010, p. 70). The speed of walking particularly allows for engagement with the physical surroundings (Calvert, 2015; Middleton, 2010). Familiarisation with environments create a sense of mobile homeliness, and place is produced by such familiarisation.

Scholars have explored engagement between walkers and the surroundings in rural walking, describing the benefits on wellbeing of walking in natural settings. For example, research has described how engagement with the landscape during rural pilgrimage walking enables spiritual engagement and elicits reflection and relaxation (Maddrell, 2013, 2011; Maddrell and Della Dora, 2013). Maddrell discusses how walking cannot be separated from the landscape, as walkers engage with the landscape "visually and materially, engaging with it kinetically, sensually and imaginatively" (2011, p. 17). For example, it is reported that for some participants, the changing physical landscape, together with the walking rhythm, have contributed to self-reflection and imagination.

Similarly, research has shown that rural walking triggers pleasure and relaxation, and these outcomes are partially related to the engagement with the rural world, which provides a 'bubble' detached from everyday stress (Crust *et al.*, 2011). Hence, both Crust *et al.* and Maddrell argue that natural settings provide a 'bubble' where walkers can relax and feel far from everyday life. These ideas echo Kaplan and Kaplan's concept of *being away*, a property which elicits restoration (1989). However, the disciplinary crossover appears to be very limited, and none of the two disciplines seems to acknowledge such similarities of ideas.

Turning to urban walking, Calvert (2015) has explored the ways urban walkers engage with the built environment, and has noted that the engagement with surroundings provides both positive and negative feelings in pedestrians. On one hand, the interaction with the city contributes to reducing negative states of mind and can elicit curiosity and imagination. Memories and imagination deepen the experience of the city and provide inspirations and stimulation. On the other hand, the outer world can be "cognitively demanding" (2015, p. 146), and it can intrude with reflection. Hence, elements such as safety concerns or the presence of motor traffic can negatively contribute to the walking experience. Related to this point, Calvert suggests that rural walking might be more relaxing and more suited for reflection than urban walking due to the fewer interruptions to the walking flow and to the fact that rural walking entails longer time (2015). This reflects Edensor's (2000) idea that urban environments provide a sensory overstimulation, while rural settings offer the opportunity to relax and reflect due to their solitary nature. However, the discussion on the potential negative and positive effects of the surrounding environments on wellbeing appears limited, with no systematic analysis of such positive and negative elements being proposed.

Some scholars have also explored engagements with the two elements identified in the previous chapter (motor traffic and architectural style; Section 2.3.3) during walking. Concerning the former, Taylor (2003) conducted a phenomenological analysis of the aesthetic experience of motor traffic, aiming to describing it rather than judging "whether or not this aesthetic experience is, overall, a good or bad thing" (2003, p. 1623). Taylor (2003) goes on to note that for some people traffic makes cities stimulating and exciting, while for some others – the majority, most likely – motor traffic is invasive for senses and cognition. Independently of personal judgements, Taylor claims that the

experience of the city has become synonymous with the experience of motor traffic. Similarly, Calvert (2015), employing participant-based research, has concluded that the influence of traffic on the pedestrian experience is mainly negative, even though there is great variation among individuals' concerns. Motor traffic is one of the main elements which can disturb the walking experience, and this is related to the disruption of freedom and reflection, to the required cognitive effort, and to the confinement of pedestrians to separate spaces.

Turning to specific architectural styles, scholars have stressed the quality of some urban settings to trigger interest (Calvert, 2015; Edensor, 2000). For example, the experience of walking in Paris, a city which offers 'a visual and sensual feast' (Berman, cited in Calvert, 2015, p. 29), was described by Urry (2007). However, these authors do not explicitly address the ways architectural styles can influence wellbeing. The importance of interestingness for wellbeing has been evaluated by a recent research study by Ettema and Smajic (2015), which explored the impact of interactions with the environment on pedestrians' wellbeing. Results showed that environments perceived as lively, diverse, and safe fostered activation and happiness, with, presence of activities (cafés, restaurants, shops, traffic) and people enhancing affect. Conversely, lack of stimulation was related to lower affect, and this was reported in areas with no people nor activities, but also in proximity of "monotone-looking buildings" (2012, p. 321).

Some researchers have also described how historic elements can influence walking. Calvert (2015) notes that through walking individuals can access memory and history, and this elicits curiosity, imagination, and positive emotions. In fact, the mobilities literature proposes that certain places, monuments, or buildings contribute to inscribe memory in the landscape (Cresswell, 2014, p. 119). Nevertheless, once again, it appears that the mobilities field has given limited attention to the potential of some built characteristics to influence wellbeing and affect.

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To summarise, the perspective on place offered by human geography marks a clear difference between physical space and *place*, and puts emphasis on the way individual experiences, associations, and intentions contribute to create place. The mobilities turn adds the idea of 'movement' to this, and suggests that place is produced during walking (Edensor, 2000). The idea that place results from the relationship between individuals,

movements, and environments is relevant to the aims of the current PhD research, as it suggests that there exist multiple subjective ways in which environments can offer affective and restorative benefits. In addition, the geographical idea of place highlights that these benefits can arise from personal associations, thus echoing claims from the recent person-centred approach to restoration (e.g., Ratcliffe and Korpela, 2016). In other words, this subjective conceptualisation of place puts the focus on the mechanisms behind affective and restorative processes, as it focuses on the individual level. Section 3.5 within the current chapter will discuss how this relates to the research questions of the current thesis.

Before presenting the final research questions of the current PhD research, Section 3.4 presents the last component of the current literature review, focussing on the ways affective and restorative experiences of walking relate to intentions to walk in the future. Investigating this link has potential important policy implications, as it could shed some light on the reasons why individuals decide to walk or not.

3.4 Affective Walking Experience and Walking Intentions

Chapter 2 illustrated evidence on the positive moderating role of different settings on affective variables during walking. Extensive research has shown that walking in natural settings elicits affective and restorative benefits, with a limited number of studies attesting that also some built settings can produce positive effects. However, it is not clear how affective and restorative experiences of walking relate to walking intentions and actual levels of walking. Hence, this section aims to clarify the nature of this gap by illustrating the limited evidence on the associations between affective experiences of walking and walking intentions. The argument is that the affective walking experience has an influence on walking intentions. In addition, it is argued that the investigation of the affective walking experience, which is a proxy of the quality of walking, offers a lens to analyse walking behaviours and to identify barriers and enablers of walking (e.g., Gatersleben and Uzzell, 2007).

Section 3.4.1 summarises the existing evidence from the walkability literature on the characteristics of the built environment that are associated with high levels of walking. Section 3.4.2 turns to the role of affective walking experiences in walking intentions.

3.4.1 Environmental qualities and walking levels

The moderating role of physical settings on the walking experience has been addressed by a large body of walkability literature. This literature aims to identify the characteristics of built environments that support walking and are associated with high levels of walking. To this end, numerous observational studies, generally cross-sectional, have assessed which built environment characteristics are associated with higher walking levels. This literature generally focuses on macro-scale features, and walkability has been associated with the so-called 'D variables' (Ewing and Cervero, 2010): Density and Diversity of land use, Design of the street network including pedestrian-oriented designs, Destination accessibility and Distance to transit bus stops. Extensive research found that walking levels are positively associated with dense and diverse areas (Sinnett *et al.*, 2011; Ewing and Cervero, 2010), accessibility to desired destinations (Sinnett *et al.*, 2011; Ewing and Cervero, 2010; Humpel, Owen and Leslie, 2002), and presence of green spaces (Giles-Corti *et al.*, 2005; King *et al.*, 2003).

Research on the walkability of settings is increasingly popular. Andrews *et al.* (2012) report that the journals *Social Science & Medicine* and *Health & Place* published more than twenty papers focusing exclusively on walkability between 2010 and 2012. However, despite such popularity, it is argued that such observational studies tell little about the walking experience from the pedestrian point of view. Arguably, this issue can limit the understanding of walking behaviours and the influence of built environments on walking. The limitations related to observational studies on walkability are illustrated below.

A first issue is that the observational approach tends to overlook micro-scale qualities related to walking intentions, despite these potentially being as important as macro characteristics. In fact, studies have found that blocks that are rated as equally walkable according to macro-scale characteristics present significant differences in walkability ratings (Brown *et al.*, 2007). Related to this, it has to be noted that macro-scale characteristics do not tell much about the walking experience from the perspective of pedestrians (Adkins *et al.*, 2012). In line with this idea, a report on the benefits of walking commissioned by the walking charity Living Streets (Sinnett *et al.*, 2011) assessed that micro-scale aesthetic features represent the most important factor to increase walking, especially recreational walking. These features include, for example, the presence of

interesting or attractive features, good quality buildings, vegetation, high quality paving or surfacing, and maintenance. However, the impact of single, specific micro-scale features has been understudied, as noted by scholars (Frank, Giles-Corti and Ewing, 2016; Adkins *et al.*, 2012). This lack of literature is also related to the fact that, as noted by Sinnett *et al.* (2011), within large observational studies it is difficult to disaggregate specific, micro aspects of 'aesthetics' of the neighbourhood and ascertain which features are the most important. Nevertheless, scholars suggest that micro-scale features should deserve more attention as they influence the *quality* of walking (Frank, Giles-Corti and Ewing, 2016; Adkins *et al.*, 2012). While it is true that levels of walking offer an indication of the walkability of settings, quality of walking is another important indicator of the 'success' of built environments that should not be overlooked (Adkins *et al.*, 2012).

Another limitation of assessing the walkability of settings with an observational approach is that this identifies associations between walking levels and physical characteristics, however it tells little about the direction of causality. This is related to the issue of neighbourhood self-selection according to which individuals tend to "choose neighbourhoods which facilitate their preferred mode of travel" (Melia, Parkhurst and Barton, 2011, p. 50). In this sense, it is possible that physical characteristics do not influence travel behaviour, as dwellers of walkable neighbourhoods are likely to have chosen a neighbourhood because of physical characteristics that suit walking. Hence, measuring neighbourhood walkability among neighbourhood dwellers might reflect their attitude towards walking, rather than an evaluation of the walkability of physical features.

In addition, a further important limitation is that such observational approaches tend to 'disembody' walking and to overlook the overall walking experience, including place experience (Davison and Curl, 2014; Andrews *et al.*, 2012). In fact, large observational studies propose a limited focus on the contextual and individual factors that might affect walking behaviours. Specifically, ex-post, close-ended questionnaires limit the analysis of environmental exposure and engagement with place, also related to potential recall bias. As a consequence, within these approaches it is challenging to understand why people walk and to assess the quality of walking. Andrews *et al.* (2012) also suggest that looking solely at 'objective' characteristics and large-scale features of the built

environment stands on the wrong assumption that researchers' viewpoints are more valuable than users' knowledge and perspectives. In particular, these authors noted that when there is a mismatch between objective and perceived measures of walkability, the walkability literature tends to give more credibility to objective factors and to conceive residents' perspectives as 'biased' (Andrews *et al.*, 2012).

Therefore, despite the important contributions of the walkability literature, these limitations can restrict the understanding of the impact of built characteristics on walking behaviours. The current PhD thesis argues that the environmental psychology experimental approach presented in Chapter 2 that assesses affective walking experiences represents an effective way to study the impact of built characteristics on walking. Such an approach can partially overcome the limitations related to observational research. First, the study of the affective walking experience enables identifying micro-scale features that encourage or discourage walking. In fact, the examination of affective walking experiences focuses on experiences and perceptions and relates them to objective physical features. This way, the micro-elements that deter or encourage walking can be identified. For example, with their experimental study Johansson, Sternudd and Kärrholm (2016) attested that the presence of green and the micro-qualities of infrastructure are important predictors of walking intentions and attitudes. Similarly, Brown *et al.* (2007) found that a lively social atmosphere is associated with higher perceived walkability.

Second, the assessment of the affective walking experience via experimental approaches reveals information on the direction of causality. In other words, it allows identifying the built environment characteristics that have a positive influence on the walking experience.

Third, the experimental study of affective walking experiences, when combined with qualitative methods, proposes a holistic study of walking experiences, rather than looking solely at environmental exposure, thus disembodying walking (Andrews *et al.*, 2012). Specifically, the study of the affective walking experience reveals important information on the quality of walking, rather than just quantity of walking.

However, the study of affective walking was largely overlooked hitherto by walking-related research. Interestingly, Andrews *et al.* (2012) also report how a walkability study has suggested that residents' "feelings of depression or loneliness [might] bias"

perceptions of the environment (Van Lenthe and Kamphuis, 2011, quoted in Andrews *et al.*, 2012). The current PhD research posits the argument that affective states should not be considered as 'biases' to be avoided, but rather as predictors of perceptions and behaviours (see also Chapter 2). This idea is developed in the next section.

3.4.2 Affective walking experience and walking intentions

The current thesis argues that the affective walking experience deserves greater attention from scholars. As noted by Gatersleben and Uzzell (2007), affective appraisals of the travel experience produce important implications for the promotion of sustainable transport. First, because they provide "insight into the reasons that people prefer certain travel modes to others" (2007, p. 417). Second, because affect was found to influence attitudes, hence it might indirectly influence intentions and behaviours (Gatersleben and Uzzell, 2007). In fact, as illustrated in Chapter 2, affective states arise from individuals' evaluations of the surrounding physical environment (Russell, 2003, 1999, 1988, 1980). Hence, affective experiences influence behaviours. It is the feeling of pleasant affect that guides individuals towards behaviours, while negative affect elicits avoidance (Schreuder *et al.*, 2016; Ekkekakis, 2013; Damasio, 1994; Russell and Lanius, 1984). Therefore, it is argued that positive affective walking experiences are likely to be associated with high levels of walking, while negative affective walking experiences may discourage walking.

These ideas have received limited attention and application in the context of mobility. According to Páez and Whalen (2010), the utility of travelling can be enhanced by pleasurable or enjoyable activities conducted during the trip and by a positive perception of the trip itself. While a stressful journey enhances the costs of travelling, an enjoyable and pleasant journey can reduce the disutility of a trip; claims that echo the idea of travel time as a 'gift' (Jain and Lyons, 2008). As a consequence, the affective traveling experience is also likely to influence future behaviours and intentions, with individuals likely to choose the travel mode that provides a positive affective experience (Páez and Whalen, 2010; Gatersleben and Uzzell, 2007). However, the role of affect in travel behaviours has received limited attention from scholars, despite it having "considerable explanatory potential" in the walkability debate (Andrews *et al.*, 2012, p. 1930). In fact, the Theory of Planned Behaviour (Ajzen, 1985), which is one of the most

applied psychological theories in transport studies (e.g., Bamberg, Ajzen and Schmidt, 2003), does not look at affect. Differently, Triandis' Theory of Interpersonal Behaviour (1979), also popular among travel behaviour scholars, considers the influence of affect on behaviours. The theory argues that affect is among the predictors of behavioural intentions, together with social factors and perceived consequences. In turn, intentions, together with habits and facilitating conditions influence behaviour. Despite Triandis including affect as a factor, empirical applications that focus on walking are limited. This is possibly related to the fact that affect is hard to measure, and that real-time experimental data collection is cost-intensive. The existing evidence on how affective experiences and/or appraisals of walking impact waking intentions is very limited, and this is reviewed below.

In 2007, Gatersleben and Uzzell examined affective appraisals of daily commutes, and found that car journeys are more stressful than walking and cycling, which are the most relaxing and exciting travel modes. The research also attested that positive affective appraisals – relaxation and excitement – are associated with positive attitudes – e.g., individuals' likes or dislikes – towards travel modes. However, no analysis was conducted on the relationship between affective appraisals and future intentions to choose a specific travel mode. In this regard, a study by Johansson, Sternudd and Kärrholm (2016) took a step forward in the investigation on how affective experiences of walking influence future intentions to walk. The research, based on participants' field walks along three different routes, showed that affective valence predicted intentions to avoid or to choose specific routes. Ferreira *et al.* (2016) applied these ideas to the neighbourhood context, and assessed associations between perceived physical and social characteristics, walking behaviours, and emotional experiences. Rather than looking at future walking intentions, these authors assessed how time spent walking and distances walked are influenced by a series of factors. Findings showed that greater perceived affective stimulation encourages urban dwellers to spend longer time walking in the neighbourhood, while a neighbourhood perceived to be relaxing led participants to walk longer distances.

Hence, these studies confirm the hypothesis that positive affective experiences of walking encourage walking. In addition, the studies by Gatersleben and Uzzell (2007), Johansson, Sternudd and Kärrholm (2016), and Ferreira *et al.* (2016) also explored the

micro-scale qualities of built environments associated with walking quality (affective experiences) and/or quantity (walking levels). In Gatersleben and Uzzell's (2007) research, it emerged that traffic, low-quality infrastructure, and perceived danger negatively contribute to walking quality, while scenery and "enjoyment of the activity itself" positively contribute to the quality of walking. However, no analysis was conducted on the effect of these factors on affective appraisals of walking. In contrast, Johansson, Sternudd and Kärrholm (2016) used multiple regression analysis to explore the impact of perceived complexity and aesthetic quality, upkeep and order, and presence of well-maintained greenery on walking quality and intentions. It was found that these elements all influenced both quality of walking and walking intentions. However, these elements were included as a single variable, hence there is no indication on which aspect – presence of greenery, level of upkeep and maintenance, and perceived complexity and aesthetic quality – is more important. Finally, Ferreira *et al.* (2016) assessed with quantitative research the impact of several characteristics on walking distance and time spent walking. Building aesthetics, mediated by neighbourhood attachment, contributed to the number and duration of walking trips, and presence of green areas contributed to number of walking trips, as mediated by the perceived relaxing character of the neighbourhood.

Overall, these studies generally indicate that affective appraisals and/or experiences of walking can influence walking behaviours and attitudes. In addition, these studies identify a series of micro-scale qualities of built settings that contribute to the walkability of environments. These studies indicate that traffic (Gatersleben and Uzzell, 2007), presence of natural elements (Johansson, Sternudd and Kärrholm, 2016), aesthetic quality (Johansson, Sternudd and Kärrholm, 2016; Ferreira *et al.*, 2016; Gatersleben and Uzzell, 2007), and the micro-quality of infrastructures (Johansson, Sternudd and Kärrholm, 2016; Gatersleben and Uzzell, 2007) contribute to walking quality and/or quantity. However, further questions remain. First, it is not clear *why* certain physical features are associated with walking quality and walking levels; arguably, understanding the processes behind the impact of the built environment on the walking experience would offer important policy implications. Second, while research indicates that aesthetics and micro-quality of infrastructures contribute to walking quality and quantity (Johansson, Sternudd and Kärrholm, 2016; Gatersleben and

Uzzell, 2007), these concepts have not been fully unpacked by scholars. Hence, a systematic exploration of barriers and enablers of walking is needed. The current thesis aims to contribute to this debate with empirical evidence.

3.5 Chapter Summary and Detailed Research Questions

By drawing on the mobilities and geographical literature, this chapter has presented two theoretical ideas that can integrate the study of the affective walking experience within environmental psychology: first, walking as meaningful experience, and second, the engagement with place, including personal experiences, associations, and perceptions. The evidence on the walking experience and affective outcomes from the geographical literature was presented, including the ways individuals engage with place and benefit from this engagement. Scholars have examined affective experiences of walking (Calvert, 2015; Crust *et al.*, 2011), and have described how engagement with place during walking elicits relaxation, positive affect, and imagination (Calvert, 2015; Maddrell, 2011). However, there appears to be a sharp dichotomy among the research assessing the affective walking experience. On one hand, as outlined in Chapter 2, research from psychology and health-related disciplines have assessed the affective benefits of walking under a heavily positivistic perspective, thus employing numerical evidence – based on either physiological measurements or psychometrics – with little interest in the contextual and individual factors that might affect and produce such outcomes. On the other hand, a body of mobilities literature, though limited, has also explored the affective aspects of walking, but scholars have adopted a constructivist viewpoint that aims to *describe* experiences, rather than *assessing* their outcomes; as a result, identifying patterns and drawing implications is challenging. The attempts to draw together the two approaches have been very limited (e.g., Ettema and Smajic, 2015).

With this regard, within the field of health geography, Gatrell has argued that "the time is right to draw together elements of the mobilities literature and elements of the well-being literature, in order to illuminate the ways in which mobilities can sustain health and wellbeing" (2013, p. 104). Hence, this thesis is an attempt to answer to Gatrell's call; this research draws together elements of the mobilities literature and elements of the environmental psychology literature on environmental affect to examine affective

walking experiences in urbans settings. It is argued that combining theoretical and methodological approaches from environmental psychology and geography offers a more detailed insight on the ways environments impact wellbeing and affect during walking. Specifically, a shift of perspective on the moderating role of settings on affective benefits is proposed. In fact, Chapter 2 has highlighted that generally environmental psychologists conceive settings as mere physical containers, and do not take into account personal relationships between individuals and environments. Scholars often refer to 'exposure' to nature, a term that seems to indicate the mere physical condition of 'being somewhere', rather than an interaction. Conversely, Chapter 3 has shown that geographers tend to refer to 'engagement'; this different nuance attributes relational value to settings and puts emphasis on the interaction between individuals and environments. Hence, the current thesis argues that in the examination of the affective benefits of walking in different settings, deeper insights can be offered by conceptualising such interaction as 'engagement' with place, rather than 'exposure' to settings.

Finally, the policy relevance of the affective walking experience was outlined, with Section 3.4 illustrating how affective experiences of walking can influence walking intentions. The evidence on the physical features that are related to high levels of walking and to walking intentions was reviewed. It was shown that affective walking experiences and appraisals influence walking behaviours, and that by examining affective variables it is possible to assess how different physical qualities influence the quality of walking and, ultimately, walking behaviours. Related to the latter point, Section 3.3 within the current chapter has illustrated how engaging with place can influence the walking experience and, ultimately, the quality of walking. As noted by Andrews *et al.*, (2012), it is argued that a geographical perspective on the meanings of movement and on the relational value of place can offer a substantial contribution to walkability debates.

Hence, by drawing on literatures of environmental psychology and geography, Chapters 2 and 3 set out the theoretical framework for this research. This is represented by Figure 3.1.

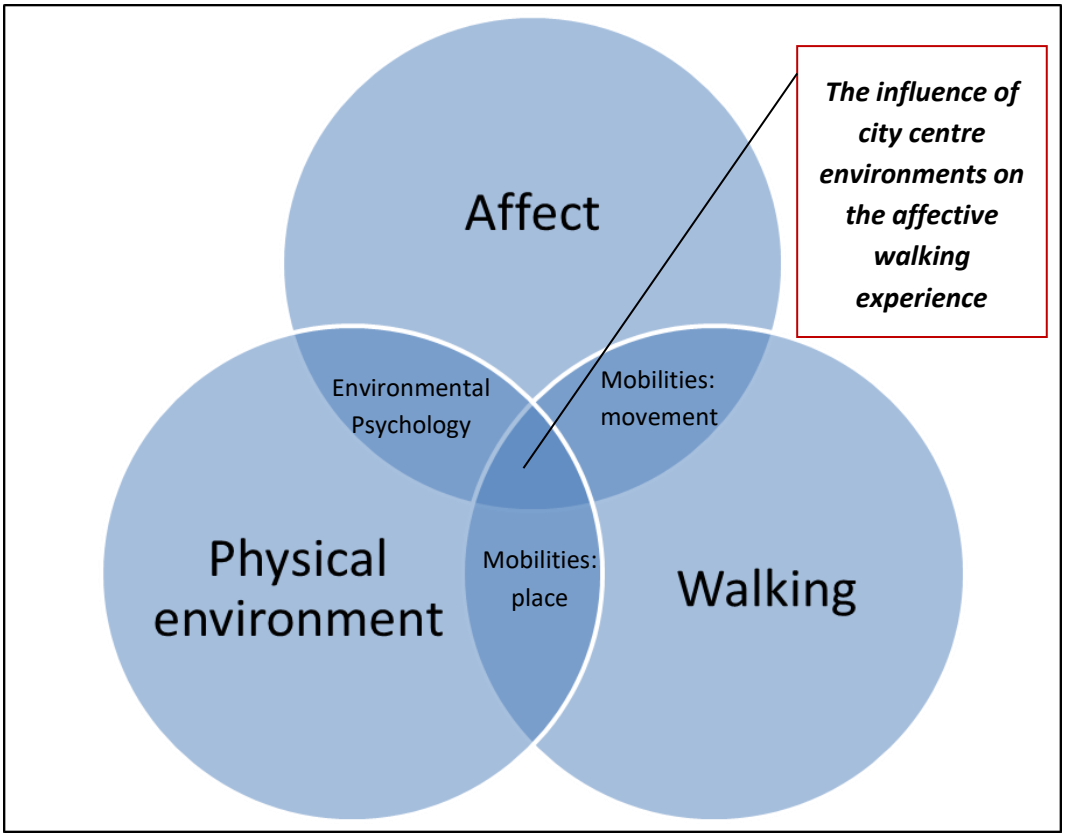


Figure 3-1: Positioning the thesis

Based on the literature review presented in Chapters 2 and 3, the novel research questions of the present PhD research have been formulated, and these are illustrated in Table 3.1. Research Question 1, which builds on the literature review presented in Chapter 2, seeks to explore the extent to which some settings can support affective and restorative outcomes, with a specific focus on the influence of settings' physical features and individual characteristics. By looking at the walking experience per se and at the meanings associated with place, Research Question 2 aims to expand RQ1 and explore *why* some settings might support affective and restorative outcomes, thus looking at barriers and enablers of a positive affective walking experience. Finally, Research Question 3 addresses the relevance of environmental affect for policies of sustainable transport and promotion of walking, and explores the extent to which affective and restorative experiences of walking, together with micro-qualities of urban settings, influence walking intentions. The remainder of this thesis is organised as follows. The next chapter describes the methodological strategy of the current PhD research. RQ1 and RQ2 will be addressed in Chapters 5 and 6 respectively, while Chapter 7 will address

RQ3. A short overall discussion, together with the conclusions of this PhD, are presented in Chapter 8.

Table 3-1: Research Questions

RQ	Research Questions	Chapter
RQ1	To what extent can different city centre environments support positive affective outcomes?	
	a. How can the mobilities and environmental psychology literatures be integrated to inform a critical realist study of the affective benefits of walking in city centre environments?	2 and 3
	b. What is the role of motor traffic and architectural style? c. To what extent do the affective outcomes of walking in city centre environments differ between a student and employee population?	5
RQ2	What are the barriers and enablers of the positive affective walking experience in city centre environments?	
	a. What is the role of motor traffic and architectural style? b. Why might affective outcomes of walking in city centre environments differ between a student and employee population?	6
RQ3	To what extent does the affective and restorative walking experience influence walking intentions within city centre environments?	7

CHAPTER 4

4. METHODOLOGY[3]

4.1 Introduction

This chapter presents the methodology of the PhD, which involved a mixed-method, two-phased strategy. Phase 1 involved quantitative research – a virtual experiment with an online survey. Phase 2 involved qualitative enquiry – photo and video-elicited interviews. Section 4.2 presents the research strategy in more detail, including the epistemological position (Section 4.2.1) and the rationale behind the chosen mixed-methods approach (Section 4.2.2). Research questions and specific methods are summarised in Section 4.3. Sections 4.4 and 4.5 outline the details of Phases 1 and 2 of the data collection respectively, illustrating the rationale and procedures followed for sampling, recruitment, and data analysis.

4.2 Research Strategy

4.2.1 Theoretical rationale

This research adopts a critical realist approach and recognises the importance of both the physical and psychological world (Robson, 2011). Such an approach builds on the strengths of the two classic research traditions – positivism and constructivism – and aims to compensate their respective limitations (Robson, 2011). On one end of the spectrum lies the positivist approach, which has strongly shaped the psychological tradition. Such a position assumes that the world is fully knowledgeable, observable and measurable. It follows that numerical, quantitative assessments are the main mode of enquiry, and objective procedures need to be used in order to ensure the reliability, validity, and generalisability of the results (Robson, 2011). The focus of positivism is to

[3] Part of this chapter is based on Bornioli, Parkhurst, and Morgan, 2018. With permission from authors, Psychological wellbeing benefits of simulated exposure to five urban settings: an experimental study from the pedestrian's perspective, Journal of Transport and Health, in press, Elsevier, 2018.

observe and quantify behaviours (Robson, 2011, p. 18). However, positivism has been the object of criticism, as theoretical concepts do not always fully correspond to reality, and it is acknowledged that the observer cannot be fully neutral (Cresswell and Plano Clark, 2011).

On the other end of the spectrum lies the constructivist approach, which has strongly influenced geographical research and the mobilities literature. This tradition assumes that reality is socially constructed, hence knowledge is highly subjective, and multiple interpretations exist. Therefore, verbal accounts are preferred to numerical assessments, as often the main goal is to explore meanings, rather than behaviours (Robson, 2011, p. 19).

However, it is argued that this dichotomy limits the understanding of the affective walking experience as result of environmental exposure and engagement with place (see Chapter 3 for a critical discussion). Scholars have tended to acknowledge the value of combining the two approaches. One particular way of addressing the dichotomy is the critical realist approach, which according to Trochim and Donnelly (2001) belongs to the category of post-positivistic epistemologies. The approach is *critical* in the sense that it critiques the assumption that researchers are able to fully know reality with certainty (Trochim and Donnelly, 2001). The critical realist approach acknowledges that there can be numerous explanations for social phenomena; the primary task of research is to identify a law, defined as a 'characteristic pattern of activity or tendency of a mechanism', and seek explanations for phenomena (Robson, 2011, p. 31). Therefore, the critical realist approach seems particularly suited to exploring how walking can support wellbeing (see Gatrell, 2013). In fact, mixed-method strategies are suited to critical realist stances, as multiple measures and observations allow obtaining a more complete idea of reality, thus balancing the limitations of each method (Robson, 2011). Such an approach is research-question led, as it gives priority to the research problem, rather than to a specific epistemological stance, and seeks the best mix of approaches to answer a specific research question. In other words, the critical realist approach answers both 'how' and 'why' questions (Robson, 2011, p. 30). Specifically, the current PhD research acknowledges that on one hand the physical world exists independently of human experiences and perceptions, but on the other hand reality cannot be observed

objectively, as there exists a filter/lens (e.g., the researcher) that can influence what is observed (see also Section 4.5.4).

The quantitative phase of the current research aimed to identify a causal relationship between affective experiences and physical settings, with the goal of identifying 'patterns' and the 'how'. An experimental approach was suitable to assess and measure affective experiences of walking, as informed by environmental psychology and health-related literatures presented in Chapter 2. However, it is recognised that the knowledge generated within the experimental phase does not represent a single, objective reality, but multiple social and cultural factors and experiences can influence affective experiences of walking. For example, survey respondents may have differing perceptions of physical elements, due to different past experiences or cultural factors, which will generate variance – e.g.: standard deviations. Related to this idea, the interview phase was designed with the aim of seeking detailed insights (the 'why') on the mechanisms that explain individuals' affective experiences, acknowledging that subjective interpretations and perceptions can influence the observed variable, thus aiming to explain the variance in the data. In this sense, theoretical and methodological insights from geography and the mobilities fields, which were illustrated in Chapter 3, offered a suitable platform to address 'why' questions and to explore processes. Hence, the mixed-method strategy allowed answering both 'how' and 'why' research questions (Robson, 2011) and it is argued that such mixed-methods approach can offer a more detailed exploration of affective and restorative outcomes, as it examines processes. The next section illustrates the overall mixed-methods strategy before each methods is reviewed in detail in Sections 4.4 and 4.5.

4.2.2 Mixed methods rationale

The use of mixed-methods strategies emerged in the 1990s and is becoming increasingly popular in the social sciences (Robson, 2011, p. 162). A mixed-methods strategy can involve either the combination of two or more methods, or simply the use of more than one method within one research project. With reference to the current PhD, the mixed-methods strategy had two main advantages: first, triangulation (e.g., corroboration) of results enhanced validity by offsetting at least some of the limitations of each approach. This offered a more complete and comprehensive picture of the targeted phenomenon.

Second, it enabled the researcher to deal with a complex phenomenon such as the affective experience of walking, looking at both environmental exposure and engagement with place (see Chapters 2 and 3).

Mixed-methods approaches can, on the other hand, be skill and time-intensive, as they require a more elaborate and thoughtful integration of findings than non-mixed-methods approaches (Robson, 2011). These aspects were considered by the researcher. Issues of skill and time resources were addressed with a careful time-management plan which also involved the enhancement and application of multiple skills (e.g., statistical analysis, qualitative methods including visual methods). With reference to the integration and interpretation of results, it has to be noted that they can take place in different stages, as there are several types of design employed for mixed-methods research. As advised by Cresswell and Plano Clark (2011), a careful reflection on how different phases of data collection and analysis should take place, and on when the triangulation should occur, was carried out. The choice within this thesis was to adopt a sequential explanatory design (Cresswell and Plano Clark, 2011; Robson, 2011), in which the collection and analysis of quantitative data was followed by the collection and analysis of qualitative data. Specifically, Phase 1 involved a quantitative experimental study with city centre users (i.e., a large sample of Bristol employees and students, n = 384, see Section 4.4.2) taking part in an online survey with recorded walks. This phase addressed RQ1. Phase 2 involved 14 photo-elicited, qualitative interviews with a sub-sample of survey respondents and addressed RQ2. Planning and delivery of Phase 2 built on results from Phase 1, with the sampling and interview schedule informed by the experiment results. Hence, stages were separate ('sequential'), and a first mixing of the data occurred when the qualitative data collection was designed based on Phase 1 results ('explanatory'). In addition, RQ3 was addressed by both Phases 1 and 2, and the triangulation took place in the interpretation and discussion phases.

4.3 Research Questions and Associated Methods

Table 4.1 summarises how each research question is addressed by specific research phases. The following sections of this chapter illustrate the rationale for each method and processes of sampling, experimental settings selection, procedure, and analysis.

Table 4.1: Research questions and associated methods

RQ	Research Question	Lit re-view	Phase 1	Phase 2
RQ1: To what extent can different city centre environments support positive affective outcomes?		✓	✓	
RQ1a	How can the mobilities and environmental psychology literatures be integrated to inform a critical realist study of the affective benefits of walking in city centre environments?	✓		
RQ1b	What is the role of motor traffic and architectural style?		✓	
RQ1c	To what extent do the affective outcomes of walking in city centre environments differ between a student and employee population?		✓	
RQ2: What are the barriers and enablers of the positive affective walking experience in city centre environments?				✓
RQ2a	What is the role of motor traffic and architectural style?			✓
RQ2b	Why might the affective outcomes of walking in city centre environments differ between a student and employee population?			✓
RQ3: To what extent does the affective and restorative walking experience influence walking intentions within city centre environments?			✓	✓

4.4 Phase 1: Experimental Design

This section illustrates Phase 1 of data collection. The rationale behind the choice of an online survey will be discussed (Section 4.4.1), followed by a discussion on sampling and recruitment strategy (Section 4.4.2). The experimental settings will be presented in Section 4.4.3, and the survey design and procedures will be illustrated in Section 4.4.4.

4.4.1 Rationale

4.4.1.1 Other methods considered

In order to investigate the affective potential of walking in different settings, the choice was to perform an experiment. An experimental design best suits the exploration of pedestrian experience and immediate wellbeing, as it entails a precise assessment of affective states limiting recall bias, whilst controlling for potentially confounding variables. Other methods were also considered. These included psychogeographical methods – e.g.: the use of geo-located data with Geographic Information Systems (GIS) technologies – and intercept surveys (see Appendix 1 for extensive discussion). The use of geo-located data has several advantages, such as allowing large recruitments (Hosang, 2016), and not restricting the analysis to a limited number of case-study areas (Hosang, 2016). The method also has high external validity, due to the fact that data are collected in situ – via ecologic momentary assessments. However, the use of geo-located data presents important limitations. First, it does not allow comparing pre and post-walk affective states, hence it is challenging to attribute affective states to specific elements of the surrounding environment. Second, it is a resource-intensive approach which requires technological skills to design mobile apps and, potentially, high costs, with data analysis being time and skill-intensive (Hosang, 2016). Third, arguably using geo-located data does not allow sufficient focus on the walking experience per se, as it does not give contextual information on social company, baseline affective state, time of the day, weather conditions, etc., which are likely to influence the affective response. For these reasons, the use of the method was excluded.

The use of intercept surveys as a research method was also considered. Intercept surveys are a less resource and time-intensive approach than the use of geo-located data. The method allows assessing affective states and perceptions in situ, real time. However, similar to the use of geo-located data, intercept surveys can be used to assess affective appraisals (see Fornara, 2011), rather than experiences, as they do not allow comparing pre and post-walk affective states. Given the research focus on the walking experience, the method was also discarded, and it was decided that an experimental design would better suit the research questions.

4.4.1.2 Experimental design

An experimental design aims to assess the impact of an intervention (in this case a walk in one of several urban settings) on a variable (change of affective state pre-post walk), controlling for as many external factors that might have a direct or indirect impact on the dependent variable (in this research, the duration of the walk, the weather, time of the day etc.) as possible (Breakwell, Hammond, and Fife-Schaw, 2012). The experimental approach is the most widespread method of analysis in environmental psychology research on environmental restoration (e.g., Van den Berg, Jorgensen and Wilson, 2014; Karmanov and Hamel, 2008; Hartig *et al.*, 2003) and health-related disciplines (e.g., Ekkekakis *et al.,* 2008). Many studies have entailed laboratory experiments using photographs (e.g., Van den Berg, Jorgensen and Wilson, 2014), while others employed videos of simulated walks (e.g., Karmanov and Hamel, 2008; Ulrich *et al.*, 1991). Some others have carried out real-world experiments (Roe and Aspinall, 2011; Hartig *et al.*, 2003). While real world experiments have the advantage of presenting high real-world relevance, laboratory experiments are characterised by high internal validity, allowing isolating the causal relationship and controlling for external factors (Breakwell, Hammond, and Fife-Schaw, 2012). Evidence shows that results from laboratory and real world experiments are generally concordant. However, some scholars have also argued that simulations might lead to lower restorative and affective benefits than field experiments, due to the limited sensory experience involved (Mayer *et al.*, 2009).

In addition, an experimental study is also suitable to explore how walking intentions vary among different settings (RQ3). The walkability literature is based to a significant extent on observational studies, which present the limitation of recall bias (Brown *et al.*, 2007; see also Chapter 3). An experimental, real-time approach has the advantage of presenting the walking environment under the same conditions – e.g., weather, time of day, social company – to participants. Hence, it allows assessing whether the same walking environment is perceived in the same way by different people (Brown *et al.*, 2007).

For Phase 1 of the current PhD research, it was decided to perform a simulated experiment, rather than a real-world one. First, because a simulated walk, in contrast to a real walk, allows controlling for the physiological action of endorphins, which can trigger positive feelings during physical activity (Lawlor and Hopker, 2011). In fact,

scholars agree on the notion that physical activity, even at moderate-low levels such as walking, entails affective benefits per se (Gidlow *et al.* 2016; Robertson *et al.* 2012; Ekkekakis and Petruzzello, 2000). Therefore, a simulated experiment, differently from a field experiment, allowed assessing environmental exposure, which is the focus on the current research, thus controlling for physiological effects. Second, a simulated experiment allows isolating the causal relationship between affective change and environmental conditions, thus controlling for as many external factors as possible (Breakwell, Hammond and Fife-Schaw, 2012) such as weather conditions, social context, time of the day, presence of other pedestrians, etc. In particular, it is argued that within field experiments, the social element of group walks can have an important influence on psychological wellbeing, hence the goal was to focus on individual walks. However, considering the number of areas included in the study (five areas were included – see Section 4.4.3), and therefore the large sample size required (e.g., at least 40 participants in each setting group were required, Field, 2009 – see Chapter 5 on Analysis of Variance requirements), a real-world experiment with individual walks would have entailed a complex and time-consuming process.

On the other hand, laboratory experiments present low external validity. In fact, being a virtual simulation, they have the disadvantage of partially filtering the environmental appraisal (Karmanov and Hamel, 2008). Hence, as noted above, there is the risk that the post-test assessment of affect might underestimate the actual affective response to a real walk (Mayer *et al.*, 2009). This aspect was taken into consideration when discussing results; however, it is argued that there is no risk of overestimating affective states. In addition, Phase 2 of research enhanced ecological validity by referring to real-world situations during interviews (see Section 4.5).

4.4.1.3 The role of online surveys

Most previous virtual experiments were performed in the laboratory (e.g., Kinnafick *et al.*, 2014; Karmanov and Hamel, 2008; Van den Berg, Koole and van der Wulp, 2003). However, visiting the university's laboratory could not have been incorporated into employees' daily routine, hence it would have limited recruiting potential among employees. This is one of the key reasons it was decided to embed the experiment in an online survey.

With reference to web-based surveys, it has to be noted that the internet is nowadays a widespread tool and platform for survey research (Van Selm and Jankowski, 2006), and the use of online surveys entails several advantages. First, they facilitate recruitment of participants (including large samples), especially among groups that use the internet regularly, such as young people and office workers (Van Selm and Jankowski, 2006). In the case of this PhD research, an online survey suited the two chosen study populations – students and employees – as both populations have daily access to the internet and have basic technology skills required to complete an online questionnaire. Second, online surveys offer financial and efficiency advantages. From the participants' perspective, web-surveys can be incorporated in the daily office routine, a quality which is especially valuable in the case of a population like office employees (see also Section 4.4.2). Also, and compared with paper-and-pencil research (Van Selm and Jankowski, 2006), web-surveys have the advantages of being low-cost (Van Selm and Jankowski, 2006; Kaplowitz, Hadlock, and Levine 2004) and entailing quicker data collection and analysis.

Potential problems related to web-based surveys include the non-randomised nature of samples and issues of representativeness. Research has shown that, though not completely representative of the population, the notion that internet samples are "maladjusted, socially isolated or depressed" is a myth (Kaplowitz, Hadlock and Levine, 2004). In addition, according to Van Selm and Jankowski there is the risk of "losing sight of who is responding to the questionnaire" (2006, p. 438). In addition, it is challenging to determine response rates. Therefore, the necessary precautions to avoid sharing access to the survey to irrelevant populations were taken, even though it was not possible to determine response rates (see Section 4.4.4 on distribution and procedures).

4.4.2 Participants

The research was aimed at two populations of Bristol city centre walking users: undergraduate psychology students from the University of the West of England – Bristol (n = 130) and employees of organisations based in and around Bristol city centre (n = 254). Given the widespread use of student samples (see Chapter 2), the current research had the secondary aim to explore whether results from student populations differ from those of non-student populations, for example a sample of adult employees. Hence, in

addition to students, a population of Bristol-based employees was sampled. Employees based in Bristol represent an important portion of city centre walking users, and they are relatively easy to reach. In addition, some previous research has involved similar groups (e.g., Gidlow *et al.*, 2016; Kinnafick and Thøgersen-Ntoumani 2014). In this regard, RQ1c aimed to explore potential differences between the two study populations.

Table 4.2 presents descriptive statistics of the two samples (see also Section 4.4.1 for survey contents). The table also highlights differences between-groups in age (higher average age within the employee sample), gender (higher proportion of female participants within student sample), residential location (higher proportion of participants living in city centre locations within employee sample), familiarity (higher proportion of participants familiar with experimental settings within employee sample), main travel mode to work/university (higher proportion of participants walking to work/university within employee sample), and walking habits (higher proportion of heavy walkers within employee sample). The existence of any statistically significant between-group differences will be explored in Chapters 5 and 7, which will also discuss the relevance of these differences in regard to the research questions.

Table 4.2: Summary of survey sample characteristics

	Overall Sample		Students		Employees	
	Valid N	Mean (SD) /Percentage	Valid N	Mean (SD) /Percentage	Valid N	Mean (SD) /Percentage
N	**384**		**130**		**254**	
Age	370	35.01 (13.89)	130	22.09 (7.00)	248	42.07 (11.42)
Gender	**378**		**130**		**254**	
Female		70.1%		80.0%		64.5%
Male		29.6%		20.0%		28.7%
Residential location	**224**		**101**		**254**	
Central[4]		32.5%		41.6%		67.2%
Peripheral[5]		22.1%		49.5%		28.7%
Lives outside Bristol[6]		2.3%		8.9%		4.1%
Familiarity with setting	**382**		**130**		**247**	
Familiar[7]		85.9%		76%		91.1%
Not familiar		14.1%		22%		8.9%
Industry					249	
Healthcare	-	-	-	-		30.1
Education	-	-	-	-		14.5
Banking and law	-	-	-	-		24.7
Government	-	-	-	-		20.9
Other	-	-	-	-		9.8
Main travel mode to work/ university	**379**		**130**		**249**	
Car		18.4%		17.9		18.6
Bus/train		24.7%		44.5		14.6
Bike		15.6		7.4		20.2
Walk		37.1%		26.7		43.2
Other		3.6%		3.7		3.2
Walking habits	**379**		**130**		**249**	
Walks everyday		48.3%		34.1		56.0
1 – 3 times a week		41.1%		56.3		36.3
Less than 1 time a week		8.5%		9.6		7.7

[4] Residential postcode: BS1 to BS8; up to 4 miles from city centre.
[5] Residential postcode: BS9 to BS37; more than 4 miles from city centre.
[6] Not Bristol residential postcode
[7] "Very familiar" or "familiar" with settings according to survey response (see Section 4.4.4.1.3)

4.4.2.1 Recruitment

The student sample was recruited through the UWE-Bristol Psychology Undergraduate Participation Panel, which consists of an online platform in which psychology studies are advertised and students can sign up in exchange for research study experience and research credits. Students participated in exchange for a 0.5 course credit, corresponding to 30 minutes of time commitment. This is a popular method of study recruitment within many psychology departments and groups within UK universities.

The employee sample consisted of individuals working in several public and private companies based in Bristol (see Appendix 2 for details). Employees were approached between November and December 2015 via key contacts in city centre organisations, such as staff travel managers. Key contacts facilitated the forwarding of an invitation email to internal staff lists containing the link to participate in the online survey. Targeted organisations included both public and private entities. Environmentally-oriented organisations were not over-represented in order to obtain a realistic picture of walking users of the city centre. Differently from students, who received course credits, employees did not receive any incentive to take the survey.

4.4.3 Settings

Five Bristol urban settings were selected according to several key selection criteria, which are illustrated below. First, in order to answer the research questions of the study, the areas were selected to represent, together, a range of different open space characteristics in terms of motor traffic, architectural style, and greenery. In addition, as the research goal was to measure affective and restorative outcomes independently from nature, areas without any evident greenery or blue elements were specifically selected.

Second, areas were selected among Bristol city centre locations; as participants were Bristol-based employees and students, the goal was to recreate a 'realistic' walking experience for participants. Hence, the critical realist approach guided towards the choice of Bristol settings, rather than settings from a different city. While Nasar has noted that "familiarity and adaptation may affect judgments of the environments" and that "it is difficult to separate the personal from the environmental bases for the rating"

(2008, p. 359), the current research did not consider the 'personal' as bias, but rather aimed to identify a pattern (Phase 1) and explain how the personal can influence this (Phase 2).

Third, only leisure/recreational walking areas were considered, and residential areas were excluded. In fact, previous research has argued that function has an influence on affective and restorative experiences, with leisure areas having a potential to be restorative per se (Staats *et al.*, 2016).

Fourth, settings were also equivalent in further characteristics of the built environment. As a reference, the following aesthetic attributes identified by Nasar (2008) were considered in order to choose similar settings: levels of vegetation, maintenance and upkeep, and openness. Specifically, the selected built-only areas presented very little or no nature, medium to good levels of maintenance and upkeep, and medium openness.

Several areas in Bristol city centre were surveyed by the researcher, and the final selection included the following settings – see also Figure 4.6 for geographical location and Appendix 4 for web links of experimental videos:

I. Corn Street (Pedestrianised Historic Environment, hereafter *PedHist* – Figure 4.1)

This pedestrianised area is located in the historic heart of Bristol's Old Town. It still has some of its Victorian character as the commercial and banking heart of the City (Foyle and Cherry, 2004), although now bars and restaurants occupy many of the former bank buildings and offices. Corn Street is dominated by neoclassical buildings, of which four are listed as national heritage (Former Bank of England building, Shaftsbury Chambers, the Corn Exchange, and the Post Office). The area has no evident greenery, with the sole natural elements constituted by several small flowerpots attached to the Corn Exchange building. The environment is relatively luminous and open, with buildings having three or four storeys, relatively clean and well kept.

II. Millennium Promenade (Pedestrianised Modern Environment, hereafter *PedMod* – Figure 4.2)

This pedestrianised area was built as part of the Bristol Harbourside masterplan by Edward Cullinan Architects in 2000. The area, adjacent to the Floating Harbour, is a

modern complex of residential buildings, cafes, and restaurants. The area has no evident greenery, with sporadic plants on the side of the thoroughfare. The environment is relatively luminous and open, with buildings having three or four storeys, and is clean and well kept.

III. College Green (Pedestrianised mixed environment, hereafter *PedMixed* – Figure 4.3)

It is a pedestrianised stone-paved thoroughfare used by pedestrians and cyclists located in the public open space of College Green. The route is framed on one side by Bristol Cathedral, originally founded in 1140 and completed in the 19th century. On the other side, it is framed by a semi-open area with grass, trees and lamp posts, and beyond that, a single carriageway principal traffic route. The area has medium levels of greenery, with trees and grass on the left side of the path. The environment is luminous, with the Cathedral having four storeys and the other side of the path open, and is clean and well kept.

Two additional areas were included as comparison groups of respectively non-restorative and restorative environments: first, a commercial area with traffic; second, an urban park:

IV. The Horsefair (Commercial area with traffic, hereafter *CommTraf* – Figure 4.4)

It is a commercial street with traffic in the Broadmead shopping area of Bristol. It has many high street retail outlets and cafes; the road is single-lane with moderate moving traffic, constituted by cars and buses. The area has no greenery. The environment is luminous, with buildings having three or four storeys, and is relatively clean and well kept. It was chosen in order to replicate previous studies that found that walking in commercial areas increases stress (e.g., Johansson, Hartig and Staats, 2011) and as comparison group.

V. Castle Park (Urban park, hereafter *Park* – Figure 4.5)

It is an urban park in Bristol City Centre. Views of the castle were avoided in order to exclude the historic element from the environmental condition. The chosen route

followed a pedestrian path through open and semi-open green areas with sporadic trees on the side of the path and, for a short segment, along a canal. The environment is clean, well-kept, and luminous. It was chosen in order to replicate previous studies that found that walking in natural spaces reduce stress (Van den Berg, Jorgensen and Wilson, 2014; Roe and Aspinall, 2011).

Figure 4-1: PedHist (Corn Street). Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2017a, 2017b, and 2018.

Top: Figure 4-2: PedMod (Millennium Promenade). Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2017a, 2017b, and 2018.

Bottom: Figure 4-3: PedMixed (College Green). Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2017a, 2017b, and 2018.

Top: Figure 4-4: CommTraf (the Horsefair). Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2017a, 2017b, and 2018.

Bottom: Figure 4-5: Park (Castle Park). Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2017a, 2017b, and 2018.

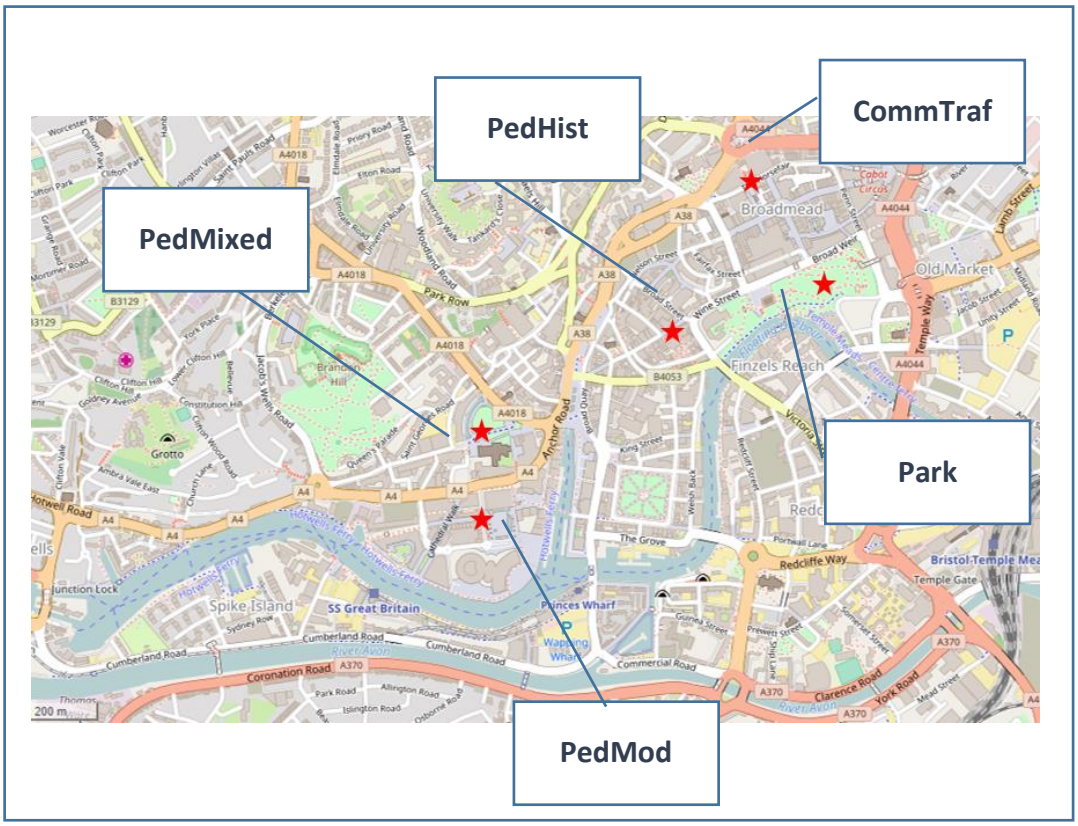


Figure 4-6: Bristol city centre and setting locations, Used with permission of the copyright holder © OpenStreetMaps contributions

4.4.3.1 The role of videos

A video of a simulated walk was filmed for each environment, similarly to previous studies (e.g., Gatersleben and Andrews, 2013; Laumann, Gärling, and Stormark 2003). Videos were filmed with a GoPro HERO 35 mm camera during several afternoons in October 2015. Crowded times of the day were avoided, but other pedestrians were present in each video and could not be avoided given the nature of the locations (i.e., Bristol city centre areas). The number of pedestrians was similar across locations, with settings not crowded (e.g., 5 to 10 pedestrians per video). Weather conditions were selected to be consistent across videos (following Nasar, 2008), and these were generally good, with cloudy but dry weather.

According to Garrett, video methodologies are under-utilised in geography, despite videos being useful research tools in geography as they "capture movement" (2011, p. 2) and are "multisensorial, capturing sound, image, movement, […] time and place" (2011, p. 11). In fact, videos capture an experience in a more realistic way than images or photographic slideshows do. First, because videos capture most of the scene-in-front given the wide-angle-camera, rather than focusing on a specific element of the

surrounding environment (Nordh *et al.* 2009). Second, videos contain sound, which is a crucial part of the walking experience, and the sensory experience of watching a video is more complex and realistic than a photograph slideshow. According to Conniff and Craig, the exclusion of the sonic dimension might even 'mislead' the interpretation of results (2016, p. 108). Third, once the camera was mounted on the bike handlebar, videos reproduced the movement of walking, hence watching a video is close to the real experience of walking.

The goal of each video was to give the feeling of movement whilst avoiding vibrations and bumpy recordings that are not representative of natural walking. Following pilot runs with the camera attached to clothing, the output was found to be too unstable compared to the human experience, which involves complex cognitive processing to 'stabilise' images from the saltation of walking motion. However, this was effectively overcome by the camera being mounted on a bicycle with the experimenter pushing it whilst walking at a slow pace, akin to a comfortable walking speed. The viewed video was accompanied by an audio file, as for most, sound is a key part of the walking experience (Conniff and Craig 2016). However, the use of a bicycle to mount the camera introduced an obvious 'ticking' sound from the freewheel mechanism. Therefore the sound channel was recorded separately and then synchronised with the video file. The two files were not exactly simultaneous but, as established from the pilot, this was not noticeable.

However, watching a video remains a proxy of walking that does not recreate the exact walking experience, as the two lead to different types of gaze and sensory experience. The wide-angle makes the gaze look a lot larger than in real walking, and individuals' attention is totally dedicated to watching a video, as there is no need to pay attention to external elements that may obtrude with walking. As Garrett has put it, despite videos being the media that arrive closest to the human multisensory experience, they do not become embodied experience (2011).

Additionally, each video was a very short film in itself, with a particular point of view that was inevitably set by the researcher, a specific gaze, duration, and content that was out of participants' control. Hence, videos were viewpoints 'imposed' on participants, and did not fully represent the walking experience. The critical realist approach within this thesis also acknowledges that the way the videos were filmed had an influence on

the way knowledge is created, as the reality depicted by the video is not objective, but rather it is one of the multiple faces of reality. Here, reality was constructed by the researcher through the video production, and each participant, with his/her own values, ideas and interpretations, contributed to constructing 'reality'. This aspect was counterbalanced with verbal interviews, as videos were discussed during the interview phase in order to interpret the affective response measured by the survey (Section 4.5).

Each video was edited with Windows Movie Maker to be exactly 1 minute long. The rationale behind the video length is discussed below. First, the streets depicted by the videos were short, and hence videos could not be longer than one minute, as longer videos would involve moving away from the street. This issue especially holds for pedestrianised areas, as in Bristol there are no extensive pedestrianised areas matching the inclusion criteria that would have allowed filming longer videos. The choice was to avoid extensive editing or creating a collage of different settings, as the goal was to keep the experience as realistic as possible. Additionally, the research goal was to identify specific micro-qualities of built environments related to motor traffic and architectural style that can influence affective outcomes; therefore, it was very important to identify specific areas that would reflect the chosen conditions. Other studies that have assessed affective responses to urban walks have presented a mix of elements (e.g.: traffic and pedestrianised areas, different architectural styles, residential and leisure areas); hence it is not clear which specific factors caused the affective response.

For instance, in Hartig and Staats (2006) the urban condition was constituted by streets with "different characters: one passes through an area of office buildings and hotels, another passes beside an outdoor market, another is a major thoroughfare [with] high pedestrian and/or vehicular traffic flow rates" (2006, p. 218). Similarly, Laumann, Gärling and Stormark (2003) filmed a video in Oslo in a mix of both pedestrian and motorised traffic streets. As a result, there is uncertainty as to which characteristics of the built environment triggered the wellbeing effect. This research intended to characterise the conditions as much as possible in order to allow attributing the affective appraisal to a specific feature of the urban environment.

Second, it is argued that a simulation, even though short, can change affective states. In fact, affect is always present but varies in intensity (Ekkekakis, 2013), and can be either unconscious or directed at something. When it is directed at something, affect becomes

an emotion (Seo, Barrett, and Bartunek 2004). In the case of the environmental simulation, it is assumed that the affective response was directed at the walk in the environment, as participants were given the task of imagining themselves walking in the setting depicted by the video. As illustrated in Chapter 2, an emotion lasts "seconds to minutes" (Ekkekakis, 2013, p. 47), and it is argued that the intensity of the affective response related to the video-walks was comparable to the intensity proper of an emotion.

Fourth, given there being five experimental settings, a large number of respondents was needed. Hence, there was a trade-off with video length, with a longer video risking a drastic limitation in the number of participants, especially among the employee sample.

Hence, employing short videos had the risk of underestimating the effect of the manipulation, but arguably there was no risk of overestimating it. Therefore, the results have to be considered as likely filtered estimate of the actual affective experience.

4.4.4 Procedure

The study was approved by the UWE-Bristol Faculty of Environment and Technology's (FET) Ethics Committee (Appendix 8). The survey was developed with Qualtrics, which is the most powerful survey platform accepted by the Faculty Research Ethics Committee as compliant with ethical and data protection policies. With reference to student participation, approval was also obtained by the Faculty of Health and Applied Sciences Ethics Committee. Data collection took place between November and December 2015. The survey was first piloted with 17 participants (friends and colleagues of the researcher naïve to the research questions, aims and hypotheses) in October 2015 in order to test the content and formulation of questions, and the general 'user-friendliness' of the online survey.

The first page of the survey included an information sheet that explained the survey contents, and informed participants about the opportunity to email the researcher to ask questions (see Appendix 3). Consent was sought, and participants were informed that they could opt out of the research by closing the web page, or even after submission by contacting the researcher within two weeks of the survey's completion (see Appendix 3).

All participants were instructed to watch the video and imagine taking a real walk in the environment depicted. A short instruction preceded the video ("*Please watch this 1-minute video. Imagine you are taking a walk in this environment during daytime. Make sure the sound is switched on and set at a comfortable audible volume. If you can, please wear headphones*" – see Appendix 4 for web links of experimental videos). The researcher purposely chose not to include a more detailed description of the walk in order to avoid influencing participants' affective experience.

The choice was not to use a stressor, a decision which followed some previous studies (Gidlow *et al.*, 2016; Roe and Aspinall, 2011). This decision was taken, first, because research has shown that urban living is associated with stress, hence it was assumed that participants would be generally stressed, so in the need of restoration, and second, because walking generates affective benefits, not only when individuals are immediately stressed, but potentially in any mental situation. Therefore, policy implications are wider if any affective benefit is detected, as already noted by Gidlow *et al.* (2016) (see Chapter 8 for potential limitations related to this choice).

4.4.4.1 Measures

The questionnaire included three sections: first, measurement of affect; second, environmental and restoration ratings; third, socio-demographics and walking habits.

4.4.4.1.1 Measurement of affect

In this section, participants were asked to fill in the affect scale twice: pre- and post-video. The chosen affective scale was the UWIST MACL (University of Wales Institute of Science and Technology Mood Adjective Checklist – Matthews, Jones, and Chamberlain, 1990). It is a dimensional scale in which affective states are measured through three dimensions: Energetic arousal (active/tired); Hedonic tone (pleasure/displeasure); Tense arousal (stress). Selecting an affective measure involves a series of complex decisions on the targeted construct (affect, mood, or emotion), conceptual model, and psychometric measure itself (Ekkekakis, 2013), even though, according to Ekkekakis (2013), many existing studies on affective appraisals are not transparent on these decisions, and often choose traditional, popular scales without giving a clear rationale.

Therefore, Ekkekakis' guidelines (2013) on the selection of affective scales were followed, and a thorough reflection informed the scale selection. The first step involved

selecting the construct to target, whether affect, mood, or emotion (Ekkekakis, 2013). As outlined in Chapter 2, walking entails both affect and emotions; the current research targeted affect, as such measurement offers a broad, encompassing overview of the respondents' affective state and allows capturing any effects of the experimental manipulation (Ekkekakis, 2013). With this regard, it has to be noted that in restorativeness research the terminology is inconsistent, with some authors defining stress as a mood state (see Roe and Aspinall, 2011; Van den Berg, Koole and van der Wulp, 2003), despite stress being an affective state (Ekkekakis, 2013; Russell, 1980).

The second step involved choosing the conceptual model of affect (Ekkekakis, 2013). Issues such as structure, dimensionality and polarity have to be considered. This research refers to the circumplex model of affect proposed by Russell (1980) as the theoretical model underpinning environmental affect (see Chapter 2).

The final task entailed the selection of a psychometric scale, based on both the targeted construct and the conceptual framework (Ekkekakis, 2013). There are numerous psychometric scales that measure affective states based on Russell's circumplex model of affect. The choice for the present research was to use the UWIST MACL scale (Matthews, Jones, and Chamberlain, 1990); despite it referring to 'mood', the scale actually measures affective states. The scale had been used before in studies examining affective responses to physical activity (Roe and Aspinall, 2011). The scale has the advantage of measuring three dimensions of affect: stress, pleasure, and energy. In fact, according to Anable and Gatersleben (2005), limiting the analysis to the dichotomy 'stressful-relaxing' is constraining, as such a dichotomy does not give the full picture of the affective walking experience. Excitement and pleasure are important dimensions of the affective walking experience, with excitement also considered an important variable in restoration research (Scopelliti and Giuliani, 2004). The scale includes 12 items, organised in the three dimensions: stress (nervous, tense, relaxed, calm); hedonic tone (happy, content, sad, sorry); energy (active, energetic, passive, sluggish). Each of the twelve item is measured on a 4-point scale, which are then summed up to obtain a total score for stress, hedonic tone, and energy respectively. Possible scores range from 4 (minimum) to 16 (maximum), with a midpoint of 10.

4.4.4.1.2 Environmental ratings, perceived restoration, and walking intentions

The survey included additional questions on environmental ratings and perceived restoration related to the environmental condition. The chosen restoration scale was the short version of the PRS (Perceived Restorativeness Scale, Berto 2005). This was included in the study in order to measure the likelihood of cognitive restoration. The shortened version was developed by Berto (2005) based on the integral version by Hartig *et al.* (1996). The short version has four statements, each of them corresponding to one of Kaplan's restorative properties (*fascination, being away, extent, compatibility*), each rated on a seven-point scale. The construct of extent includes scope and coherence (Abdulkarim and Nasar, 2014). Statements were adapted to the walking context (Being away: "*Walking in this setting allows me to get away from it all and relax";* Extent*: "Walking in this setting feels like being in a world of its own";* Fascination*: "When I walk in this setting my attention is drawn without effort and my interest is engaged";* Compatibility*: "Walking in this setting makes me feel at ease*").

Environmental scales included a measure of attractiveness and interestingness already used by Karmanov and Hamel (2008). Attractiveness included six items (ugly–beautiful, unpleasant–pleasant, unfriendly–friendly, unenjoyable–enjoyable, repulsive–inviting, impersonal–personal). Interestingness included four items (uninteresting–interesting, average–exceptional, dull–exciting, simple–complex) (Karmanov and Hamel, 2008). Attractiveness and interestingness were measured on 5-point scales.

A final question focused on the perceived walkability of the setting depicted in the video, and this was developed by the researcher: "*If this kind of environment was on your way to work/place of study, would you be more likely to walk to work/place of study more often?"* rated on a 5-point scale. This question was included to address RQ3 (To what extent does the affective and restorative walking experience influence walking intentions within city centre environments?).

4.4.4.1.3 Socio-demographics and personal characteristics

The survey also included questions on socio-demographic factors (age, gender, ethnicity, industry/sector, residential postcode, familiarity with the area – three levels of familiarity were included: 'I know the area well'; 'I know the area a bit'; 'I don'*t* know the area). Questions on transport habits included one categorical question on travel

mode to work/place of study ("*What is your main mode of travelling to work/place of study*?") and one question on walking habits ("*How many days per week do you walk for at least 30 minutes?*"). Based on the two questions, two dummy variables were created: '*Walks to work'*, which refer to participants who walk to work/place of study, and '*Heavy walkers'*, which refers to participants who walk for 30 minutes at least 4 days a week.

4.5 Phase 2: Photo-Elicited Interviews

Phase 2 of the data collection involved 14 photo-elicited semi-structured interviews with 14 participants that had previously completed the survey; it took place between August and October 2016. Prior the interview, participants were asked to take a walk in the city centre and photograph elements of the surroundings that made them feel good or bad during the walk. The photographs were then discussed during the interview. This section presents the rationale behind this two-stage method (Section 4.5.1), followed by the illustration of sampling strategy, data collection, and analysis (Sections 4.5.2, 4.5.3, and 4.5.4).

4.5.1 Rationale

The qualitative phase was designed to integrate the experimental study with an in-depth exploration of the affective and restorative potential of urban settings. In fact, as noted by Scopelliti and Giuliani (2004, p. 434), simulations typical of experimental designs have the disadvantage of overcoming the focus on place experience; hence, qualitative research was chosen for its strength of offering thick and rich accounts of experiences (Braun and Clarke 2013, 2006). While Phase 1 was designed in order to obtain a precise, numerical measurement of affective outcomes, the interview phase aimed to investigate the *hows* and *whys* of such experiences, thus addressing RQ2: *What are the barriers and enablers of the positive affective walking experience in city centre environments?* In addition, the phase also explored how built features influence walking intentions, thus addressing RQ3. In fact, while quantitative surveys have the limitation of precluding researchers from taking into account the meanings that individuals attribute to environments (Belon *et al.* 2014), interviews capture nuances related to individuals' relationships with place. In fact, most research on how physical elements

affect walking levels and walking intentions has been based on quantitative methods (e.g., Cain *et al.*, 2017; Giles-Corti *et al.* 2005).

In designing Phase 2 of data collection, considerations were made on the fact that a crucial aspect of this research was the *mobile* experience of place. This is why a quasi-mobile interview method was employed, e.g., photo-elicited interviews based on photographs taken during walking. With the emergence of the new mobilities paradigm, there has been growing interest in mobile methods. These include walked interviews (Evans and Jones, 2011), video-recorded walks (Delaney, 2016; Delaney, Parkhurst, and Melia 2016; Pink 2007), or cycle rides (Brown and Spinney 2010). Mobile methods have the advantage of 'being there' while the phenomenon is happening (Brown and Spinney, 2010), hence allowing investigating the practice from a close perspective. However, some academics have argued that mobile viewpoints might be too close, in the sense that the presence of the researcher can obtrude the activity itself (Brown and Spinney, 2010). Arguably, this 'there-ness' (Merriman, 2013) may interfere with the activity and prevent practices and outcomes to take place. Taking in mind these aspects, several mobile methods were considered. These are illustrated below.

First, the walked interview (Evans and Jones, 2011) was excluded in relation to its 'there-ness' (Merriman, 2013). Additionally, it is argued that a walked interview methodology is more suited to phenomenological approaches, in which research seeks to investigate the construction of meaning, rather than causal relationships. In fact, the method exposes participant and researcher to an intense multi-sensory stimulation of the surrounding environment (Evans and Jones, 2011). The researcher felt that the 'immediacy' and 'kinaesthetic rhythm' (Evans and Jones, 2011) offered by such multi-sensorial experience might have prevented the discussion from focusing on specific aspects of the walking experience and from the identification of causal mechanisms.

Second, the researcher considered to design a field experiment with mobile electroencephalography (EEG) measurement followed by interviews. The use of mobile EEG supported by GPS allows recording and analysing the affective experience of individuals while on the move, and the tool is increasingly widespread (see for example Tilley *et al.*, 2017; Osborne and Jones, 2017; Aspinall *et al.*, 2013). However, scholars have suggested that a post-walk interview to interpret the EEG data with participants' accounts is both enriching and necessary to fully exploit the value of EEG data (Tilly *et*

al., 2017; Spinney, 2015; Nold, 2009), especially considering that the use of EEG to track affective responses is still at early stages. Specifically, scholars from the field of geography have raised some scepticism on the objectivity of data derived from physiological measurements such as EEG or galvanic skin response (e.g., Osborne and Jones, 2017; Tilley et al., 2017; Spinney, 2015). These scholars have argued that such tools should be used in conjunction with qualitative methods in order to provide insight into the quality of affect, in addition to the quantity insight provided by the bio-sensing tools (Spinney, 2015, p. 240), and to provide context for the neuroimaging data (Tilley *et al.*, 2017).

A pilot study with a mobile EEG recorder was run in September 2015. The recorder was an Emotiv EPOC provided by UWE's Faculty of Health and Applied Sciences. The Emotiv recorded four affective dimensions: frustration, engagement, arousal, and meditation. Two volunteers took part in the study; the EEG recorder was worn during a 30-minute walk around the University campus, which included green areas, indoor spaces, and outdoor built spaces. The goal was to identify preliminary patterns of affective responses, and understand how these would vary depending on the walking setting. However, several problems emerged. First, the practical use of the equipment was particularly challenging due to the poor adherence of the sensors to the scalp. This led the Emotiv's recording to be not fully reliable and constant. This issue, which was particularly problematic with long-haired participants, was also observed by Jones *et al.* in their research project CycleBOOM on ageing and cycling (2016, p. 16). Second, analysis the raw data revealed to be particularly challenging without the support of a neuroscience unit. Also, it has to be noted that the recent study by Tilley and colleagues (2017) has highlighted a discrepancy between EEG data and participants' self-ratings on affective wellbeing. Therefore, due to the complexity involved in data analysis and to limited resources and time, the EEG option was dropped.

Third, another method that was piloted consisted in video-elicited interviews based on participants' self-recorded videos of individual walks (Brown and Banks 2014; Delaney, 2016). The method was used before to explore practices of dog-walking (Brown *et al.*, 2008), cycling experiences (Spinney, 2011; Brown and Spinney, 2010), and interactions between pedestrians and cyclists in a shared-used path (Delaney *et al.*, 2016; Delaney, 2016). It has the advantage of offering a balance between observing the experience and

the excessive 'there-ness' (Delaney, 2016), thus witnessing the experience (through video), whilst at the same time leaving the walking experience as normal and undisturbed as possible. Three video-walks were piloted over the summer. Participants were asked to choose a walking journey to record which involved at least partially Bristol city centre. The required length of the recording was 10 to 30 minutes, in order to ensure that the video would be at the same time useful and relatively quick to analyse for the researcher. Arrangements were made with each participant for an initial meeting to give the camera together with instructions. A Veho Muvi Micro Action Camera (55mm x 20mm x 20mm) was used. This was attached to the bag strap on participants' chest. The video footage was then uploaded from the cameras to a laptop using a USB cable. The video footage was first analysed by the researcher prior to the interview, and it was then discussed during the interview.

The methodology offered the advantage of observing the walking experience from a privileged point of view without intruding the walking practice. However, several limitations emerged. First, the recorded video represented one specific point of view, which was different from the participant's gaze. For this reason, several times the camera failed to capture what the participant was paying attention to (e.g.: being attached to the chest, the camera did not capture the actual perspective of pedestrians). For instance, one participant felt disappointed when the video did not record a particular view that she had enjoyed during walking. Therefore, the video partially failed to act as visual prompt during the interview. Second, still related to the camera's gaze, participants were not fully aware of what was recorded, and they did not have the chance to watch the recorded video prior the interview. For these reasons, they did not have the chance to reflect and fully elaborate on the physical elements that affected their walk, and the level of reflection remained superficial. Therefore, the video-elicitation technique was substituted by a photo-elicitation method.

Hence, following these pilots, the researcher selected photo-elicitation interviews, e.g., a sedentary method based on the mobile experience of walking (i.e., depicted by participant-produced photography). The advantages of such method are discussed below.

4.5.1.1 Photo-elicited interviews

The chosen methodology for the qualitative phase of data collection consisted in photo-elicited interviews. Photo-elicitation or photo-voice methods are a popular tool in social (Guell and Ogilvie 2013), health (Oliffe and Bottorff, 2007; Frith and Harcourt, 2007) and psychology research (Bagnoli, 2009; Frith *et al.,* 2005) aimed to explore perceptions, practices and activities, or social interactions. A photo-elicited interview entails several advantages. First, the interview process is revolutionised. The interview empowers participants, as they are enabled to reflect on specific issues and to take control of the interview and use the photographs to talk freely. In a way, participants adopt the role of experts, and are left set their own pace. In this regard, photographs act as prompts and ice-breakers, making the interview more fluid, and reduce misunderstandings (Harper, 2002). Photo-elicitation also contributes to building trust and rapport between researchers and participants (Hurworth, 2004).

Second, photographs can be evocative and descriptive. Hence the use of photographs can uncover details, memories, and feelings related to in situ experiences (Bagnoli, 2009; Frith and Harcourt, 2007; Harper, 2002). In fact, according to Ettema and Smajic (2015), affective walking experiences cannot be fully explored through traditional, ex-post interviews, due to the fact that emotions are extremely transient. In this sense, photo-elicitation has the advantage of prompting memories while at the same time enabling deep, ex-post reflection. This is especially relevant for emotions and affect (Frith and Harcourt, 2007), which are sometimes easier to represent visually than verbally, while can be teased out during the interview. Photographs are "visual reminders" (Frith and Harcourt, 2007, p. 1342) that encapsulate detailed stories or symbolise events, experiences, and ideas. According to Oliffe and Bottorff, photo-elicitations "illuminate the complexities of how, why, and under what conditions cultural norms might be followed, redefined, and/or explicitly rejected" (2007, quoted in Guell and Ogilve, 2013). In addition, photographs represent a 'shared resource' that can be examined, explored, and used not only by participants, but also by researchers (Frith and Harcourt, 2007); in this way, participants' experiences are further explored during interviews. In this regard, Guell and Ogilve's methodological study (2013) examined strengths and weaknesses of photo-elicitation in exploring commuting practices in Cambridge (UK). The authors concluded that photo-elicitation offered deeper and richer

insights into commuting experiences than the ones offered by traditional interviews, and enabled participants to reflect on their experiences of travel

Third, the use of photographs during interviews has the advantage of making participants reflect on a phenomenon, thus 'breaking the frame' (Harper, 2002). In other words, participants are required to reflect on their relationship with the environment in a way that would not usually occur. Such reflection takes place during walking and during the interview discussion. As Harper has put it (2002, p. 21), unusual angles and perspectives can raise new awareness around experiences that are generally taken for granted, such as the affective walking experience. In this regard, Belon *et al.* (2014) conducted a photo-voice study to explore aspects of physical activity among Canadian residents related to physical, sociocultural, economic, and political elements. These authors suggested that photo-voice provides insights on the multiple dimensions of environment, and these dimensions might influence physical activity behaviours. According to Belon *et al.* (2014), photographs are particularly suited as they can represent multiple aspects of the relationship between people and physical environments, and these are not limited to the physical dimension. For example, visual depictions can describe personal experiences, social influences, and meanings attributed to the environment.

Fourth, compared to the walked interview, with photo-elicitation participants experience the walk in the absence of the researcher, while the discussion around the photographs enables the researcher in, somehow, "being there" (Spinney, 2015, p. 235) thanks to the visual aids that witness the walking experience.

In addition to the use of participant-produced photography, interviews included a phase in which researcher-produced videos of the experimental settings that were used in the online experiment (see Section 4.4.3.1) were discussed with participants. Similarly to the use of participant-produced photography, using researcher-produced visual aids reduces misunderstandings (Harper, 2002) and help participants to remember feelings and experiences that happened in situ, hence data collection is more reliable (Tilley *et al.*, 2017).

4.5.1.2 Limitations of photo-voice method

Notwithstanding the advantages of photo and video elicitation methods, these can present challenges; therefore, a careful reflection around the potential limitations of the method was performed before carrying out the qualitative data collection (see also Chapter 8, Section 8.5.6 for a final reflection on the method). A first challenge is related the fact that photographs are a *representation* of reality, rather than the exact copy of it (Brown, Dilley, and Marshall 2008; Pink, 2007). Related to this point, it is worth noting that participants are given control over the specific subjects to represent in the photographs. In this sense, the exercise might be subject to expectation bias, with participants taking specific photographs in order to fulfil the researcher's expectation. Alternatively, it is possible that participants chose what to photograph reflecting the idea of themselves that they want to give to the researcher. In this sense, it is acknowledged that an image is in itself a representation. In fact, as reported by Frith *et al.* (2005) scholars in psychology have questioned the validity of photo-elicitation, arguing that participant-produced photography leads to non-objective interpretations and have "a great layering of meaning through multiplicity of presentations" (Penn, 2000, quoted in Frith *et al.*, 2005, p. 187).

However, the critical-realistic approach adopted in this thesis acknowledges that reality cannot be fully accessed; hence, the researcher's interpretation has a crucial role in reaching conclusions, and it is argued that photo-elicitation is a way of analysing one particular reality. Related to this, Guell and Ogilve (2013) reflected on the credibility of data obtained with photo-voice methods, and on whether capturing 'positive' images was more convenient for participants. They concluded that the credibility of data lied in the rich narrative offered during the interviews, which supported the idea that the photo-voice "reflected more than simple Kodak moments" (2013, p. 210). For this reason, the interview explored in detail the reasons why participants took specific photographs and what they wanted to make visible, as previous research advised (Frith and Harcourt, 2007). In addition, the photographic evidence was never treated as data per se, but rather it served as support during the interview, with the idea that it would offer a detailed insight into the affective walking experience.

A second issue relates to the task of producing photographs, which might disturb the 'normal' practice of walking. Nevertheless, it is argued that taking photographs during

daily mobility has become a widespread practice among general populations, due to the increasing popularity and availability of smartphones – in 2015, 66% of UK adults owned a smartphone (Ofcom, 2015).

Third, the use of participant-produced photographs adds a layer of complexity to ethical considerations. For instance, consent on the use of photographs in publications and visual representations, as well as copyright ownerships, were agreed in advance between the researcher and participants (Frith *et al.*, 2005). Also, considerations around participants' safety during the photographing task were made, and participants were reminded to take safety precautions during their photo-walk.

4.5.2 Sampling strategy

The population for the qualitative phase included 14 participants that had previously completed the online survey. In fact, upon completion of the online survey, participants were asked to provide their email addresses if they were interested in taking part in a follow up study. Eighty-four individuals provided their contact details (22% of the survey participants). A purposeful sampling strategy was adopted in order to involve a variety of individuals and views. For this reason, specific criteria were identified (Robson, 2011):

a. **Walking habits**. The aim was to involve both heavy walkers and medium walkers – e.g., individuals who do not walk often due to preferences or limited opportunities. In this sense, it was important to explore affective walking experiences of those individuals who do not walk regularly, also to research barriers to enjoying walking. This was based on survey responses on "travel mode to work" and "walking habits"; heavy walkers were operationalised as those individuals who walk to work regularly and/or walk at least 4 times a week.
b. **Nature versus urban oriented**. Participants were classified as nature-oriented or urban-oriented based on the affective response to the experimental walk. When the walk in the park led to an improvement in affect, or when the walk in the urban areas led to a negative affective outcome, they were categorised as nature-oriented; when the walk in the urban settings led to an improvement in affect, or when the walk in the park led to a negative affective outcome, they were categorised as urban-oriented. This basic classification served to collect,

through the interview phase, different attitudes and viewpoints on urban settings. As the literature shows that individuals tend to prefer natural settings over built ones (Van den Berg, Jorgensen and Wilson, 2014; Hartig *et al.*, 2003), it was important to involve in the current study also some individuals who had expressed positive attitudes towards built environments in order to be able to answer the research questions.

c. **Age/student-employee classification**. In order to explore potential differences between students and employees (RQ1c), three categories were included: students (under 25); employees 26 to 40 years old; employees over 40.

Figure 4.7 illustrates the sampling strategy and describes respondents' characteristics. The three conditions above led to a target sample size of 12 interviewees. Gender was not included as a sampling criterion, as previous studies did not show gender differences in the way individuals experience psychological restoration (e.g., Scopelliti and Giuliani, 2004). However, a fairly balanced sample with respect to gender was obtained. Fourteen participants were interviewed. These included six students (three females) and eight employees (five females). Pseudonyms were used to guarantee anonymity and confidentiality.

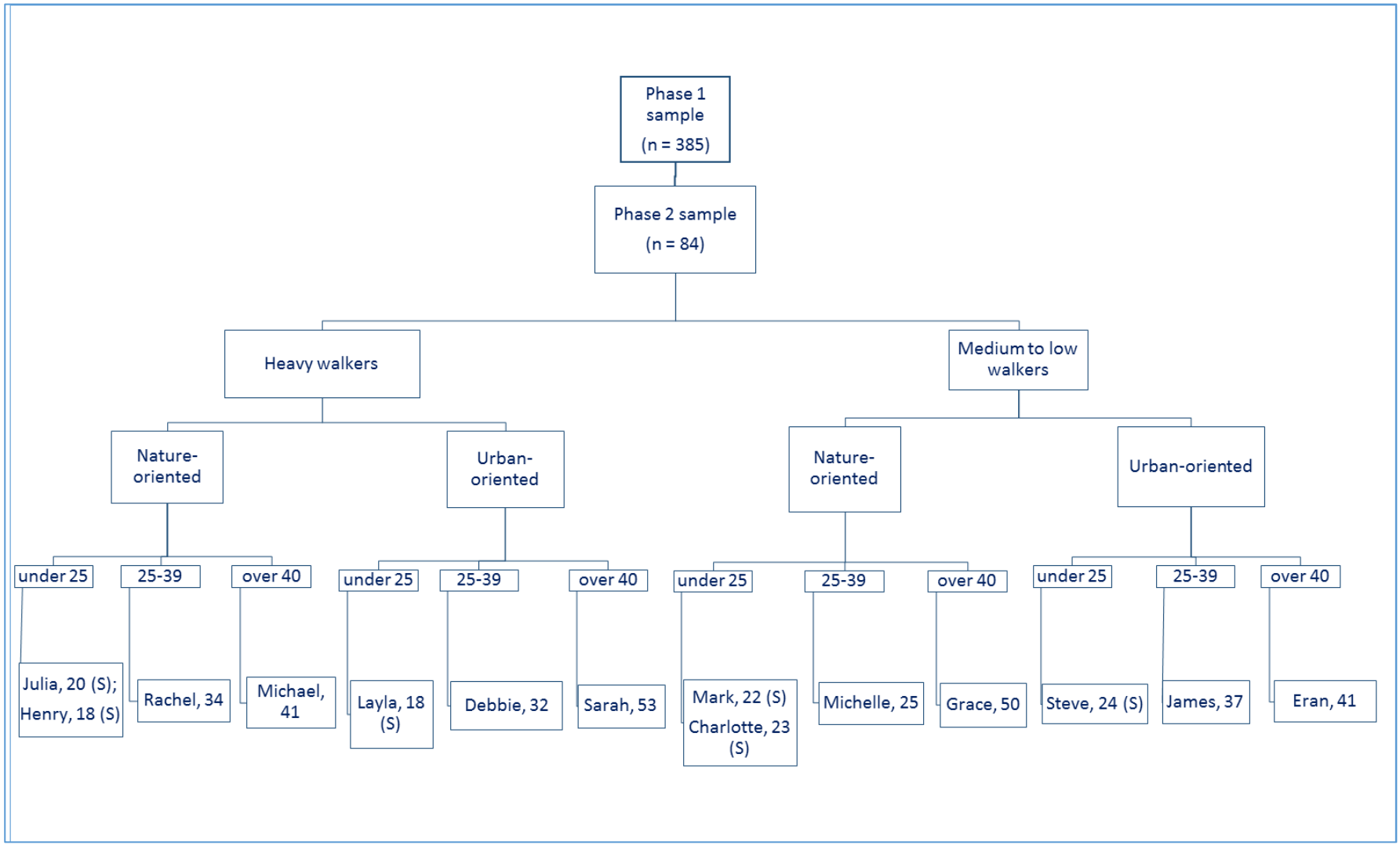


Figure 4-7: Interview sampling strategy

4.5.3 Data collection and administration

Among the employee group, potential interviewees were sent a recruitment email with a follow up email after seven days in case of no response; the information sheet was provided via email prior to participation. No incentive was offered to employees. Students were recruited through the UWE Psychology Participatory Panel and were rewarded with 1 course credit. Participants were asked to choose a walking journey of their choice which involved at least partially Bristol city centre; this could be a commuting journey or a leisure walk. Participants were given the choice to use their own equipment or to be given a camera by the researcher. The procedural instructions asked participants to photograph "*the things of the surroundings that draw your attention during the walk (…) and make you feel good or bad during the walk"* (see Appendix 6 for interview schedule and Appendix 7 for interview information sheet).

Interviews took place one or two days after the walking journey in order to ensure that memories of the walk were still fresh in participants' mind. Participants were asked to share their photographs with the researcher before the interview in order for the researcher to prepare points of discussion to be explored during the interview. Before the interview started participants were provided with the information sheet, and were given the choice to keep it – these were not automatically given to participants to avoid paper waste. Participants were given the opportunity to ask any questions and were informed about the possibility to opt out of the research at any stage. Participants were also provided with a consent form (see Appendix 7).

The interview structure was designed based on the existing literature (Delaney, 2016; Brown, Dilley and Marshall, 2008). Interviews started with a participant-led discussion, in which the interviewee had the chance to talk freely about his/her journey using the photographs. The second phase was led by the researcher, and involved specific questions on specific photographs or areas that were relevant for research purposes. Questions were open-ended in order to encourage in-depth discussion. A third phase within the interview involved watching and discussing the videos of the experimental settings that were used in the online survey. Interview lasted between 30 and 90 minutes, and were recorded with a digital recorder.

4.5.4 Analysis

Qualitative data were analysed with thematic analysis. This approach involves "identifying, analysing, and reporting patterns (themes) within data" (Braun and Clarke, 2006, p. 6). Braun and Clarke's guidelines on thematic analysis were followed (2013). First, a reflection on how the epistemological assumptions inform and influence the analysis took place. The critical realist epistemological approach of this thesis "acknowledge(s) the ways individuals make meaning of their experience, and, in turn, the ways the broader social context impinges on those meanings, while retaining focus on the material and other limits of 'reality'' (Braun and Clarke, 2006, p. 9).

Second, the approach to identifying patterns in data was made explicit, and this was a deductive or theoretical approach. While within the inductive approach data drive the analysis, in the theoretical approach the analysis is driven by the research questions and existing theories (Braun and Clarke, 2013) – in this case, theories of environmental affect and geographical ideas of place. Such an approach offers a more focused analysis.

Third, initial phases of analysis involved transcription and familiarisation. The researcher transcribed the interview recordings, thus simultaneously familiarising with the data (Braun and Clarke, 2006, p. 17). In this phase, initial comments and notes were developed. Once transcription was concluded, transcripts were re-read in order to become fully 'immersed' in the data.

Fourth, a coding phase took place. An initial set of codes was developed based on the research questions and on the quantitative findings. Codes capture *one* idea (Braun and Clarke, 2013). Initial codes included the constructs measured in the online survey: affect (stress, pleasure, energy), perceived restorativeness (being away, fascination, compatibility, extent), place perceptions (aesthetics, interestingness). Other codes included the settings, walking habits, and walking intentions. Additional ideas related to the research questions that emerged during the interviews were also carefully considered and analysed.

Fifth, data were then drawn together into initial themes. A theme is a "central organising concept" that captures an aspect of the data that is important in relation to the research question (Braun and Clarke, 2013, p. 123). Themes tell something meaningful about the data, hence themes should be distinctive and should "make sense on their own" (Braun

and Clarke, 2013, p. 123). After having developed 8 initial candidate themes, the analysis was revised. At this stage, it emerged that some themes presented overlaps, hence they were re-developed. The final analysis led to a total of 6 themes organised within 4 overarching themes, which "organise and structure the analysis" (Braun and Clarke, 2013, p. 125). Final themes were distinctive, coherent, and related to the research questions (Braun and Clarke, 2013). Themes and overarching themes were also named in order to be "evocative, catchy, concise, and informative" (Braun and Clarke, 2013, p. 130) and reflect the essence of the concepts. With this regard, it is important to note that the critical-realist approach also guided the way the analysis was operationalised. In fact, it is acknowledged that the researcher had an active role in developing themes from the dataset. In this sense, themes are not discovered (Braun and Clarke, 2013), as it is the researcher who determines the scope of the analysis. In fact, the analysis was guided by the research questions. In this sense, several ideas emerging from the interviews were dropped from the analysis, as they were not relevant to the research questions. Hence, the same dataset, if guided by different research questions, could have led to different findings (Braun and Clarke, 2013).

Finally, it has to be noted that in this phase the photographic evidence was not analysed, but represented an additional data source which was referred to during the analysis. When photographs offered a deeper layer of complexity of a particular phenomenon, they were included in the thesis as an added visual/communicative element to the presented findings (Chapter 6). However, photographs were never treated as standalone data, and text remained the primary data.

4.6 Chapter Summary

This chapter has described, discussed, and defended the methodology of this PhD research. A critical realist epistemological approach has shaped the methodology, with the research questions driving the methodological strategy. Within the mixed-method approach, quantitative (Phase 1) and qualitative (Phase 2) research was carried out. The experimental design within Phase 1 offered a precise assessment and comparison of affective experiences in several settings controlling for other variables. Photo-elicited interviews within Phase 2 explored the relationship between individuals and place from a mobile perspective, and contributed to explaining the quantitative findings.

Figure 4.8 illustrates how each RQ was addressed by each phase of data collection. The quantitative data, collected through the experimental study, addressed RQ1 on the affective potential of walking in different urban settings. Results and discussion related to this will be illustrated in Chapter 5. The qualitative phase of research (photo-elicited interviews) have addressed RQ2, thus exploring the barriers and enablers of the positive affective walking experience in city centre environments. This will be presented in Chapter 6. Finally, the experimental study, together with the qualitative phase of research, have addressed RQ3 regarding the role of the affective walking experience on walking intentions. This will be explored in Chapter 7. Throughout the presentation of these results, policy implications for urban planning and design are highlighted and discussed in the concluding chapter (Chapter 8).

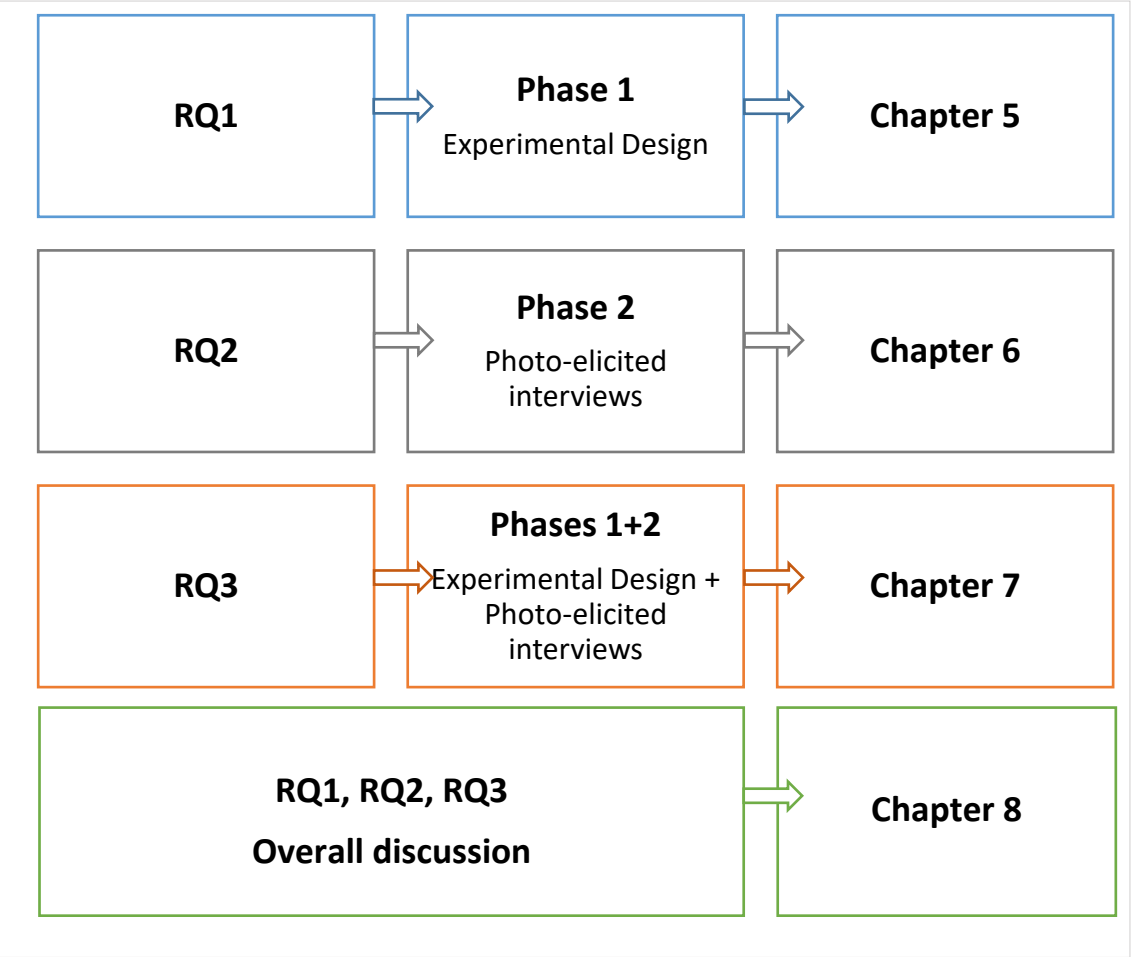


Figure 4-8: Research phases, RQs, and thesis chapters

CHAPTER 5

5. THE AFFECTIVE POTENTIAL OF FIVE VIRTUAL WALKS IN CITY CENTRE ENVIRONMENTS[8]

Chapter 5 Research Questions

RQ1: To what extent can different city centre environments support positive affective outcomes?

- **b.** What is the role of motor traffic and architectural style?
- **c.** To what extent do the affective outcomes of walking in city centre environments differ between a student and employee population?

Chapter 5 Hypotheses

H1: PedHist, PedMod, and PedMixed will support affective outcomes as opposed to walking in CommTraf, which will not support affective outcomes;

H2: PedHist will elicit greater affective benefits than PedMod;

H3: PedHist, PedMod, and PedMixed will be perceived as restorative as opposed to CommTraf, which will be perceived as not restorative;

H4: PedHist, PedMod, and PedMixed will be perceived as attractive and interesting as opposed to CommTraf, which will be perceived as not attractive and not interesting;

H5: There will be differences in affective outcomes between a student and employee population.

Box 5-1: Chapter 5 Research Questions and Hypotheses

5.1 Introduction

This chapter explores the affective potential of walking in different urban settings, thus addressing RQ1. As illustrated in Chapter 4, an online experiment was conducted with students at a university campus in the northern suburbs of Bristol, and a group of Bristol-

[8] Part of this chapter is based on Bornioli, Parkhurst, and Morgan, 2018. With permission from authors, Psychological wellbeing benefits of simulated exposure to five urban settings: an experimental study from the pedestrian's perspective, Journal of Transport and Health, in press, Elsevier, 2018.

based employees (n = 384). The between-participant experiment measured affective outcomes before and after a simulated walk in one of five urban settings located in Bristol city centre: a pedestrianised historic environment (PedHist), a pedestrianised modern environment (PedMod), a pedestrianised area with a mix of natural and historic elements (PedMixed), a commercial road with traffic (CommTraf), and an urban park (Park). The urban park condition and the retail area with motor traffic condition were used as benchmark/control groups as respectively positive and negative environments. Hypothesis H1 states that urban settings without traffic elicit affective benefits as opposed to CommTraf; H2 sets that PedHist will elicit greater affective benefits than PedMod; H3 states that urban settings without traffic are perceived as restorative as opposed to CommTraf. H4 states that urban settings without traffic are perceived as attractive, and interesting as opposed to CommTraf. Finally, H5 sets that there are differences in affective outcomes between a student and employee

population.

Table 5-1: Hypotheses and test types

H	Hypothesis	Tests	Section
H1	PedHist, PedMod, and PedMixed will support affective outcomes as opposed to walking in CommTraf, which will not support affective outcomes;	Mixed ANOVA (5 settings x 2 time stages)	5.2.2
H2	PedHist will elicit greater affective benefits than PedMod;	Mixed ANOVA	5.2.2
H3	PedHist, PedMod, and PedMixed will be perceived as restorative as opposed to CommTraf, which will be perceived as not restorative;	One way ANOVA	5.2.3
H4	PedHist, PedMod, and PedMixed will be perceived as attractive and interesting as opposed to CommTraf, which will be perceived as not attractive and not interesting;	One way ANOVA	5.2.4
H5	There will be differences in affective outcomes between a student and employee population.	Mixed ANOVA (5 settings x 2 time stages x 2 groups)	5.2.5

Section 5.2 presents the empirical findings from the experimental study. Specifically, Sections 5.2.2 to 5.2.4 address H1 to H4, and Section 5.2.5 addresses H5 on the

differences between student and employee populations. Table 5.1 illustrates test types for each hypothesis.

Results are discussed in Section 5.3, based on the study hypotheses and on the existing literature on the psychological wellbeing benefits of walking. Section 5.4 summarises Chapter 5 and reflects on next phases of research.

5.2 Results

5.2.1 Initial conditions

5.2.1.1 Data screening

Among the employee sample there was a significant proportion of missing values in the affective scales, with 55% of employees (n = 115) presenting at least two missing items from the affective scale. When more than one item was missing in a 4-item scale, the case was excluded from the analysis. When one item was missing in a 4-item scale, a strategy of simple mean imputation within each participant was adopted, which is "the most desirable method for imputing both the random and non-random missing items in the psychometric scale construction" (Siddiqui, 2015, p. 1). Hence, 115 cases were excluded from the analysis. This led to a total sample size of 269 (students n = 130; employees n = 139).

Analysis of Variance (ANOVA) was employed as it assesses main effects, interactions (for factorial designs) and post-hoc comparisons between more than two conditions. Before running the ANOVAs, the assumptions of normality and homogeneity of variance were tested on all variables. First, the normality assumption for the dependent variables was tested for each setting. The Shapiro-Wilk Test was applied and indicated normality in most of the cases, but presented values lower than .05 in three cases out of nine. Second, assumptions of homogeneity of variances were met (Levene's test) for all variables in all settings (p > .05). Given that some variables were not normally distributed, the use of Kruskal-Wallis tests, which do not require normality, was considered. However, the test does not allow post-hoc comparisons between more than two groups, whereas between-group comparisons for five conditions represent a core

element of the present analyses. Therefore, it was decided to proceed with ANOVAs. ANOVA is "robust" to violations of normality when there are at least 40 degrees of freedom and/or when group sizes are equal (Field, 2009 p. 360). However a series of Kruskal-Wallis tests was also conducted in order to try to corroborate the results from the ANOVAs, and results are consistent (see Appendix 9).

Within the current study, hedtone and stress/relax had very good inter-item reliability (Chronbach alpha: α = .789 and α = .827 respectively), while energy had low scale reliability (Chronbach alpha: α = .503). Partial eta square values were used to interpret size of effects (small effect with η_p^2 = .01; medium effect with η_p^2 = .06; large effect with η_p^2 = .14, Cohen, 1988).

5.2.1.2 Pre-test conditions

Table 5.2 outlines descriptive statistics for affective states pre-test.

Table 5-2: Pre-test affective states

	N	Mean	Std. Deviation	Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Std. Error
Hedtone	245	11.65	1.95	-.37	.15	.27	.31
Stress/Relax	257	12.42	2.10	-.41	.15	.01	.30
Energy	260	10.26	2.19	-.02	.15	-.33	.30

Note: Affective scales range from 4 (minimum) to 16 (maximum)
Stress/Relax scale here expressed in terms of relax

As can be seen from Table 5.2, before watching the video of the simulated walk participants were in a neutral affective state, e.g., not particularly contented/happy, stressed, nor energetic. A one way between-subjects ANOVA for environment type (PedHist, PedMod, CommTraf, PedMixed, Park) was conducted (Table 5.3).

Table 5-3: Pre-test differences in affective states

	Sum of Squares	*df*	*F*	Sig.
Hedtone	5.66	4	.36	.833
Stress/Relax	10.59	4	.59	.668
Energy	5.35	4	.27	.895

The one way ANOVAs showed that there were no statistical differences between settings groups in initial hedtone, stress, and energy levels. In addition, a series of tests

was conducted to detect possible statistical differences between groups in terms of socio-demographics (Table 5.4).

Table 5-4: Pre-test differences in socio-demographics

ANOVA	Sum of Squares	*df*	Mean Square	*F*	Sig.
Age	781.57	4	195.39	1.06	.376
Chi-Square		***df***		**Value**	**Sig.**
Gender		8		11.22	.18
Ethnicity		40		45.08	.26

As shown in table 5.4, there were no statistical differences in age, gender, and ethnicity, thus confirming that randomisation to setting conditions was successful.

5.2.2 Affective experiences

The targeted variable was the variation pre-post test, and this is indicated with the delta (Δ) symbol. Descriptive statistics for Δstress, Δhedtone, and Δenergy in each setting group are reported in Table 5.5.

Table 5-5: Descriptive statistics for Δstress, Δhedtone, and Δenergy

Setting		N	Mean	Std. Deviation
Park	Δstress	53	-.52	2.22
	Δhedtone	54	1.61	1.91
	Δenergy	58	1.25	2.37
PedMixed	Δstress	47	-1.74	2.04
	Δhedtone	45	2.04	1.70
	Δenergy	51	.60	2.23
PedHist	Δstress	39	-.01	2.61
	Δhedtone	40	1.23	2.28
	Δenergy	46	.33	2.72
PedMod	Δstress	47	.54	2.50
	Δhedtone	46	.59	2.60
	Δenergy	50	.80	2.61
CommTraf	Δstress	44	3.04	2.95
	Δhedtone	45	-1.29	2.90
	Δenergy	50	.34	2.64

Note: mean values range from 0 (no variation) to ±12 (maximum variation). Δstress > 0 indicates an increase in stress. Δstress < 0 indicates a decrease in stress

In order to test whether some built settings offered affective benefits (H1) and whether these varied between PedHist and PedMod (H2), a mixed 5 (setting – between participants) x 2 (test time: pre- and post- simulated walk – repeated measure) ANOVA

was conducted on stress, hedtone, and energy data. Results are summarised by affective variable below.

5.2.2.1 Stress

Description and analysis of interactions is contained in Table 5.6.

Table 5-6: ANOVA of stress variations pre to post in each setting.
ME = main effect; I = interaction

Variable	Main effect (ME) Interaction (I)	*F*	*df*	*p*	η_p^2
Stress	ME time	1.80	1, 241	.180	.008
	ME setting	7.68	4, 238	.008	.114
	I time x setting	23.85	4, 238	.000	.286

The mixed ANOVA revealed that the main effect of time (pre to post) was not significant, but there was a significant main effect of setting with medium effect size. Stress increased in CommTraf (p = .000) and decreased in PedMixed (p = .000). In Park (p = .123) and PedHist (p = 1.000) the stress decrease was non-significant. In PedMod there was a non-significant stress increase (p = .144). There was a significant setting group x test time interaction with a large effect size. Bonferroni post-hoc tests indicated that the walk in CommTraf led to an increase in stress that was significantly different from the decrease in PedHist (p = .000), PedMod (p = .000), PedMixed (p = .000), and Park (p = .000). The walk in PedMixed led to a decrease in stress that was significantly different from the stress increase in PedMod (p = .001) and marginally non-significantly different from the stress decrease in PedHist (p = .057) (Figures 5.1 and 5.2).

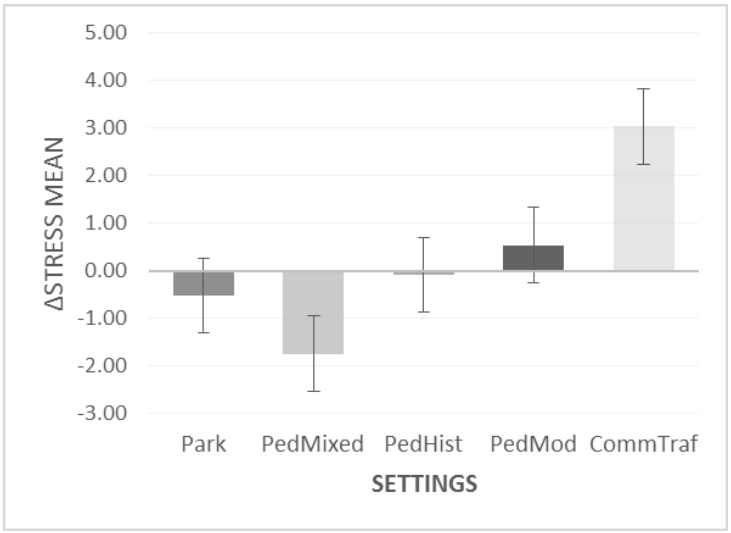
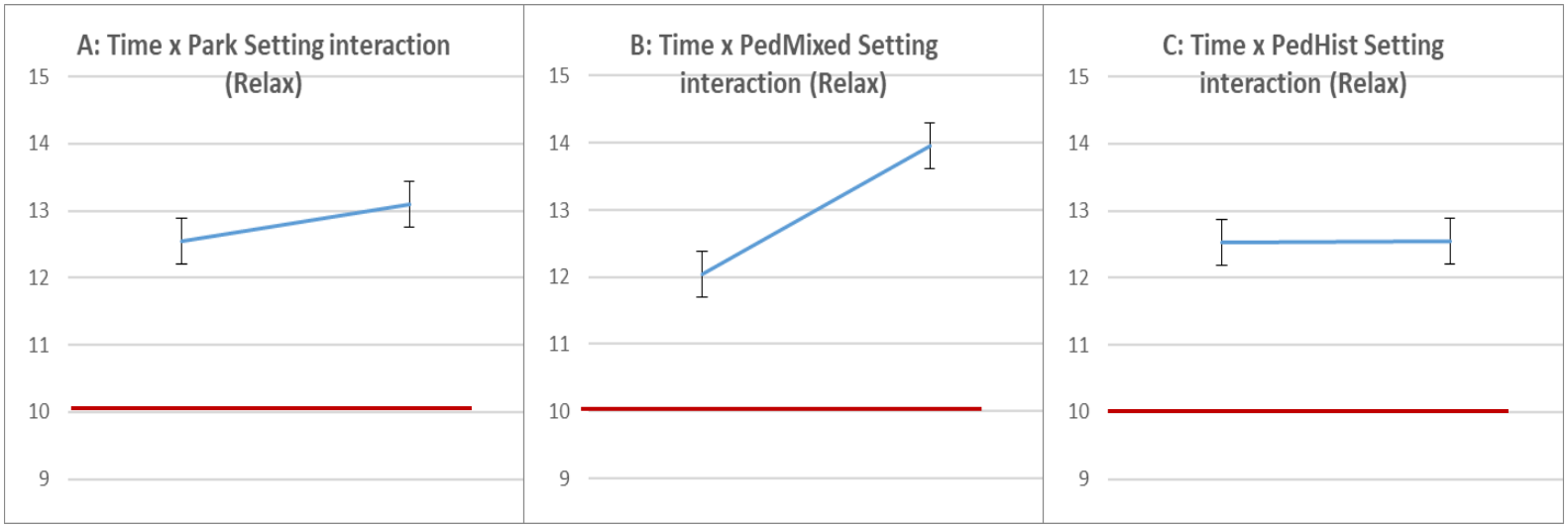
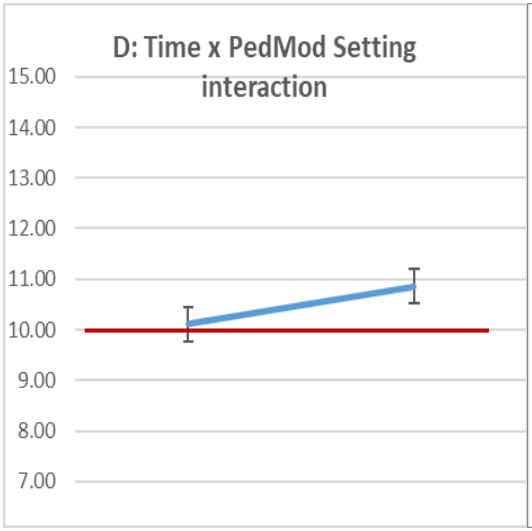
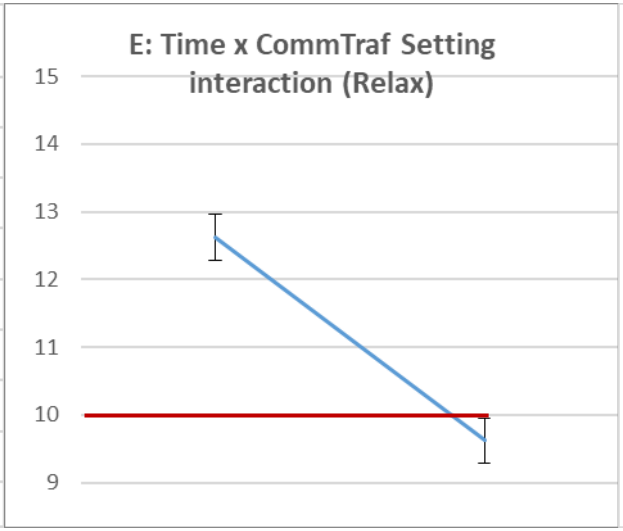


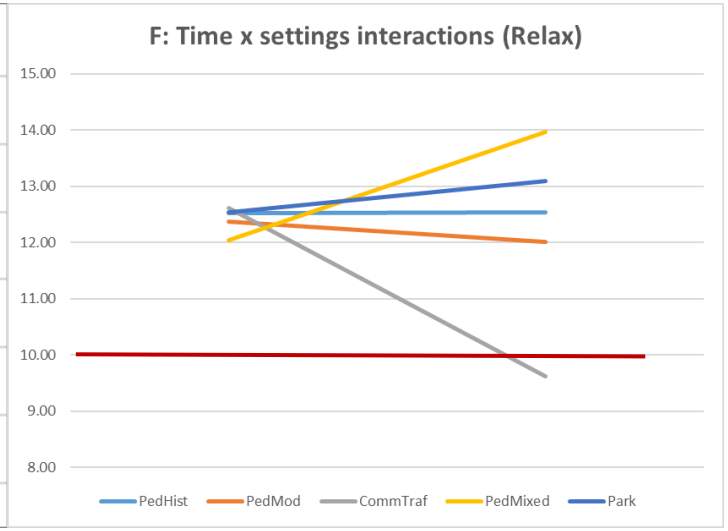
Figure 5-1: Δstress per setting. Difference between pre–post scores on stress scale in five settings. Note: values range from 0 (no variation) to ±12 (maximum variation). The y-axis shows the change in stress (post minus pre-test scores); a bar above the y-axis represents an increase in stress. A bar below the y-axis represents an increase in relaxation. Error bars (95% confidence intervals) are shown. Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2018.



Figures 5-2 A to F: Mean Relaxation scores associated with pre and post-test phases, in each setting. Scale ranges from 4 to 16; midpoint is shown (=10)







5.2.2.2 Hedonic tone

Description and analysis of interactions is contained in Table 5.7.

Table 5-7: ANOVA of hedtone variations pre to post in each setting.
ME = main effect; I = interaction

Variable	Main effect (ME) Interaction (I)	*F*	*df*	*p*	η_p^2
Hedtone	ME time	26.33	1, 226	.000	.104
	ME setting	5.40	4, 226	.000	.114
	I time x setting	13.63	4, 226	.000	.194

The mixed ANOVA revealed a significant main effect of time with medium effect size and setting with medium effect size. Hedonic tone increased in PedHist (p = .001), PedMixed (p = .000) and Park (p = .000) and decreased in CommTraf (p = .000). In PedMod, the effect was non-significant (p = .113). There was a significant setting group x test time interaction with a large effect size. Bonferroni post-hoc tests indicated that the walk in CommTraf led to a decrease in hedonic tone post-simulated walk that was significantly lower than the one relative to the walks in PedHist (p = .000), PedMod (p = .001), PedMixed (p = .000), and Park (p = .000). In addition, there was a significant difference between the walk in PedMod and PedMixed (p = .015), with PedMixed associated with a larger increase in hedtone (Figures 5.3 and 5.4).

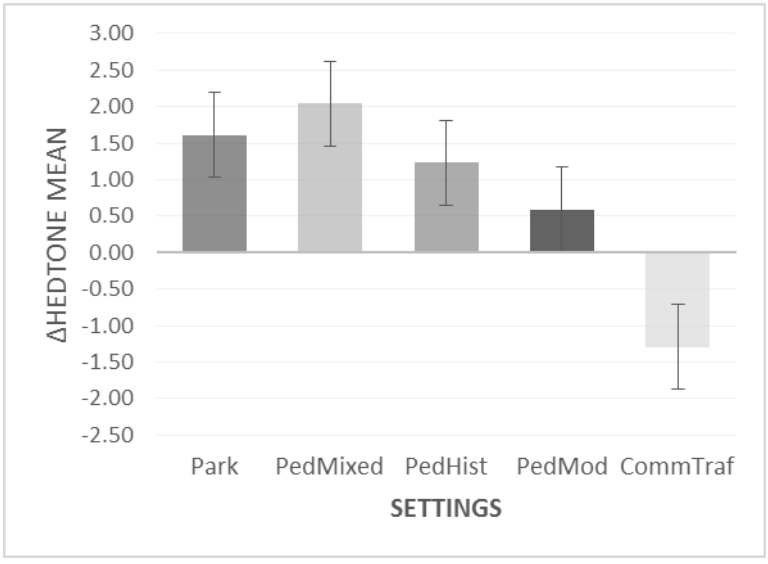


Figure 5-3: Δhedtone per setting. Difference between pre–post on hedonic tone scale in five settings. Note: values range from 0 (no variation) to ±12 (maximum variation). The y-axis shows the change in hedtone (post minus pre-test scores). Error bars (95% confidence intervals) are shown. Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2018.

Figures 5-4 A to F: Mean Hedtone scores associated with pre and post-test phases, in each setting. Scale ranges from 4 to 16; midpoint is shown (=10)

5.2.2.3 Energy

Description and analysis of interactions is contained in Table 5.8.

Table 5-8: ANOVA of energy variations pre to post in each setting.
ME = main effect; I = interaction

Variable	Main effect (ME) Interaction (I)	*F*	*df*	*p*	η_p^2
Energy	ME time	18.11	1, 252	.000	.067
	ME setting	1.23	4, 252	.299	.019
	I time x setting	1.17	4, 252	.320	.018

The mixed ANOVA on energy data revealed that the main effect of time was significant with medium effect size, while the main effect of setting was not significant. Energy increased in Park (p = .000) and PedMod (p = .031). The setting group x test time interaction was not significant (Figures 5.5 and 5.6). However, this could be explained by the low inter-item reliability of the energy scale. Due to the poor scale reliability of energy, results are not discussed in Section 5.3. This limitation will also be discussed in Chapter 8.

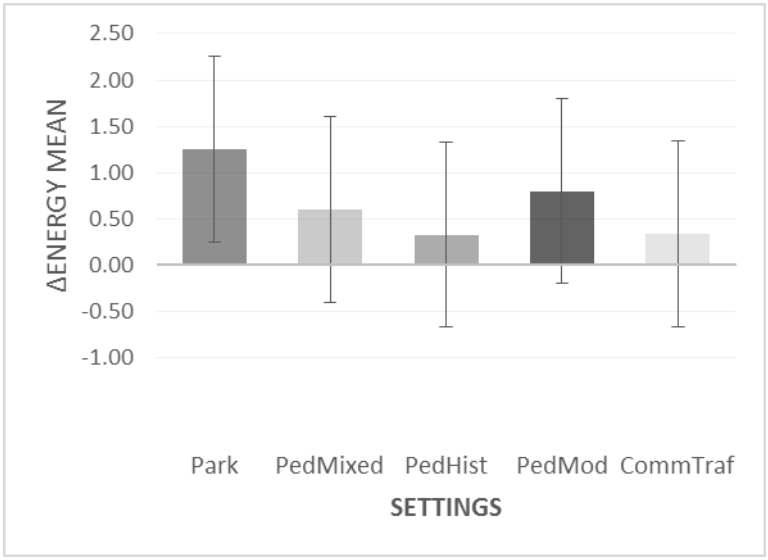
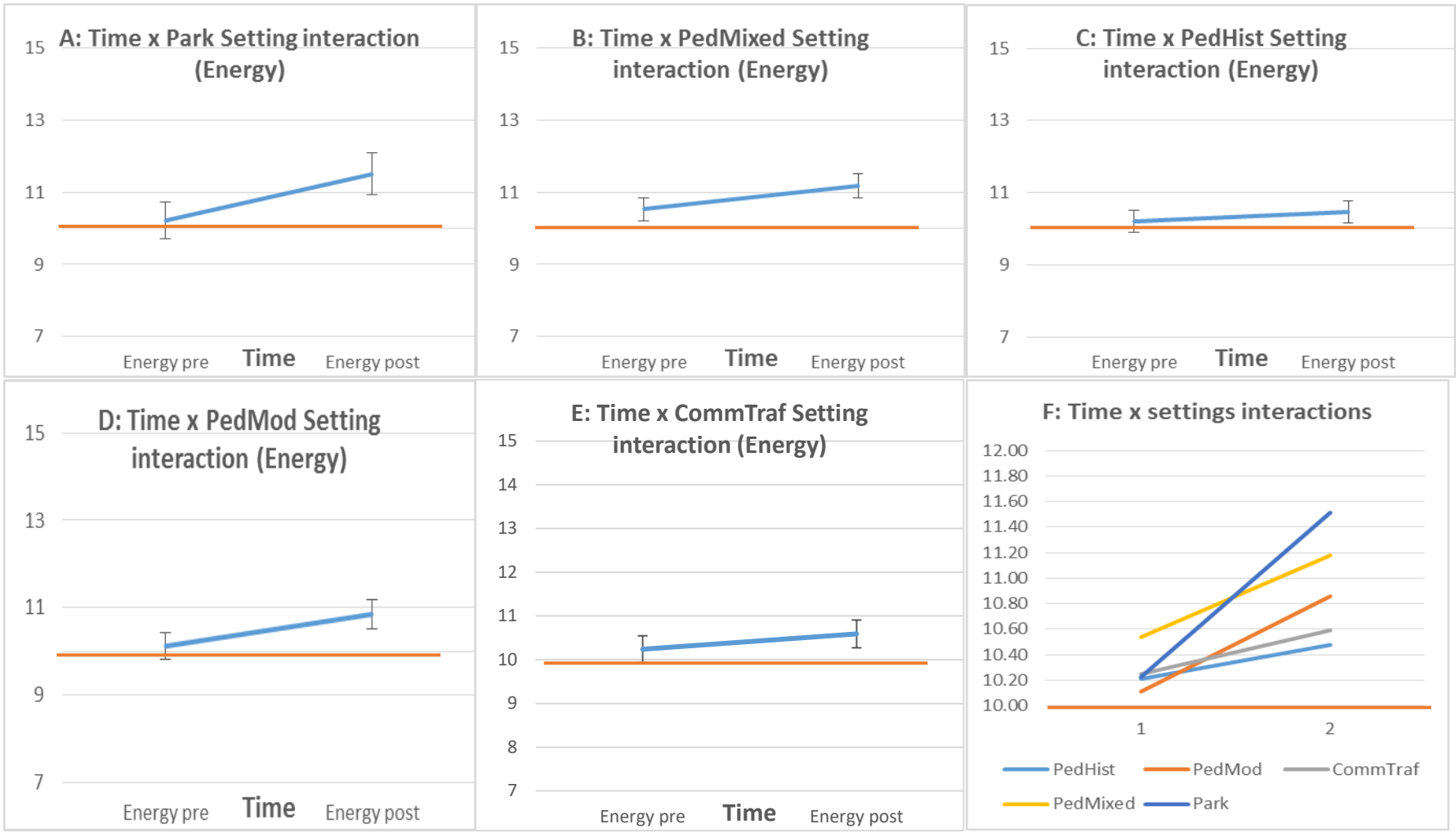


Figure 5-5: Δenergy per setting. Difference between pre–post on energy scale in five settings. Note: values range from 0 (no variation) to ± 12 (maximum variation). The y-axis shows the change in energy (post minus pre-test scores). Error bars (95% confidence intervals) are shown.



Figures 5-6 A to F: Mean Energy scores associated with pre and post-test phases, in each setting. Scale ranges from 4 to 16; midpoint is shown (=10)

5.2.3 Perceived Restorativeness

In order to test H3 whether PedHist, PedMod, and PedMixed were perceived as restorative as opposed to CommTraf, perceived restoration was measured based on the short version of the Perceived Restorativeness Scale (PRS – Berto 2005) (see Chapter 4). This includes four items, each measuring one of Kaplan's restorative properties (fascination, being away, scope, compatibility, Kaplan and Kaplan 1989) measured on a 7-point scale. Based on the study data, the PRS scale had an excellent scale reliability (α = .896). In line with H3 (PedHist, PedMod, and PedMixed will be perceived as restorative as opposed to CommTraf, which will be perceived as not restorative), a high PRS score in the three high-quality urban settings was expected, and a lower score in the commercial road with traffic setting. This was confirmed, as participants rated positively PedMod, PedHist, and PedMixed, while CommTraf was rated negatively. In line with the literature, the park was also rated positively. Table 5.9 shows PRS ratings from which it can be inferred that all the non-traffic conditions were associated with varying degrees of restorativeness, as opposed to the traffic condition.

Table 5-9: Mean ratings for PRS score and Kaplan and Kaplan's properties across the five setting conditions

Setting		PRS score	Being Away	Scope	Fascina-tion	Compati-bility
Park	Mean	4.89	5.08	4.58	4.85	5.23
	Std. Deviation	1.25	1.36	1.65	1.22	1.37
PedMixed	Mean	5.00	5.01	4.52	5.10	5.39
	Std. Deviation	1.05	1.22	1.44	1.24	1.14
PedHist	Mean	4.28	3.98	3.94	4.49	4.73
	Std. Deviation	1.08	1.46	1.36	1.30	1.28
PedMod	Mean	4.07	3.83	3.70	4.18	4.60
	Std. Deviation	1.19	1.47	1.33	1.53	1.37
CommTraf	Mean	3.15	2.78	3.08	3.60	3.21
	Std. Deviation	1.26	1.71	1.57	1.72	1.57

Note: PRS rated on 7-point Likert scale

A one-way between-subjects ANOVA was conducted to test for possible differences between settings in perceived restorativeness, and this identified a significant main effect with a large effect size, $F(4, 265) = 25.77$, $p = .000$, $\eta_p^2 = .283$. Scheffe post hoc analyses indicated that CommTraf was perceived as significantly less restorative than PedHist ($p = .000$), PedMod ($p = .000$), PedMixed ($p = .000$), and Park ($p = .000$). In addition, PedMixed was perceived as more restorative than PedMod ($p = .009$), and PedHist ($p = .021$). Park was perceived as more restorative than PedMod ($p = .006$) and PedHist ($p = .014$) (Figure 5.7). Hence, participants distinguished three different levels of perceived restorativeness (the park and the mixed area; the two settings with no traffic; the retail area with traffic), hence contributing a third, intermediate category to the classic dichotomy 'natural versus urban' (see Karmanov and Hamel, 2008).

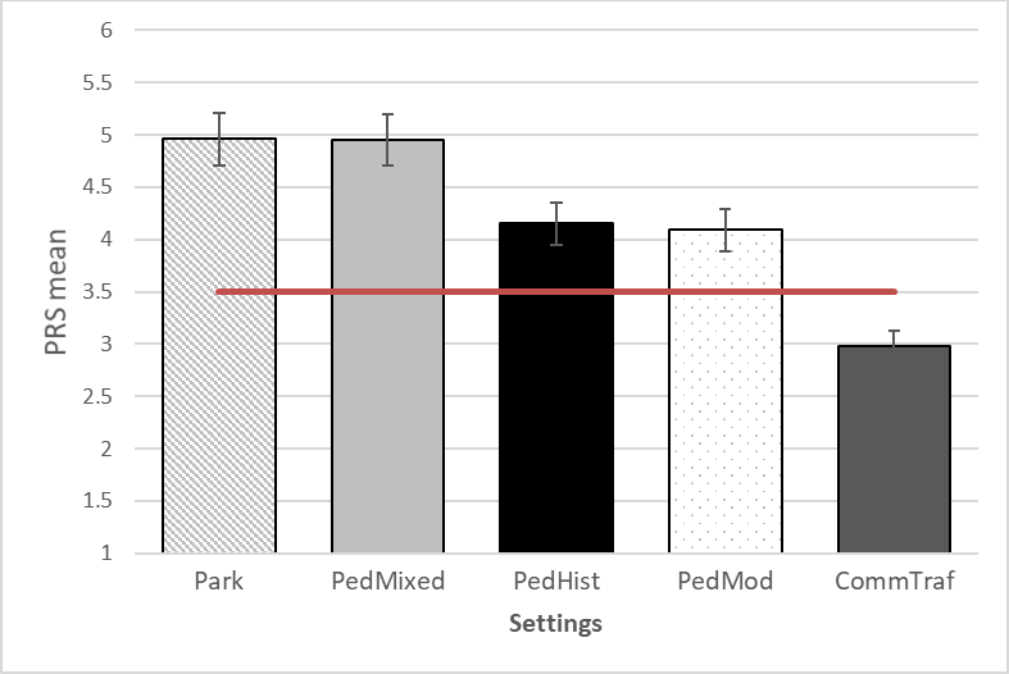


Figure 5-7: Perceived Restoration by setting and between-groups differences. PRS ranges from 1 to 7. Midpoint of the scale is shown (=3.5). Figure adapted from author's own work in Bornioli, Parkhurst, and Morgan, 2018.

5.2.4 Environmental perceptions

In line with H4 (PedHist, PedMod, and PedMixed will be perceived as attractive and interesting as opposed to CommTraf, which will be perceived as not attractive and not interesting), it was expected that the non-traffic built settings would be perceived as attractive and interesting as opposed to the commercial road with traffic. This was confirmed, as participants regarded PedHist, PedMod, and PedMixed as attractive, while CommTraf was perceived as not attractive (Table 5.10; Figure 5.8).

Table 5-10: Mean ratings (standard deviations) for attractiveness and interestingness across the five setting conditions

Setting		Attractiveness	Interestingness
Park	Mean	3.67	3.00
	Std. Deviation	.72	.62
PedMixed	Mean	3.90	3.57
	Std. Deviation	.74	.58
PedMod	Mean	3.28	2.99
	Std. Deviation	.82	.84
PedHist	Mean	3.57	3.34
	Std. Deviation	.71	.72
CommTraf	Mean	2.36	3.05
	Std. Deviation	.90	.83

Note: Attractiveness and Interestingness rated on 5-point Likert scales.

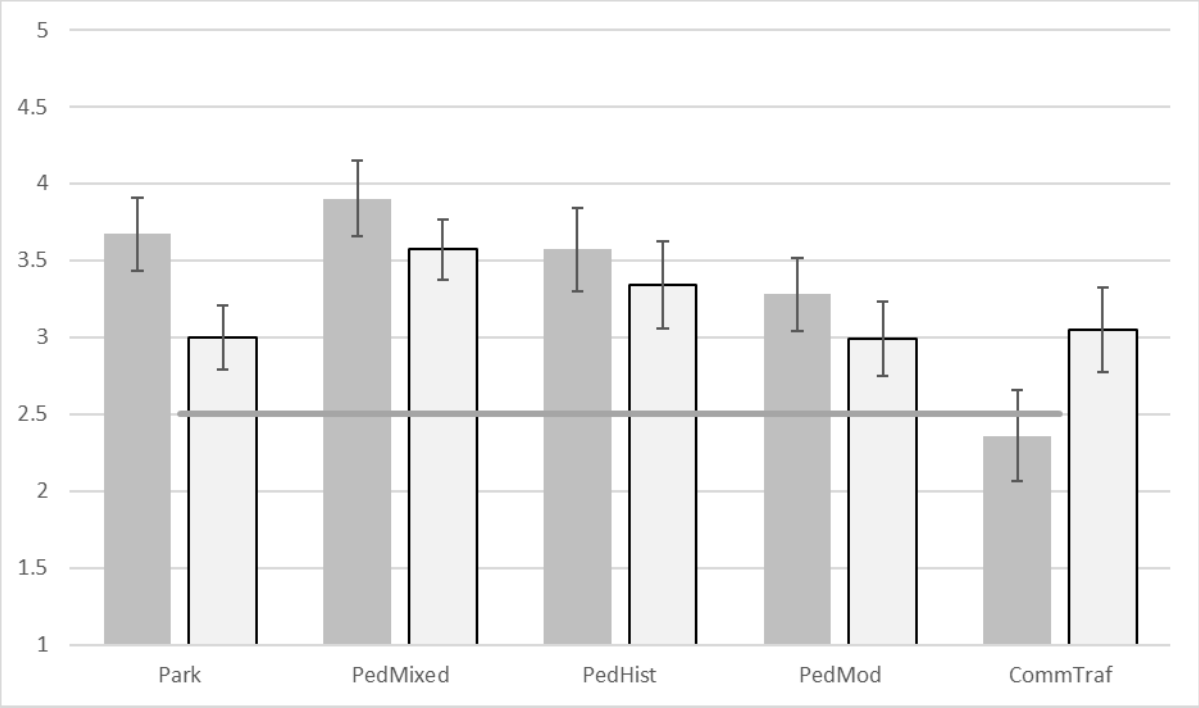


Figure 5-8: Attractiveness (dark grey) and Interestingness (light grey) mean scores per setting. Min score = 1; Max score = 5. Midpoint of the scale is shown (=2.5).

Two one-way between subjects ANOVAs were conducted to test for possible differences between settings in terms of attractiveness and interestingness. These identified a significant main effect of attractiveness also with a large effect size, $F(4, 268) = 35.48$, $p = .000$, $\eta_p^2 = .350$, and of interestingness with a large effect, $F(4, 268) = 23.42$, $p = .000$, $\eta_p^2 = .262$. Post hoc analyses using the Scheffe post hoc criterion for significance indicated that CommTraf was perceived as significantly less attractive than PedHist (p =

.000), PedMod (p = .000), PedMixed (p = .000), and Park (p = .000). CommTraf was also perceived as significantly less interesting than PedHist (p = .000), PedMod (p = .000), PedMixed (p = .000), and Park (p = .000). In addition, PedMixed was perceived as significantly more attractive than CommTraf (p = .000), PedMod (p = .001), and PedHist (p = .026), and significantly more interesting than PedMod (p = .004) and Park (p = .001).

5.2.5 Students-Employees Differences

This section addresses H5 (There will be differences in affective outcomes between a student and employee population). Differences in initial affective conditions and in socio-demographics are illustrated (Section 5.2.5.1). In order to test whether there was a difference in affective outcomes between the student and employee sample (H5), a series of mixed ANOVAs (2 groups – between participants – x 5 settings – between participants – x 2 time stages – repeated measures) was conducted. Results are summarised per affective variable (Section 5.2.5.3).

5.2.5.1 Initial affective conditions

Table 5.11 displays descriptive data for students and employees' pre-test affective states.

Table 5-11: Descriptive statistics for pre-test affective states, students and employees

	Stress/Relax		Hedtone		Energy	
Setting	Students	Employees	Students	Employees	Students	Employees
Mean	12.83	12.00	11.66	11.63	10.40	10.13
N	129	128	128	117	129	131
Std. Dev	1.90	2.22	1.49	2.36	2.09	2.29

Note: Affective scales range from 4 (minimum) to 16 (maximum)
Stress/Relax scale here expressed in terms of relax

A series of independent samples t-tests were initially conducted to explore potential differences in pre-test affective state between students and employees (Table 5.12).

Table 5-12: Differences in pre-test affective states, students and employees

	t	df	p (two-tailed)	Mean difference
Stress pre-test	-3.39	255	.001	-.87
Hedtone pre-test	-.27	243	.787	-.06
Energy pre-test	-1.18	258	.239	-.32

As can be seen from the tables, students were more relaxed pre-test than employees.

5.2.5.2 Students-employees differences in personal characteristics

Several tests were performed to assess possible differences between the student and employee samples in terms of socio-demographic factors (Table 5.13; for descriptive statistics see Chapter 4, Table 4.1).

Table 5-13: Students-employees socio-demographics differences

Variable	Test type	Value	*df*	*p*
Age	*t*-test	-17.17	371	.000
Gender	Chi-square	5.87	2	.054
Ethnicity	Chi-square	19.10	12	.086
% living in central Bristol	Chi-square	10.37	2	.006
% very familiar with setting	Chi-square	30.34	1	.000
% not familiar at all with setting	Chi-square	9.65	1	.002

Students were younger (*M* = 22.09, SD = 8.61) than employees (*M* = 42.07, SD = 11.38). There were marginally non-significant differences in gender (80% females in student sample; 64% females in employee sample). Students were also less likely to live in a central location than employees (41.6% students; 67.2% employees) and to be very familiar with the experimental settings than were employees (76% students; 91.1% employees) or not familiar at all (22% students; 8.9% employees).

5.2.5.3 Affective experiences

In order to test whether there were differences in the way students and employees experienced the simulated walk (H5), a mixed ANOVA (2 groups – between participants – x 5 settings – between participants – x 2 time stages – repeated measures) was conducted on stress, hedtone, and energy data. Results are summarised by affective variable below (see Appendix 10 for SPSS outputs).

5.2.5.3.1 Stress

Table 5.14 illustrates descriptive statistics for Δstress in the student and employee samples.

Table 5-14: Descriptive statistics for Δstress in student and employee samples

Setting	Group	N	Δstress (SD)
Park	Students	28	-1.25 (2.01)
	Employees	25	.29 (2.20)
PedMixed	Students	25	-1.48 (2.10)
	Employees	22	-2.04 (2.58)
PedHist	Students	26	-.56 (2.42)
	Employees	13	1.07 (2.74)
PedMod	Students	25	.85 (2.33)
	Employees	22	.19 (2.69)
CommTraf	Students	24	3.88 (2.58)
	Employees	20	2.03 (3.11)

Note: Note: Stress/Relax scale is here expressed in terms of relax.
Δstress calculated as post minus pre video scores. Values range from 0 (no stress variation) to ±12 (maximum stress variation).
Δstress > 0 indicates an increase in stress. Δstress < 0 indicates a decrease in stress

The mixed 5 (setting – between participants) x 2 (test time: pre- and post- simulated walk – repeated measure) x 2 (participant type: students and employees) ANOVA revealed that there was a significant main effect of setting, $F(4, 239) = 8.19$, $p = .000$, $\eta_p^2 = .121$ and of participant group, $F(1, 239) = 13.53$, $p = .000$, $\eta_p^2 = .054$. The main effect of time was not significant, $F(4, 239) = 2.49$, $p = .115$, $\eta_p^2 = .010$. There was a significant time x setting interaction (see Section 5.2.2.1), while the time x participant group interaction was not significant, $F(4, 239) = .00$, $p = .957$, $\eta_p^2 = .000$. There was a significant setting x time x participant type interaction, $F(4, 239) = 3.40$, $p = .010$, $\eta_p^2 = .054$, thus indicating that the setting x time interaction described in Section 5.2.2.1 was different between students and employees. Contrasts were used to break down this interaction. These revealed significant differences in Δstress between employees vs students in PedHist, $F(1, 239) = 5.34$, $p = .022$, $\eta^2 = .022$, CommTraf, $F(1, 239) = 6.12$, $p = .014$, $\eta_p^2 = .025$, and Park, $F(1, 239) = 17.62$, $p = .069$, $\eta_p^2 = .069$. Specifically, stress recovery in Park was significant in the student sample ($p = .009$), but not in the employee sample ($p = .123$). Also, students had a non-significant stress recovery in PedHist ($p = .234$), while

in the employee sample the non-significant trend was positive (i.e., increase in stress) (p = .292). Students also had a larger increase in stress in CommTraf than employees (Figure 5.9).

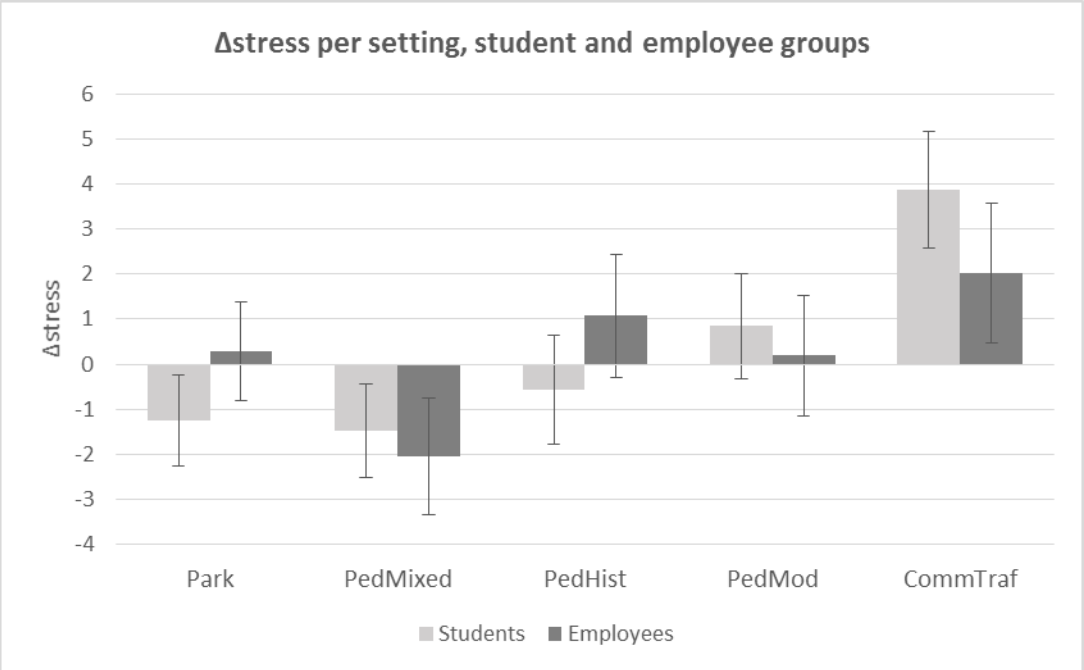
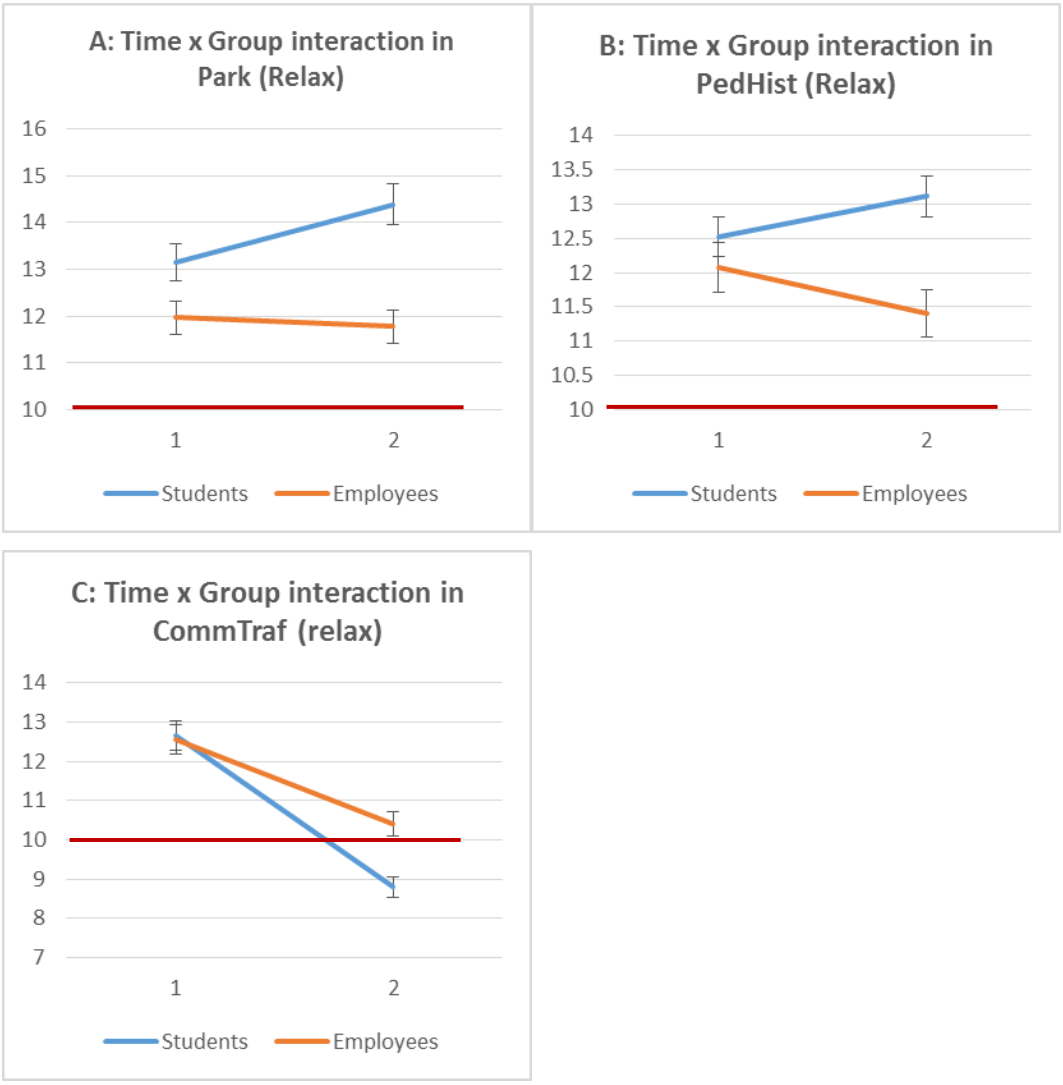


Figure 5-9: Δstress per setting, students vs employees. Difference between pre–post on stress scale in five settings per sample group. Note: values range from 0 (no variation) to ±12 (maximum variation). The y-axis shows the change in stress (post minus pre-test scores). Error bars (95% confidence intervals) are shown.



Figures 5-9 A to C: Time x Group interactions in Stress among employees-students in three settings. Scales range from 4 to 16. Midpoint of the scale is shown (=10).

5.2.5.3.2 Hedtone

Table 5.15 illustrates descriptive statistics for Δstress amongst students and employees.

Table 5-15: Descriptive statistics for Δhedtone in student and employee samples

Setting	Group	N	Δhedtone (SD)
Park	Students	28	2.17 (1.75)
	Employees	26	.84 (1.93)
PedMixed	Students	25	2.11 (1.37)
	Employees	20	1.70 (2.08)
PedHist	Students	26	1.89 (1.84)
	Employees	14	.33 (2.60)
PedMod	Students	25	1.20 (2.21)
	Employees	21	-.24 (2.90)
CommTraf	Students	24	-1.16 (2.57)
	Employees	22	-1.20 (3.29)

Note: Δhedtone calculated as post minus pre video scores. Values ranges from 0 (no variation) to ±12 (maximum variation).

The mixed ANOVA revealed ANOVA revealed that there was a significant main effect of time, $F(4, 227) = 23.50$, $p = .000$, $\eta_P^2 = .094$. There was also a significant main effect of setting, $F(4, 227) = 7.05$, $p = .000$, $\eta_P^2 = .111$ and of participant group, $F(1, 227) = 12.33$, $p = .001$, $\eta_P^2 = .052$. The time x participant group interaction was significant, $F(4, 227) = 9.87$, $p = .002$, $\eta_P^2 = .042$, however the setting x time x participant type interaction was not significant, $F(4, 227) = .87$, $p = .479$. Subsequent analysis revealed significant differences in post-test values between participant type in PedHist, $F(1, 227) = 7.73$, $p = .006$, $\eta_P^2 = .033$, PedMod, $F(1, 227) = 9.44$, $p = .002$, $\eta_P^2 = .040$, and Park, $F(1, 227) = 9.82$, $p = .002$, $\eta_P^2 = .041$. Specifically, students had a significant increase in hedtone in PedHist ($p = .000$), while in the employee sample there was a non-significant increase ($p = .573$). Students also had a significant increase in hedtone in PedMod ($p = .012$), while in the employee sample there was a non-significant decrease ($p = .631$). Finally, both participant groups had an increase in hedtone in Park, but this was larger among students (Figures 5.10 and 5.11).

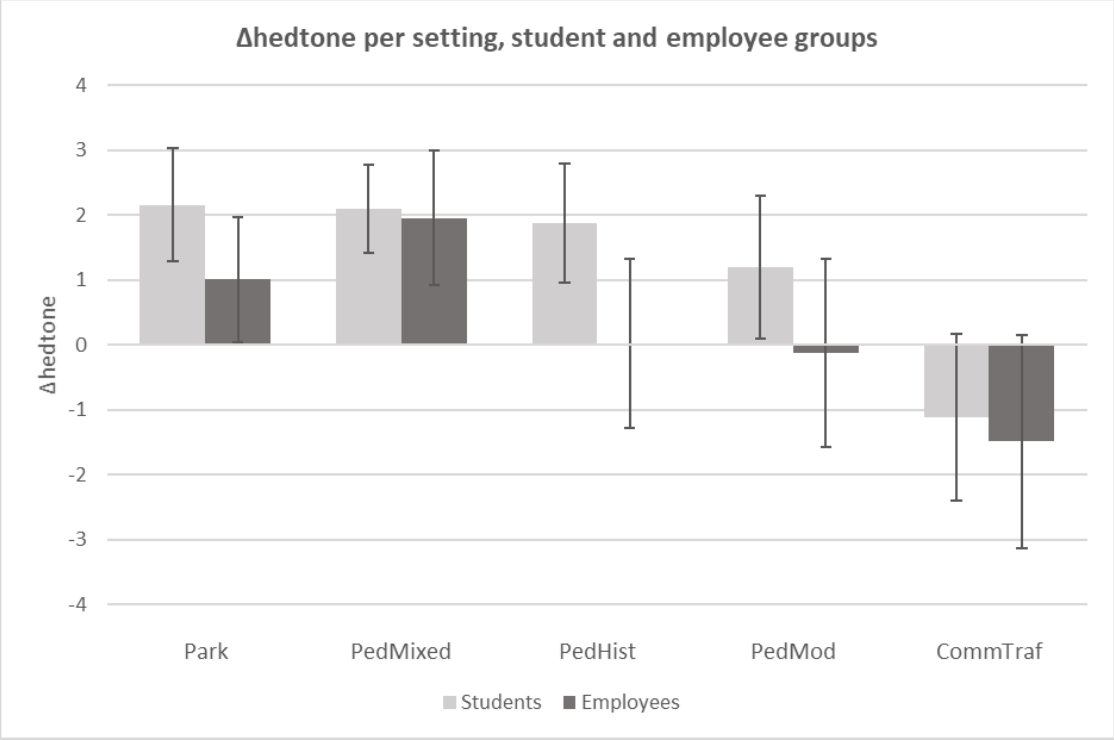
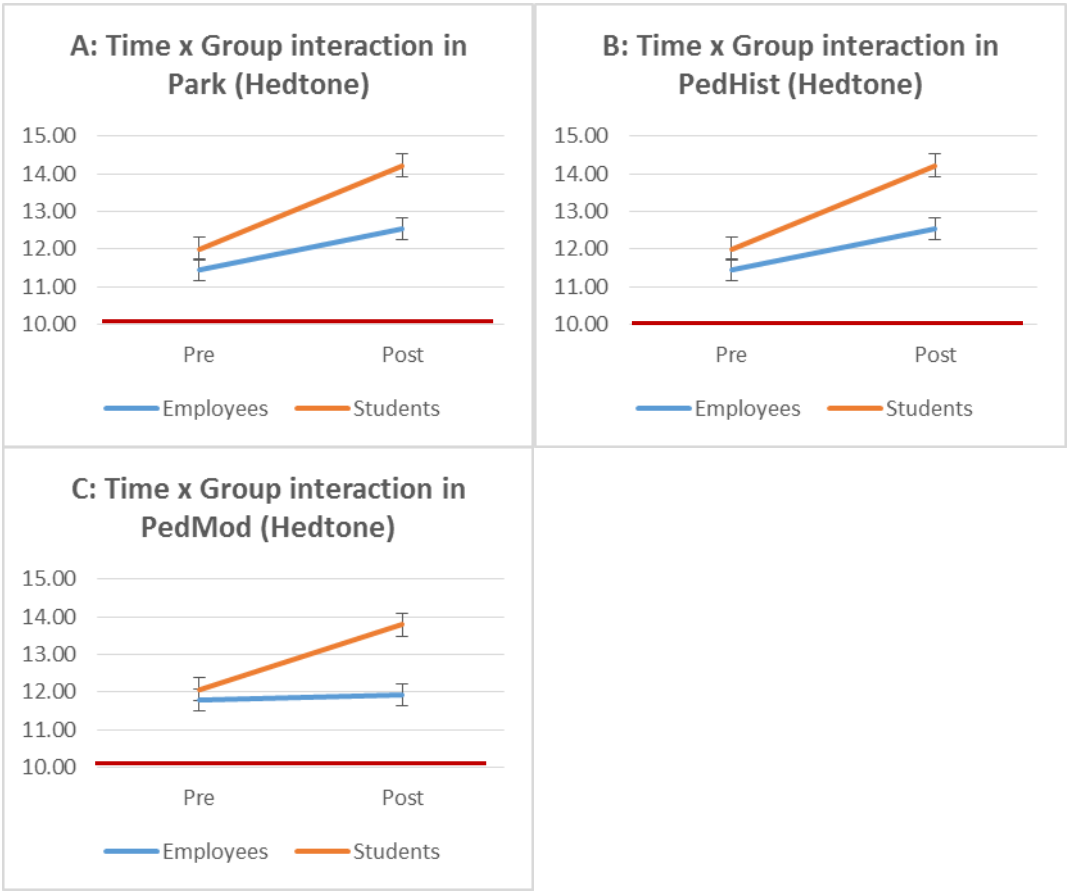


Figure 5-10: Δhedtone per setting, students vs employees. Difference between pre–post on hedtone scale in five settings per sample group. Note: values range from 0 (no variation) to ±12 (maximum variation). The y-axis shows the change in hedtone (post minus pre-test scores). Error bars (95% confidence intervals) are shown.



Figures 5-11 A to C: Time x Group interactions in Stress among employees-students in three settings. Scales range from 4 to 16. Midpoint of the scale is shown (=10).

5.2.5.4 Further tests on personal characteristics

In order to explore the influence of familiarity on affective outcomes, experimental groups were matched on the covariates. Due to the low number of older students and of younger employees, it was not possible to conduct analysis on age. Also, due to the low number of responses, it was not possible to conduct analysis on residential location.

Only participants who were familiar with the settings were considered, and participants who were not familiar with the research settings were excluded. In the new sample (n = 220), familiarity did not differ between students and employees in PedMod (p = .875), CommTraf (p = .125); PedMixed (p = .090), and Park (p = .219). An analysis was not conducted for PedHist, where the two groups still differed significantly in their levels of familiarity (p = .045). A series of independent samples t-tests showed that differences in Δstress remained in CommTraf (p = .044) and Park (p = .025), thus showing that familiarity does not fully explain between-group differences. Also, new between-groups

differences emerged in CommTraf, where students had a larger increase in hedtone than employees (p = .025) (Table 5.16).

Table 5-16: Students-employees differences among participants familiar with settings

		Mean values		*t*	*df*	*p*
		Students	*Employees*			
PedMod	Hedtone	1.20	-.12	1.75	44	.086
CommTraf	Stress	3.85	2.16	2.07	45	.044
	Energy	-.41	1.16	-2.05	51	.045
Park	Stress	-1.25	.29	-2.66	51	.010
	Hedtone	2.16	1.01	2.30	52	.025

5.3 Discussion

The current study has assessed the affective outcomes of watching videos of simulated walks in different urban settings. Settings included two pedestrianised settings with no natural elements (PedHist and PedMod), a predominantly built area with historic and green elements (PedMixed), one area with motor traffic (CommTraf) and an urban park (Park). Results have confirmed H1, as the simulated walks in PedHist, PedMod and PedMixed promoted positive affect (hedonic tone), with the simulated walk in PedMixed also reducing stress levels, as opposed to CommTraf. H2 was partially confirmed, as PedHist scored relatively better than PedMod in stress (Figure 5.1) and hedtone (Figure 5.2) measurements, even though no between-settings differences were detected in any measure. H3 and H4 were also confirmed, as participants attributed higher perceived restorativeness (Figure 5.7), attractiveness (Figure 5.8), and interestingness (Figure 5.5) to the simulated walks in PedHist and PedMod settings compared to the CommTraf setting. Finally, H5 was partially confirmed, as there were minor differences in affective outcomes between the student and employee samples (Figures 5.9 and 5.11). These results are discussed below.

5.3.1 The role of motor traffic in the affective walking experience (RQ1b)

As noted above, the analysis revealed that there was a significant difference in affective outcomes, restorativeness perceptions, and environmental ratings between the simulated walks in CommTraf and the two pedestrianised settings respectively. In ranking the five settings according to their affective and restorative potential, three categories of affective and restorative outcomes, rather than two (e.g., the classic

dichotomy ‘urban vs natural’, cf. Karmanov and Hamel, 2008), were highlighted. First, the two areas with green elements (Park and PedMixed) elicited stress recovery and hedonic tone improvement and were perceived as highly restorative. Second, the two pedestrianised areas with no evident greenery (PedHist and PedMod) supported hedonic tone and were perceived as moderately restorative. Third, the commercial area with traffic (CommTraf) was associated with an increase in stress and a decrease in hedonic tone, and was perceived as non-restorative.

Therefore, the only simulated walk that was associated with negative effects and perceptions was the one in the area with traffic. Hence, the role of traffic emerged as key element linked to psychological wellbeing outcomes of the simulated walking experience. Arguably, motor traffic could be the critical factor that caused the reduction in reported wellbeing in urban settings as identified by previous studies, as these were performed in areas with medium to heavy traffic (e.g., Tilley *et al.*, 2017; Johansson, Hartig and Staats, 2011; Hartig *et al.*, 2003). For example, Hartig *et al.* (2003) found that a 50-minute walk in an industrial area with motor traffic decreased positive affect and increased anger and depression in a group of university students. The area was described as “of medium-density professional office and retail development in the city of Orange […] carrying traffic volumes to 24,000 vehicles per day” (Hartig *et al.* 2003, *p*.111) – e.g.: high levels. More recently, Johansson *et al.* (2011) attested that a walk in a commercial area which “typically carried vehicular traffic of moderate intensity” (2011, *p*. 266) led to a tranquillity decrease in a group of university students. Hence, it is argued that the negative scores on affective restoration identified by Hartig *et al.* (2003), Johansson *et al.* (2011), and by the current study were, at least partially, caused by the presence of motor traffic. Conversely, those studies that assessed psychological responses in urban areas with low traffic found positive affective benefits – even though statistically smaller than those in natural areas (Gidlow *et al.*, 2016; Karmanov and Hamel, 2008; Van den Berg, Koole and van der Wulp, 2003; see Chapter 2 for an extensive review).

Hence, the presence of heavy motor traffic could be (one of) the common denominators for those studies that identified negative psychological effects following walks in urban settings. Several observational studies have attested the negative influence of traffic exposure on affective variables in the urban (Knöll *et al.*, 2017) and residential context

(von Lindern, Hartig, and Lercher, 2016). Research has also examined the negative effect of motor traffic exposure on wellbeing (e.g., Miedema, 2007), with several studies highlighting the negative role of exposure to motor traffic sound in affective and cognitive performance (Benfield *et al.,* 2014; Ratcliffe, Gatersleben, and Sowden, 2013; Alvarsson, Wiens, and Nilsson, 2010). However, there seems to be a lack of studies on the role of traffic on the affective walking experience specifically. The current results suggest that traffic could also have a role in immediate affective walking experiences.

On the other hand, the walks in the two pedestrianised settings with no evident natural elements (PedMod and PedHist) were associated with neutral or positive affective outcomes, and were perceived as mildly restorative, attractive, and interesting. This finding contradicts Ulrich *et al.*'s (1991) research, which found that a walk in a pedestrianised shopping area had negative effects on wellbeing. Arguably, such a discrepancy might be related to the differences in setting types to and in levels of pedestrian flows. In fact, research has found that outdoor shopping malls can be perceived as stimulating rather than relaxing (Fornara, 2011) and that their perceived restorative potential is unclear (Staats *et al.*, 2016). In addition, the relatively high pedestrian flow in Ulrich *et al.*'s (1991) study (7 to 35 pedestrians passing/min, 1991, p. 211), might trigger crowding and hence elicit stress and negative feelings for some participants (e.g*.,* Evans, 1984). Hence, differently from Ulrich *et al.*'s (1991) research, the current study reveals that some pedestrianised, non-crowded leisure urban settings can represent walking environments that support wellbeing despite the absence of major natural features. Therefore, the current findings support Staats *et al.*'s (2016) idea that an urban street with traffic is not representative of all urban settings.

It should also be noted that the only walks associated with stress recovery contained natural elements (PedMixed and Park). Such a result confirms theoretical and empirical claims on the stress recovery properties of nature (e.g*.,* Hartig *et al.*, 1996; Kaplan and Kaplan, 1989; Ulrich, 1983). Hence, the current results indicate that the absence of traffic does not promote stress recovery per se, but it might still have an important role.

5.3.2 The role of architectural style in the affective walking experience (RQ1b)

Turning to H2, it was expected that the walk in the pedestrianised historic environment (PedHist) would elicit greater affective benefits than the walk in the pedestrianised

modern environment (PedMod). This was partially confirmed, as PedHist was associated with a significant increase of hedonic tone, while in PedMod the increase was a trend at best and not significant. Also, the non-significant trend for stress was negative in PedHist and positive in PedMod. However, no significant differences in affective outcomes were detected between PedMod and PedHist on any measure. Hence these findings are mixed, making it difficult for any conclusive conclusions to be drawn. Previous research has already suggested that places with a strong historic value are restorative (Fornara, 2011; Hidalgo *et al.* 2006; Galindo and Hidalgo 2005). In 2010 Packer and Bond's qualitative study found that visiting a museum was restorative for individuals. Also, in 2011, Fornara posited that spending time in an "historic-panoramic site" scored positively on the PRS. Finally, in 2011, Roe and Aspinall measured affective restoration with the UWIST MACL scale in a good mental health group and a poor mental health group, and found that a walk in Stirling city centre was restorative for the poor mental health group. The authors speculated that the restorative effect could be attributed to the historic character of the city of Stirling, UK. Results from the current study confirm the idea that the historic character of place might contribute to restoration. It is observed that the fields of urban planning and heritage studies hold that historic places offer an engaging and symbolic narrative linked to the relational value of cultural heritage (Smith, 2006; Hayden 1997; Lynch, 1972). Based upon some of the current findings, it is suggested that such a narrative may elicit affective benefits and relieve attentional fatigue. In fact, scholars have already claimed that historic architectural styles reflect individuals' place identity (Fornara, 2011) and hence support place attachment (Cerina, Fornara, and Manca, 2016). These ideas will be further explored in the qualitative phase of research (Chapter 6).

In addition, H2 is also partially corroborated by scores in PedMixed. In fact, in the pedestrianised setting with built and natural elements (PedMixed) the affective outcomes and PRS ratings were comparable to those in the park setting, against expectations. Previous research has found that street vegetation (Lindal and Hartig, 2015) and the presence of grass, trees, and bushes in pocket parks (Nordh *et al.*, 2009) increase restoration likelihood. However, the positive outcome in the PedHist and PedMod settings cannot be attributed to the presence of natural elements, as in PedHist, PedMod, and CommTraf, street vegetation levels were comparable, and the

green was constituted only by sporadic flowerpots or bush plants. In addition, the current study has found that the affective outcomes in PedMixed were not statistically different from those in the park setting – a result which perhaps comes as a surprise considering that PedMixed is a predominantly built-up urban setting, whilst the park is predominantly natural. Indeed, in contrast, some authors have associated the amount of grass surface and park size with restoration likelihood (Nordh *et al.*, 2009). Hence, it is speculated that the historic character of PedMixed, which was also significantly more interesting than the Park setting, contributed to its affective benefits. Thus, the presumed high relational value of settings rich in historic elements could explain why the affective benefits in the PedMixed setting were as large as the ones in the Park setting despite the lower level of greenery in the former, and why the PedHist setting scored relatively better than PedMod. In addition, it is also possible that the affective outcome in PedMixed was fostered by a spiritual or religious meaning associated with Bristol's Cathedral (Herzog *et al.*, 2010; Ouellette, Kaplan, and Kaplan, 2005). In fact, in the cultural geography literature Maddrell has argued that spirituality can facilitate mental healing and recovery during pilgrimage walks (Maddrell, 2013). These ideas were explored further with qualitative research, and results will be illustrated in the next Chapter 6.

5.3.3 Differences between student and employee samples (RQ1c)

H5 was addressed by conducting separate analysis on student and employee samples and examining possible between-groups differences (Section 5.2.5). Results showed that significant differences in affective outcomes existed between the student and employee samples. Specifically:

1. the student sample had larger benefits following the simulated walk in the Park setting – the Park walk reduced stress levels in students, while it led to a non-significant reduction in stress in the employee sample (Figure 5.10-A), and also, led to a larger increase of hedonic tone (Figure 5.11-A);
2. students became more stressed than employees following the walk in CommTraf (Figure 5.10-C);
3. the simulated walk in PedHist triggered larger affective benefits among students than among employees – students' hedonic tone improvement in PedHist was

significantly larger than the employees' (Figure 5.11-B); also, while the PedHist setting was associated to stress recovery among students, it led to an increase of stress among employees (Figure 5.10-B);

4. the PedMod setting led to an increase of hedonic tone among students, and to a non-statistically significant result among employees (Figure 5.11-C).

Points 1 and 2 are surprising considering the difference in pre-test stress between students and employees, with students being significantly less stressed than employees (Tables 5.11 and 5.12). Scholars have suggested that the restorative potential of green settings increases when individuals are in need of restoration, e.g., when they are stressed or mentally fatigued (e.g., Hartig and Staats, 2006; Hartig *et al.*, 2003), whilst in the current research the green setting had a larger stress recovery effect in the group that was less stressed pre-test. However, the evidence on the impact of mental fatigue on restorative outcomes seems contrasting. In fact, more recently Staats et al. (2016) did not detect any effect of imagined mental fatigue in judged restoration likelihoods in a café, a park, a busy street, and a shopping mall. Therefore, it seems that there might be additional factors that explain the differences in affective outcomes between students and employees.

A first factor could be age, with Scopelliti and Giuliani (2004) suggesting that restorative experiences vary over the life span, and that different age groups have different restorative preferences. Their research determined that for young people (mean age = 27), experiencing excitement is relatively more important and restorative than for older/middle-aged adults (mean age = 42). Based on this, it is possible that age difference could explain students' increase of hedonic tone in PedMod, which is potentially an exciting area. However, it was not possible to conduct analysis on age, hence this aspect will be explored further in Chapter 6.

A second explanation might be related to familiarity and residential location, which differed significantly between the two populations. Students were less familiar with the city centre settings, and less likely than employees to live in Bristol city centre. In fact, 27% of student participants lived on the university campus, which is approximately 5 miles from the city centre; hence it is likely that opportunities to visit Bristol city centre are limited for most of them compared to the employee group. Authors have suggested that familiarity and associations related to green environments can relate to nature

restoration (Pretty, 2004). Hartig and Staats (2006) detected a positive association between familiarity and, respectively, environmental rating and perceived restoration likelihood. The recent person-centred focus on restoration (Ratcliffe and Korpela, 2017, 2016) looks at personal perceptions, attitudes, and memories related to restoration. In a series of studies, Ratcliffe has shown that positive memories contribute to perceived restoration (Ratcliffe, Gatersleben, and Sowden, 2013) as mediated by place attachment (Ratcliffe and Korpela, 2016). Similarly, Tilley *et al.* (2017) attested that personal memories related to places during walking contributed to feelings of happiness and pleasures among a group of older individuals.

However, when the two samples were balanced with respect to their levels of familiarity (Section 5.2.5.4), differences between students and employees remained. This indicates that familiarity per se, as measured by the survey questions, does not explain such differences in affective outcomes. Nonetheless, it is possible that, despite relatively less familiar with the research settings than employees, students' affective experiences in the park and in PedHist were influenced by positive memories and associations – variables which were not measured within the survey. In parallel, it is possible that walking in a busy area like CommTraf was more detrimental for students because they were generally less familiar with it than employees were. With this regard, Kaplan, Kaplan, and Ryan (1998) argued that individuals' landscape preferences are based on their ability to understand the landscape. Hence, it is possible that being less familiar with the city environment might be related to weaker preferences for urban settings. However, the claims above remain tentative, and will be further developed in the next Chapter 6.

5.4 Chapter Summary

The aim of the work presented in this chapter was to explore with quantitative research the potential of different urban settings to support the affective walking experience, thus addressing RQ1. Results have been presented from an online experiment that measured affective outcomes and perceived restorativeness following a simulated walk in one of five urban settings located in Bristol city centre. H1 was confirmed, as PedHist, PedMod, and PedMixed supported affective outcomes as opposed to walking in CommTraf. Specifically, PedHist and PedMod triggered hedonic tone and were

perceived as restorative. In addition, a pedestrianised area with greenery and historic elements (PedMixed) supported stress recovery and hedonic tone improvements – variations that were not statistically different from those in the Park setting. H2 was partially confirmed, as PedHist scored relatively better than PedMod, even though no significant differences were detected. H3 and H4 were confirmed, as PedHist, PedMod, and PedMixed were perceived as restorative, attractive, and interesting as opposed to CommTraf. Finally, H5 was partially confirmed, as there were differences in affective outcomes between a student and employee population.

These results suggest three key things. First, that motor traffic could be the most important element of the urban realm that negatively affects mood in the urban context. Second, that the historic character of a place might contribute to psychological wellbeing and restoration. Third, that residential location and familiarity might play a role in affective experiences of walking.

However, further questions arise. A first set of questions relates to the role of motor traffic in the affective walking experience. Why is traffic negative for the affective walking experience? What elements of traffic do trigger stress and negative hedonic tone? Can walking in pedestrianised areas be restorative?

The second set of questions is related to the role of historic architectural styles in the affective walking experience. The quantitative analysis has highlighted the potential role of historic architectural styles and elements to support stress restoration (in PedMixed) and to trigger hedonic tone (in PedHist). Hence, are these outcomes influenced by historic architectural styles and elements? Why might historic architectural styles have the potential to trigger affect and restoration? Is this related to the symbolic narrative embedded in historic areas? Why was PedMixed perceived as restorative as the park despite the lower amount of greenery? Is it related to the spiritual and/or historic value of Bristol's Cathedral?

Finally, a third set of questions is related to H5 on the differences in affective outcomes between students and employees. Why did students find the park simulated walk more relaxing than employees did? Why did students find the walk in CommTraf more stressful and the walk in PedHist more pleasant (e.g., hedonic tone) than employees did? Do age, familiarity, and residential location play a role?

The next chapter takes the analysis further with qualitative research and aims to address the questions above. To this end, it will present results from the qualitative phase of research (photo-elicited interviews) to answer RQ2: What are the barriers and enablers of the positive affective walking experience in city centre environments?

CHAPTER 6

6. QUALITATIVE INSIGHTS ON THE PSYCHOLOGICAL WELLBEING POTENTIAL OF WALKING IN CITY CENTRE ENVIRONMENTS[9]

Chapter 6 Research Questions

RQ2: What are the barriers and enablers of the positive affective walking experience in city centre environments?

a. What is the role of motor-traffic and architectural style?
b. Why do the affective outcomes of walking in city centre environments differ between a student and employee population?

Box 6-1: Chapter 6 Research Questions

6.1 Introduction

Chapter 5 presented results from an experimental study that explored the affective potential of walking in different urban settings. Key findings were that walks in PedHist, PedMod, and PedMixed supported affective outcomes as opposed to walking in CommTraf. PedHist and PedMod triggered hedonic tone and were perceived as restorative, and PedHist scored relatively better than PedMod, even though no significant differences were detected. The affective benefits in PedMixed and Park were comparable, as there were no statistically significant differences in the two setting groups. Finally, there were differences in affective outcomes between student and employee populations, with students reporting higher affective benefits in the park and in the pedestrianised settings than employees, but becoming more stressed in CommTraf than employees.

[9] All images in the current chapter were produced by the research participants. Permission to re-use the images was obtained from participants by signature of the consent form.

The main aim of the current chapter is to drill deeper into these findings and further explore the role of motor traffic, architectural style, and personal characteristics in the affective walking experience. The findings presented within this chapter relate to the second research question of the PhD: *What are the barriers and enablers of a positive affective walking experience in city centre settings?* This chapter is based on the qualitative phase of this PhD (Phase 2), which involved 14 photo-elicited interviews that took place after participants took an individual walk in the city centre (see Chapter 4). As discussed in Chapter 4, 14 participants who had previously completed the online survey agreed to be interviewed. They included 6 students and 8 employees. Data were then analysed using thematic analysis (Braun and Clarke, 2013; Braun and Clarke, 2006) and considered in the context of ART (Kaplan and Kaplan, 1989) and SRT (Ulrich, 1983) as well as literatures on mobilities and place (Gatrell, 2013; Sheller and Urry, 2006; Edensor, 2010, 2000) (see Section 4.5 within Chapter 4 for a description of analysis approach).

Barriers and enablers of a positive affective walking experience were identified, and these are summarised in Figure 6.1. First, the overarching theme 'barriers' discusses the barriers that can prevent restorative and affective benefits. This theme refers to the elements related to the physical surroundings that might not fit with pedestrians' basic needs during walking, and these elements include motor traffic, city busyness, and poor aesthetics. In this regard, it emerged that urban walking needs to be comfortable, safe, and undisturbed, and the elements above can represent an obstacle to comfort, safety, and quietness. Related to this, the theme 'walking can be restorative per se' describes the potential of the walking mode per se to support stress recovery and positive affect – outcomes which are more likely to take place in the absence of barriers.

The second overarching theme, 'enablers', discusses the elements that favour a positive affective walking experience. These enablers also include 'presence of nature', a theme which emerged during the interviews. However, this theme does not relate to a major research question or aim of the current thesis and it will be not be discussed extensively. The theme 'enablers' includes a third overarching theme 'connection with place'. This emerged as a further enabler of a positive affective walking experience, and describes the power of some places to communicate a narrative to individuals and to enable the development of a bond between an individual and place (e.g., Gatrell, 2013). The theme

includes three elements: personal connection with place, connection with Bristol's identity (place identity), and connection with community (sense of community). The themes are discussed below.

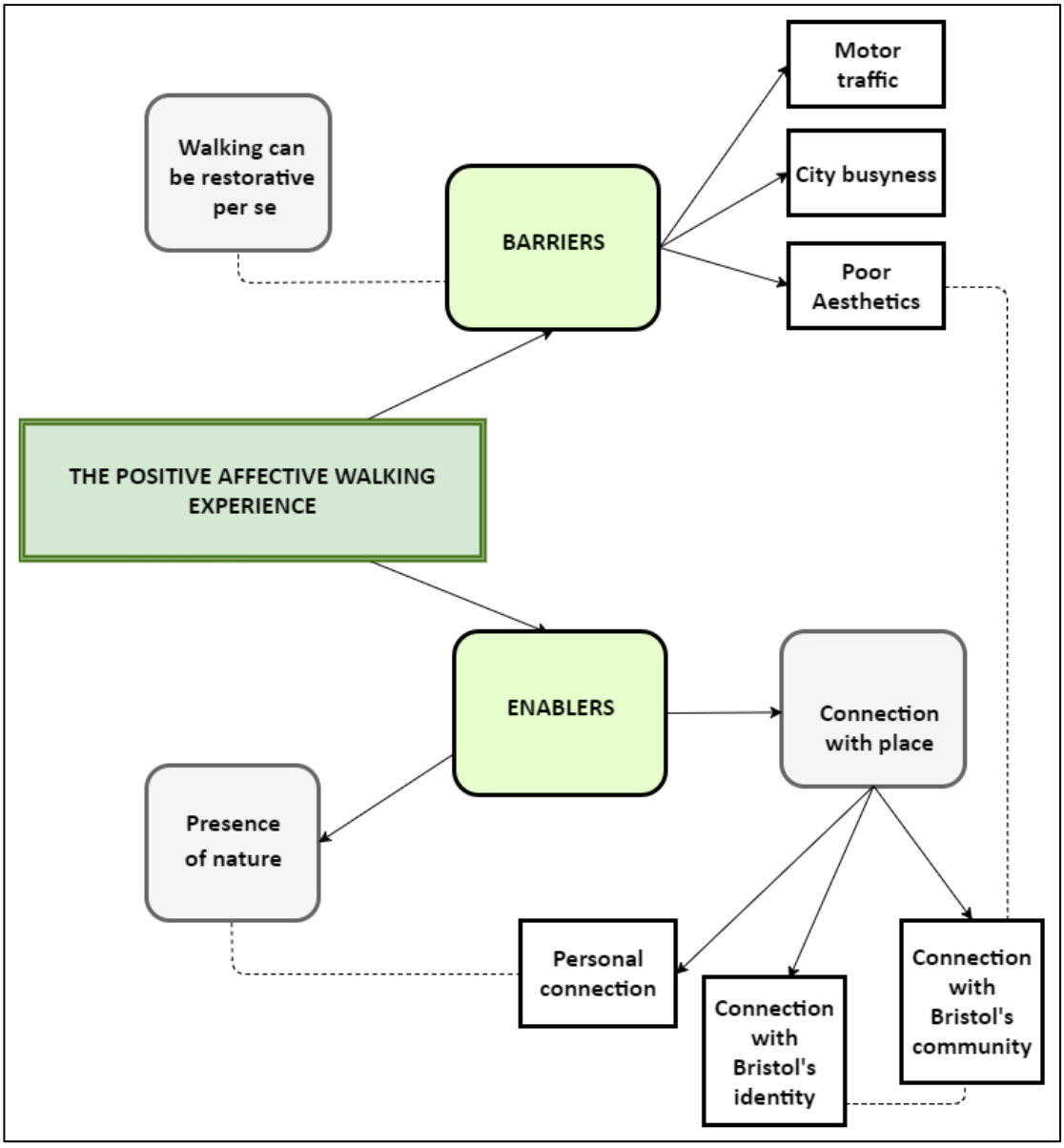


Figure 6-1: The affective walking experience in the urban context

6.2 Barriers of the Positive Affective Walking Experience: Urban Walking Needs to be Comfortable, Safe and Undisturbed

The experimental phase highlighted that the commercial area with traffic was significantly less restorative, attractive, and interesting than any other setting. These results were explored during the interviews, and three factors emerged as barriers to a positive affective walking experience. The first is motor traffic, thus confirming the

discussion within Chapter 5 on the potential negative role of motor traffic on the affective walking experience. The second element is city busyness, which one participant described as the feeling that "the city never seems to rest". The third element is poor aesthetics. Before reviewing these three elements, the theme 'walking can be restorative per se' is illustrated in Section 6.2.1. The theme illustrates that, in the absence of barriers, walking per se can aid relaxation and positive affect.

6.2.1 Walking can be restorative per se

Research has attested that urban life is more stressful compared to rural life (Peen *et al.*, 2010); it emerged from the interviews that walking is a restorative practice per se that contributes to recovery from urban life. Talking about his lunchtime walk, James explained:

> *I find walking quite good to de-stress generally. It is good for you. When I came back to work [from the walk] … it felt pretty good actually. I felt my mind was cleared, and I was refreshed. I think generally it is good (James, MW-U-37[10]).*

Hence, it emerged that walking is about "doing nothing", "relax", and "getting lost in thoughts". As Sarah explained it, "walking helps think thighs through, ordering your thoughts". This was confirmed during the interviews:

> *I find walking much easier, cycling is more stressful. You need to pay more attention to cars and people... When you walk it is more straightforward (Eran, MW-U-41).*

Another element that makes walking relaxing and restorative is its slowness, which enables a deeper interaction with place and allows noticing the details:

> *In terms of being part of the environment, walking is definitely better [than driving] (Sarah,* HW-U-*53).*

And also:

[10] In the current chapter and in following Chapter 7, interview extracts are reported with quotes and with in-text quotation marks. Participants are identified by their walking habits (HW= heavy walker; MW= medium walker), nature/urban orientation (N=nature; U=urban), and age.

> *Cycling is more exciting because you are faster. I like both. [When you are walking] you can pay attention to details. It makes me think that […] people don't look, and I do look. People miss out (Eran, MW-U-41).*

In addition, participants noted that when they seek walking to recover from stress and mental fatigue, they prefer to walk in green areas. However, participants tended to be divided between those who had a preference for walking in natural areas, and those who prefer walking in 'interesting' areas. "Things to notice", like "different boats, and the old buildings, seeing the water", or "signs of schools, dogs and cats, those sort of things that make you stay in touch with the environment" emerged as very important during walking. Comparing walking in cities with walking in natural areas, Sarah reported:

> *When walking in Bristol you have more things to look at. It makes it more interesting. Walking in nature, in the woods, I get that for some people it is relaxing and it makes you feel away from reality, but is not as interesting as walking in cities (Sarah,* HW-U-*53).*

Similarly, Debbie reported that she likes the "busyness" of the city:

> *I like walking through the city. I like the busyness, and having always something different to see, and various characters on the way, interesting people (Debbie, HW-U-34).*

Therefore, on one hand "quietness" seems to be one of the pivotal aspects that contributes to stress recovery during walking. The idea that walking per se can be restorative confirms previous research that attested that walking is a practice that offers time to think and relax (Calvert, 2015; Gatrell, 2013; Middleton, 2009) and requires low affective and cognitive efforts (Gatersleben and Uzzell, 2007). Additionally, this idea is confirmed by the work by Anable and Gatersleben (2005), who claimed that walking journeys are usually perceived as more relaxing than those by other travel modes. On the other hand, feeling "in touch with the environment" through the engagement with physical surroundings seemed to make walking more pleasant for participants. In some cases, restorative properties emerged, and walking was described as distracting and fascinating. While the role of engaging with surroundings will be discussed in Section

6.3.1, the following Sections 6.2.2-4 illustrate the main barriers of a positive affective walking experience.

6.2.2 Motor traffic interferes with walking

Motor traffic emerged as a major negative element in relation to the restorative walking experience. Participants explained that traffic requires a lot of attentional effort and triggers stress. Walking in conditions of heavy motor traffic is a source of cognitive fatigue, as participants noted that they need to "pay more attention", "get focused" and "be constantly aware of the surroundings" in areas with motor traffic. Several elements of motor traffic contribute to such a negative effect: noise and air pollution; interruption to the walking flow due to motor traffic; and safety concerns and power dynamics related to motor traffic. These are reviewed below.

The most basic sources of affective and cognitive disturbance from motor traffic is noise and air pollution. Within the current study, noise was the primary feature mentioned by participants. Taking one example (see Figure 6.2):

> *There's so much noise from the cars and stuff, it is very hard to focus (Julia, HW-N-20).*

Figure 6-2: Motor traffic represented by participants' photographs

Julia's comment highlights that traffic noise impacts concentration, a feature that was highlighted by several participants. Participants also talked about their daily strategies

to overcome noise; some of them use headphones to listen to music and "avoid listening to all of that". Others mentioned that they "literally block [their] ears to avoid the noise" when the ambulance or buses are coming. In fact, participants noted that it is especially the loud noises from buses or ambulances that can be particularly frustrating.

Fumes from motor vehicles represent a further source of stress related to motor traffic. Participants within the current study reported feelings of frustration related to air pollution:

> *I'm thinking of how much of it gets into my lungs… the air pollution. I started to think that maybe I should be wearing a mask. Sometimes you get a big lorry passing you, and that air of the diesel is pretty fowl. That doesn't put me off, but it concerns me (Rachel, HW-N-34).*

These findings on the role of noise and fumes on the walking experience confirm previous works from different disciplines. In fact, in his phenomenological auto-ethnographic analysis of the aesthetic experience of motor traffic, Taylor (2003) defined the experience of motor traffic as multisensory, as it involves hearing, smelling, and seeing. According to the author, the sensory experience is mainly negative, as these represent intrusions whose degree of discomfort "should not be underestimated" (Taylor, 2003, p. 1617). Similarly, Calvert (2015) explored the role of motor traffic in the walking experience, and concluded that the role of motor traffic is mainly negative. Within restorativeness research there is a growing consensus around the notion that sounds represent a crucial aspect of the restorative experience (Conniff and Craig, 2016; Ratcliffe, 2015; Payne, 2013). For example, Ratcliffe (2015) found that listening to birdsongs can be restorative *per se*. According to Conniff and Craig (2016), the exclusion of the sonic environment may even lead to biases in the interpretation of affective and cognitive recovery potential. Research has also been conducted to compare effects of traffic and nature sound exposure on the restorative experience, concluding that natural sounds are associated with faster cognitive recovery compared with urban sounds, including noise from motor traffic (Ratcliffe, 2015; Benfield *et al.*, 2014; Payne, 2013). For example, Benfield *et al.* (2014) assessed the role of natural and artificial sounds on park scenes ratings, finding that noise from air traffic, ground traffic, or voices negatively impacted environmental assessments, decreased participants' serenity and increased hostility. However, not many studies have focused specifically on the role of motor

traffic in restorative walking experiences. The current research has confirmed the negative role of traffic sounds for affective experiences, and also shows that such a negative effect can influence the affective walking experience in particular.

Turning to air pollution, the direct health risks related to air pollution are well known (e.g., Rivas, Kumar and Hagen-Zanker, 2017; Brunekreef and Holgate, 2002). However, the current study adds to these by highlighting that being exposed to fumes also bears indirect health risks, as it is a source of concern and stress. A recent research has also found that active commuters relying on public transit are even more exposed to air pollution than drivers (Rivas, Kumar and Hagen-Zanker, 2017), thus these results are even more relevant.

A second source of stress and cognitive fatigue related to motor traffic is represented by the numerous interruptions to the walking flow that characterise the urban context. The current analysis showed that "keeping the walking rhythm" is a crucial aspect of walking for pedestrians. Participants reported that they like to "turn off" during walking, and having to pay attention to the surroundings is a "hassle" that disturbs daydreaming. Crossing the road is one of the main sources of interruptions to the flow. For example, James, 37, took a picture of a 'WAIT' traffic light to represent the frustration of waiting at crossing points (Figure 6.3). He explained:

> *That's another feature of my walk. Stop here, stop there… when you walk you have to stop.*
>
> *Interviewer: Do you think waiting, and roadworks, can put you off?*
>
> *Yeah, but they also make the experience not as enjoyable. You've got like a natural flow into thinking, and sometimes I walk from Temple Meads into town, and you've got kind of a route[11], it is quite a nice flow. It's designed quite well. I think if there were more things like that, it would help (James, MW-U-37).*

[11] James refers to the Brunel Mile route, a pedestrian route between Bristol Temple Meads station and the Harbourside that facilitates pedestrian flow with high-quality pedestrain infrastructure, signage system, information panels.

Figure 6-3: Traffic light and the frustration of waiting at crossing points

These interruptions to daydreaming also negatively affect mood. Talking about her walk, Julia explains how she experienced walking from a green area to a road crossing:

> *Then I go up the road, and I become more aware. I stop daydreaming in a sense, and I prepare myself to cross that road. I don't know, it is literally there, that my mood changes. I'm still under the tree but I just know what's coming. It's that thing of going from a really nice area to an area that is not that nice. I don't like that road because it is so busy, I never know what's happening, I just wait for the green man and I run across (Julia, HW-N-20).*

The current findings confirm ideas from the mobilities literature on the fluidity of movement and rhythm as important aspects associated with walking (Taylor, 2003; Edensor, 2000). Taylor (2003) noted that interruptions can trigger tension and frustration, and the current research confirmed these ideas with participant-based research.

A third issue related to motor traffic is represented by safety concerns and power dynamics. In fact, crossing the road is a source of stress and attentional fatigue for pedestrians also because it is perceived as a dangerous activity. Participants felt that they have to be very attentive and "watch for cars and buses". Michael also explained (Figure 6.4):

I have to negotiate, so I was thinking how to cross, which stop I am aiming for. It is possible to get across here, without waiting for the green man, if you know what you are doing, but of course there is your life in your hands. It saves you a little 30 seconds [laughs], but when you are walking it is nice to keep the rhythm and not stop, keep the momentum. It is nice if lights are green (Michael, HW-N-41).

Figure 6-4: Negotiating and thinking about crossing the road

Hence, interrupting the walking flow and "the momentum" even for a few seconds can be frustrating for pedestrians, but it is challenging to find a balance between keeping the flow and safety measures. In some cases, other than during road crossing, participants also felt threatened when walking on the pavement, such as when vehicles invade the pedestrian space. Sarah explained the feelings of discomfort and frustration when a car invaded the pavement to avoid a cyclist (Figure 6.5):

The car came up onto the pavement towards me to avoid the cyclist and it was quite narrow. It wasn't a particularly pleasant experience, although the person [i.e. car driver] avoided me (Sarah, HW-U-*53).*

Figure 6-5: Car invading the pavement in order to avoid a cyclist.

Related to this, it emerged that some participants feel powerless towards cars. This idea was put into words by Julia:

> *I feel like a lot of people watching me. And because they have got a car, and I'm just walking, it is kind of like they win (Julia, HW-N-20).*

Therefore, other than the real risk of being hit by a car, there are power dynamics that characterise the relationship between pedestrians and cars, due to the fact that cars dominate the road and have priority – e.g., "they win". These empirical findings support Taylor's idea of the "depersonalisation of the city" (2003, p.1619), according to which individuals see motor vehicles as moving objects, rather than as other people. This negative feeling can be exacerbated by the fact that even drivers may see pedestrians as 'obstacles' obstructing their movement, rather than human beings.

To summarise, concerns related to motor traffic (noise and fumes, interruptions to the walking flow, and safety) seem to prevent individuals from restoring during walking. In support of this idea, it emerged that walking in pedestrianised areas is not characterised by the same concerns. In fact, as described in Chapter 5 the pedestrianised settings (PedMixed, PedHist, and PedMod) were rated as significantly more restorative than

CommTraf. In the interviews, participants explained that it feels ‘‘wider’’, “less constricted”, “more open”, as “you have the whole pavement to move around”. Also, walking in pedestrianised areas can feel “safer [because] you don’*t* need to pay a lot more attention to what is going on around you”, and “quieter”. For example:

> *I do like being into places that are not near a road. So any sort of opportunity to be like... off, away from a road is good. […] I think is not being by the side, is the noise, the movement, and also, you feel a bit more able to sort of move around really (James, MW-U-37).*

Therefore, the presence of motor traffic can partially explain the difference in restorative potential and in *compatibility* (measured by the PRS scale) between CommTraf and the two pedestrianised settings (PedHist and PedMod) identified in the quantitative analysis outlined in Chapter 5. Specifically, the lower compatibility of CommTraf (see Chapter 5) can be explained by the fact that an area with traffic may not fit with individuals’ needs and expectations of space, time, and safety.

6.2.3 City busyness: ‘the city never seems to rest’

The second barrier is ‘city busyness’, and is related to the general busyness of city life, which causes further stress and fatigue. Urban settings can be generally overwhelming due to the multiple activities that take place at the same time. For some participants, being in a city can feel like “being in prison”, as it was noted that there are many constraints of space and several environmental stressors. These two elements – lack of space and environmental stressors – are illustrated below, and describe the discomfort related to urban walking.

Lack of space is one of the main issues related to the walking experience. On one hand, as discussed above, motor traffic is the primary source of lack of space, as it takes the majority of road space. On the other hand, walking on pavements is frustrating due to narrow sizes and the large number of other pedestrians walking. Participants noted that crowds of people make the walking experience uncomfortable and frustrating. First, because moving in crowded spaces requires more attention and takes more time:

> *Walking uphill you can’t see the top, what you can see is the crazy amount of people. It is horrible, there are so many people walking towards you, and a*

lot of them wouldn't move out of the way, so I can't just listen to music and just walk. I have to focus of moving out of everybody's way. That is quite horrible (Julia, HW-N-20).

Figure 6-6: Crowded pavements make walking frustrating

Second, some participants had the perception that other people "don'*t* care" about others, and are always in a hurry. In some cases, pedestrians felt "small" and powerless compared to the crowd, a finding that echoes the dynamics between pedestrians and motor vehicles described in the previous section. With reference to Figure 6.6 above, Julia explains:

Sometimes they [e.g., other pedestrians] touch you, because they are in a hurry. Even though they don't mean it, it makes you feel quite small. Because it makes you think that people aren't noticing you. And even though it is not their fault, because they are in a hurry, when you are not in a hurry, and you're just doing you walk, it is not very nice (Julia, HW-N-20).

The second element of 'city busyness' is environmental stressors. It emerged that the city environment imposes heavy distractors and a series of elements that represent a heavy load in terms of stress and cognition. For example construction sites and scaffolding can be "noisy" and "dirty", as noted by one participant (Figure 6.7):

It is just ruined, because all you hear is the drilling, people shouting, and it ruins the mood almost. It is not nice to see it […]. And I feel so dirty, even

though I'm not gonna touch it, I look at it and I think that's almost like a grotty area, I wouldn't want to walk behind it every single day (Mark, MW-N-*22).*

Figure 6-7: Construction works and related signs disturb the pedestrian

Moreover, a multitude of signs and shops dominates the city, attracting pedestrians' attention in an overwhelming way. Participants noted the excessive number of high street shops in the city. Discussing the area of CommTraf, James explained that when he walked there coming from an urban area nearby his mood changed "from being relaxed to not quite relaxed" due to the high number of 'for sale' signs, fast-foods, and high street shops, which made him feel "gloomy" (Figure 6.8):

There's Tescos everywhere, such marginalisation, we already passed a Tesco down there, this is like the fourth Tesco I passed, we don't need more Tescos (James, MW-U-37).

Figure 6-8: Multitude of signs represent increased cognitive load

Finally, tall buildings made some people feel "overwhelmed", "enclosed" and "claustrophobic". Some noted that walking in the commercial area with traffic (the Horsefair, CommTraf) felt "imposing" because "buildings are so massive". Julia put into words the claustrophobic feeling of walking in an area with tall buildings:

> *My building has 12 floors, so I'm really small compared to it, and it is not even the tallest one. And it is quite daunting, especially because it blocks out the sun and light, because it is so tall… not very nice (Julia, HW-N-20).*

These findings on the city busyness provide empirical support to ideas by the German sociologist Georg Simmel, who in his urban sociology essay The Metropolis and Mental Life (1903) considered the negative effects of urban experience on mental health. According to Simmel, compared to life in rural villages life in the metropolis intensifies nervous fatigue due to the multiple stimuli taking place at the same time, with constant bombardments of sights, sounds and smells. According to Simmel, life in the metropolis leads dwellers to "unwanted physical contact" (1903, p. 6). Individuals in cities become more individualistic and to develop "indifference… a mutual strangeness and repulsion which […] can break out into hatred and conflict" (1903, p. 6). In addition, congestion and crowding are known to have adverse effects on psychological health (e.g., Evans, 2003, 1984).

However, there has been very little research on the effects of crowding on the affective walking experience. Cole and Hall's (2010) research compared restoration in a wild park trail in conditions of moderate and high congestion, but did not find any significant effect of congestion on restorative outcomes – a finding which contrasts with the current qualitative analysis. However, Cole and Hall's (2010) study context was a wilderness area where, it is argued, even a condition of high congestion is generally lower than urban congestion levels. In addition, as noted in Chapter 5 Ulrich *et al.* (1991) found that a simulated walk in a crowded pedestrianised shopping area led to negative affective outcomes, and arguably these could have been related to the high pedestrian flow. While the experimental phase of this research controlled for congestion levels, the qualitative phase indicates that these might be an important aspect in the affective walking experience (see Chapter 8 for future research recommendations). Finally, the findings on the negative role of tall buildings in the affective walking experience confirm previous research on building height as a negative element for restoration (Lindal and Hartig, 2013). The current research adds to this by explaining that walkers feel over hanged and powerless in front of tall buildings.

6.2.4 Poor aesthetics

The third element that interferes with a positive walking experience is poor aesthetics. Participants reported feelings of discontent and stress when walking in "ugly" or "unpleasant" areas. Talking about her walk to the station, Julia explains that she would prefer not to spend time in one particular street (Figure 6.9):

> *This… it's just horrible, and looks so cheap and old… I wouldn't stand on that side of the road waiting to be picked up (Julia, HW-N-20).*

Figure 6-9: A building that triggers negative feelings

Participants also noted that litter, fly-tipping, overflowing bins, or tagging also make walking unpleasant (Figure 6.10):

> *There are bits of Bristol that I find negative because they are the dirtiest. That is disgusting! There are bits of glass there, so it is something that makes me look on the floor and make sure that I'm not stepping on them (Henry,* HW-N-*18).*

Figure 6-10: Poor aesthetics and lack of care trigger negative emotions

Therefore, poor aesthetics triggers a negative sensory experience which seems to influence affective states and behaviours (see Chapter 7 for the influence of the affective walking experience on walking behaviours). Interestingly, it also emerged that poor aesthetics is often interpreted as perceived lack of care and, thus, can trigger safety

concerns. Talking of the Bearpit[12], Charlotte explained that she did not like the aesthetics of a graffiti because it made her "think of the people who hang out here and did the graffiti":

> *I don't like it because its dark colours, and it makes it quite… not intimidating, but it makes it not a nice place to be, because it makes me think of the people who hang out here and did the graffiti (Charlotte, MW-N-23).*

Similarly, it emerged that also lack of care in abandoned buildings, litter, or illegal tagging made some people concerned and "on the edge" about the "wrong type of people" who may live or hang out in an area (see also Section 6.3.1.3 on sense of community).

Therefore, the current findings provide further empirical support on the link between aesthetic value and affect. In fact, aesthetic value is identified by previous research as one of the pivotal predictors of restoration (e.g., Hartig *et al.*, 2003; Van den Berg, Koole and van der Wulp, 2003). However, most studies have focused on aesthetic perceptions in green or blue settings, rather than in urban contexts. Once exception is Galindo and Hidalgo's 2005 study, which identified categories of attractive and unattractive places in the urban realm with the aim of exploring the relationship between preferences, aesthetic perception and restoration. They found that the favourite places were considered more aesthetic and more restorative, thus confirming the correlation between aesthetic value and restoration. In addition to these ideas, the current research adds that one element that explains the link between poor aesthetics and low restoration is perceived safety, as poor aesthetics can trigger safety concerns. Gatersleben and Andrews already noted that perceived safety is an element that can affect preferences for natural environments (Andrews and Gatersleben, 2010) and prevent restoration in green spaces (Gatersleben and Andrews, 2013). Their research attested that exposure to natural environments with open prospects and low levels of refuge can be scary and intimidating, rather than restorative. The current qualitative findings highlight that these ideas are likely to apply to urban contexts too, with safety concerns preventing cognitive and affective restoration to take place.

[12] The Bearpit is a public space under the St. James Barton Roundabout, Bristol (UK). It is a large, sunken open space area underneath the roadway linked to street-level pedestrian facilities via four interlinked tunnels (Buser, 2017).

6.3 Enablers of the Positive Affective Walking Experience

This section illustrates the enablers of the positive affective walking experience. These include 'connection with place' and 'presence of nature'.

6.3.1 Connection with place

The theme 'Connection with place' refers to the connection that individuals establish with place. While some environments might aid a positive walking experience but remain anonymous, some places communicate a narrative to individuals and enable a bond between the individual and place (see Gatrell, 2013). It emerged from the interviews that unusual and interesting element of the physical surroundings are focussed upon:

> *When you are walking, you want to start thinking, so the walk goes quicker, at least I prefer that, so I like to have stuff to think about. And it will often be just little things that I notice and I'll focus of them for quite a while […]. And because you are walking and you don't have much else to look at, the things you are looking at are really important, I mean, they take up a lot of the walk (Steve, MW-U-24).*

As Steve said, "the things you are looking at are really important" and "take up a lot of the walk". With this regard, as noted by Sarah (Section 6.2.1), some elements of place "make you stay in touch with the environment". In other words, some places have the power to communicate their own history, to tell a narrative and to encourage people imagine scenarios or stories. The narrative offered by some places can provoke vivid imagination in individuals, and enables a connection with place. The 'story' can be related to the environment's identity and history, but also to individuals' own lives, habits, and memories. As the following sections will outline, the interviews highlighted that such connection with place triggers interest, curiosity and engagement, thus explaining the positive affective experiences in terms of hedonic tone in certain settings. Such connection can be related to personal memories and associations (Section 6.3.1.1), to Bristol's history and identity (Section 6.3.1.2), and to Bristol's community (Section 6.3.1.3). The ways in which these elements influence the affective walking experience according to the findings of the current study are illustrated below.

6.3.1.1 Personal connection

This theme refers to personal memories and habits related to place, and those elements that remind of 'home', or references to personal life such as friends and favourite things. These aspects were not measured in the survey, but emerged during the interviews as elements that offer a positive distraction and trigger positive affect. First, it emerged that memories related to specific elements of the urban realm make places more familiar, which in turn can make participants feel more comfortable. For example, talking about the buildings in Corn Street (PedHist), James explained that walking in that area made him feel at home:

> *I used to work there… I registered my kids there, you've got some connections! So I feel quite connected to this. I feel at home, when I walk down here (James, MW-U-37).*

Even a street name or a graffiti can make people feel more connected with place and trigger positive affect and relaxation. For instance, Rachel, 34, noted that reading the word "goddamn" in a piece of graffiti made her laugh because it reminded her of the book 'The Catcher in the Rye', where the protagonist "says 'goddamit' all the time" (Figure 6.11). Arguably, these elements trigger fascination. In fact, according to Hartig *et al.*, fascination is "an effortless attention that can be triggered by objects and events" (1996, p. 379). In this sense, familiar objects or places offer a positive distraction during walking.

Figure 6-11: Graffiti triggers a personal association

Even imagined scenarios related to the future, rather than the past, can make place more familiar and be fascinating. Talking about Bristol Cathedral, adjacent to College Green (PedMixed), where the UWE-Bristol university graduation ceremonies take place, 18-year-old UWE-Bristol student Henry explained (Figure 6.12):

> *I think that's where the graduation ceremonies take place! So it's good you know… to imagine that moment (Henry,* HW-N-*18).*

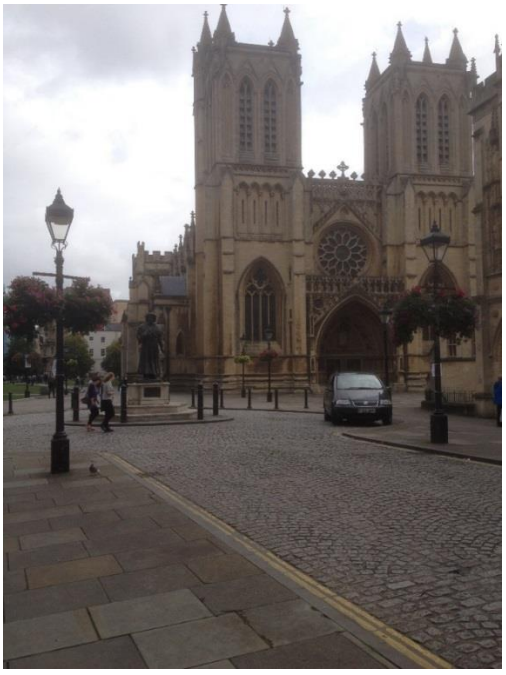


Figure 6-12: Physical places trigger excitement related to future events

Second, for those individuals whose birthplace is not Bristol, finding socio-cultural references to their own place of birth or country of origin triggers imagination and positive affect. For example Layla, a student originally from the Middle East, noted that a falafel shop reminded her of 'home' (Figure 6.13). This engendered a connection with place, which in turn triggered positive feelings:

> *This falafel shop made me happy. And there's also Asian shops, or Middle Eastern shops, I noticed them, where they have products that they sell here and in Egypt, so it makes me feel more at home. It makes me happy (Layla, HW-U-18).*

Figure 6-13: A falafel shop that reminds participant of home

References to 'back home' seem to trigger feelings of *being away*: by remembering objects, people, and places from someone's country or city of origin offers involuntary attention, which in turn engages positive affect. Memories of 'back home' also influence preferences. For example, Charlotte has a preference for old architectures because they remind her of her town, and she also feels "safer and cleaner". Similarly, talking of College Green (PedMixed), Mark confirmed that seeing elements of the urban environment that remind of individuals' birthplace can have a positive impact on the affective walking experience, and can trigger curiosity, interest, and happiness:

This is a beautiful area, especially with the church here and all the greenery around. It is absolutely beautiful. It reminds me a lot of home actually. Especially because of the church and the architecture of that, which looks like one that is close to my house. So it reminds me of home a lot. It is quite nice to see it. Whenever I walk past here, I smile. Because it reminds me of home. I always slow down, and go around it, instead of along it… it makes me happy. It is a nice area (Mark, MW-N-22).

Third, routine – e.g., even taking the same routes or visiting the same places everyday – can make places more familiar and, in turn, home-like. Grace explained that seeing the same shops and people every day is more engaging than seeing the sights of Bristol (Figure 6.14):

There is a ballerina shop there, lovely, and when you walk past, you always see the mums with their daughters, dressed as ballerinas, and it is lovely. […] This is a barber, and she does clothes alterations you know, and she looks exactly like this cartoon on the window! She has got beautiful red hair, very fifties style, you could stare at the window all day!

Interviewer: Do you know her personally?

No, I don't, but I could recognise her because she is working on her sewing machine every day (Grace, MW-N-50).

Figure 6-14: Becoming familiar with people and places forming part of the everyday commute

The current findings echo the geographical idea of place theorised by Tuan (1976) and Relph (1976). By prompting memories, home nostalgia, and routine, place becomes a "centre of meaning" (Tuan, 1976, p. 141) rich of personal value. Walking seems produces a "sense of mobile place" (Edensor, 2000) which is also enabled by the speed of walking, which supports attachment and positive affect. In addition, in environmental psychology Russell claimed that affective experiences are influenced by personal experiences (Russell and Lanius, 1984) and "real, imagined, remembered, or anticipated […] objects, events, and places" (Russell, 2003, p. 149). These claims have received limited empirical application, and the current research has provided empirical support.

In restorativeness research, a limited number of scholars have also looked empirically at the role of place memory and place attachment in restorative processes. It was suggested that place attachment and positive place memories are drivers of restoration (Ratcliffe and Korpela, 2017; Ratcliffe and Korpela, 2016; Spartz and Shaw, 2011). As Ratcliffe and Korpela put it, places can prompt memories of experiences that happened in situ, thus becoming familiar and comforting (2016). These ideas were confirmed by the current study; the current findings confirm that memories and place attachment related to natural and built environments contribute to cognitive recovery (Ratcliffe and Korpela, 2016). Through memories, place becomes meaningful, and ultimately a bond

between people and places develops. The current qualitative study confirms that memories and daily habits can make places more familiar and, in turn, support positive feelings and cognitive distraction.

In addition, personal associations seem to influence outcomes of nature restoration (see also Section 6.3.2). In fact, some Bristol-based but non-native participants explained that Bristol can feel claustrophobic because they are used to a quieter and greener environment. Talking of the Horsefair (CommTraf), Henry, noted that he did not like the area:

> *Interviewer: What's wrong with the area?*
>
> *Just no fields, no trees, no nature, lots of people, noise, and like just busyness and traffic… just stresses me out. It feels more... not in prison, but kinda close, in the city centre. While here [*e.g.*, on campus] you can do what you like (Henry,* HW-N-*18).*

Other interviewees described feelings of nostalgia towards nature, reporting that they miss "trees", "seeing the stars and the moon", but also nature-related items such as boats. When Charlotte was shown the video of Castle Park (Park), she said that it is her favourite setting among the five experimental settings, also because it reminds her of home:

> *The river is so nice. So relaxing… Reminds a bit of Devon, the countryside, I'm quite a countryside girl (Charlotte,* MW-N-*23).*

Hence, the current findings indicate that previous experiences of environments influence affective experiences, thus confirming Russell's ideas of adaptational affect (Russell and Lanius, 1984). The influence of place identity on the affective walking experience can also contribute to explain some of the differences detected between the student and employee samples within the experimental phase of research (see Chapter 5). Within the experimental design, students reported higher stress recovery in the park than employees, became more stressed in CommTraf than employees, and had a larger increase in hedonic tone in PedHist than employees. However, the quantitative analysis did not explain these findings, and questions remained on whether age, familiarity, and residential location played a role. The interview phase seems to indicate that personal associations with nature influenced affective experiences of walking among students.

Previous research has suggested that childhood landscapes shape individual preferences (Adevi and Grahn, 2012), and the current findings seem to confirm this idea. Previous research has also argued that nature connectedness can influence restorative experiences in nature. Mayer *et al.* (2009) have investigated the reasons why nature produces beneficial effects using mediational analysis, and concluded that the positive effects of exposure to nature are partially mediated by increases in connectedness to nature. Ratcliffe and Korpela (2017; 2016) also found that restoration is predicted by place identity, defined as the extent to which a place is considered to be part of oneself.

6.3.1.2 Connection with Bristol's identity

A second theme within 'Connection with place' is 'Connection with Bristol's identity'. While Section 6.3.1.1 illustrated how personal associations can influence the affective walking experience, this section turns to associations related to Bristol's history (Section 6.3.1.2.1) and contemporary culture (Sections 6.3.1.2.2 and 6.3.1.2.3). These three sub-themes are discussed below.

6.3.1.2.1 Sense of history

The interviews revealed that the restorative effect of cultural significance is related to the fact that, in some places, individuals can "feel history":

> *When you read from papers is different… when you're in the ground, in the field, I always feel in this land that there are other people who walked before me, and it's such a different feeling, I think it gives you more than just reading history books, or watching a movie. It is very interesting to 'feel the ground', in my opinion. That's a very different feeling, 'cause you can't really feel it… the past, history is not just for the books (Eran, MW-U-41).*

It emerged from the interviews that sensing history 1) enabled fascination and being away, 2) triggered sense of safety and comfort, and 3) stimulated pride and sense of belonging. These three areas are explored below.

First, the interviews highlighted that sense of history offers a distraction which triggers feelings of fascination and being away (e.g., ART framework, Kaplan and Kaplan, 1989). Participants explained that seeing old buildings and historic artefacts during walking "gave interest and beauty" to the journey, and provided something to notice and to

think about during walking. Talking about an old buoy that he photographed (Figure 6.15), James explained:

> *I think where it comes from, and the history behind it, I find it interesting […], I quite like history, so I was like 'that's an old buoy', I like it. It's good, sort of intriguing, isn't it. Because you know sometimes you're in a place and there's not much that marks out that place from another place, so it is good to know… sort of the identity of your place (James, MW-U-37).*

Figure 6-15: Historic elements are symbols of the identity of Bristol

This feeling offers fascination and provides a distraction from everyday routines (being away). It emerged from the analysis that such narrative, which can be triggered by an old building, a historic artefact such as industrial cranes or an old buoy, triggers imagination and offers a distraction due to the particular story that individuals imagine in relation to historic elements.

In particular, it is especially the details of older architectures, compared to brutalist and modern styles that seemed to trigger imagination, curiosity and fascination in participants. In some cases, participants felt awestruck by the details and eminence of historic elements (Figure 6.16):

> *I love this building, it's the way it's like, almost like a triangle like a curve at the end, and I think it is so interesting! And also like the patterns of the bricks, it's not just plain, it gives you something to look at, and I do find it really*

appealing. And the windows have cute little grape things across them, and I really like that. But I don't know, I haven't seen many buildings with that curvy shape. And when you compare it to the big square tower that Bristol has, it's so different (Julia, HW-N-20).

Figure 6-16: An old building triggers imagination and curiosity

In addition, the distraction offered by the sense of history also produced a feeling of being away. Participants noticed that seeing an old building or an historic artefact made them feel away from everyday routine:

Maybe it is like… escapism… When you see older stuff it takes you to another state of mind, takes you from the present, modern world and distracts you with different, older scenarios that you'd usually... not be used to anymore, so it takes you away from the daily routine that you have (Steve, MW-U- 24).

Other than attention restoration benefits, affective benefits also emerged. According to participants, old buildings offer safety and comfort, and thus a relaxing feel; interviewees stated that they felt "secure", "comforted", and that "nothing bad could happen next to old buildings". Even a detail such as cobbled floor was sufficiently powerful to make Julia feel safer (Figure 6.17):

I feel quite safe especially on this bit especially, because I wouldn't associate cobbled floor with city, rather with villages, or nice, small areas […] and it makes me feel relaxed and safe. Which is silly because it is just the pavement! (Charlotte, MW-N-*23).*

Figure 6-17: Cobbled floor improves safety perceptions

Interviewees also felt particularly engaged by the effort and care that architects and artists put in some of the buildings and elements, and this in turn stimulated pride and sense of belonging. For instance, Sarah felt "inspired" by the effort put to build "old churches" and buildings. Talking about the Harbourside[13], Rachel explained:

I feel that there is history there, I suppose that when I'm walking around I feel proud actually. You know I'm a Bristol person and I think we're quite proud now, in this day and age. The Harbourside to me represents part of the pride of being a Bristolian, and you've got these symbols of the city around, and the harbour itself is a symbol, so I feel proud, when I walk around (Rachel, HW-N-34).

[13] The Harbourside is a redevelopment of the former historic docks of Bristol, and nowadays offers a traffic-free promenade around the 80 acres of tidal river, with a mix of historic boats, restaurants, green areas, and residential complexes (Bristol City Council, 2009).

Hence, the preference for old elements can also partially explain why online survey respondents rated PedHist relatively better than PedMod (Chapter 5). This seems to have to do with the character of Corn Street (PedHist), contrasted with Millennium Promenade, which is "nice but very standard compared to other cities that you can visit", while historic areas like the Bristol Harbourside or Clifton Suspension Bridge "have a unique element of Bristol, something that is emblematic of the city". Sarah also put this idea into words, explaining that, sometimes, character is more important than functionality:

> *Bristol is a mix of styles and elements. It is not like walking in new towns like Milton Keynes, where everything is of necessity. In Bristol it may get uncomfortable to have cobbled stones, or uneven pavements. But it is more interesting (Sarah,* HW-U-*53).*

These findings support and integrate the existing literature on historic elements and affective and restorative outcomes. In fact, previous research has already found that historic settings might offer *soft fascination* and feelings of *being away* (Fornara, 2011; Roe and Aspinall, 2011; Packer and Bond 2010). For example, Roe and Aspinall (2011) found that a walk in Stirling city centre was restorative for a poor mental health group, and speculated that the restorative effect could be attributed to the historic character of the city of Stirling. Also, in her study on the restorative potential of visiting a museum, Packer (2013) reported that visitors described the feeling of entering in a "completely different world" and of switching off (2013, p. 232). However, the restorative potential of historic settings hasn'*t* been unpacked yet by scholars, and the processes behind these effects seem to remain unclear. The current findings reveal that such a positive effect on wellbeing is related to the narrative offered by some historic elements. Such a story offers a positive distraction, but can also support perceived safety and sense of belonging. As noted in the previous chapter, in the fields of urban planning and heritage studies, scholars tend to agree on the notion that historic places offer an engaging and symbolic narrative (Smith, 2006; Hayden, 1997; Lynch, 1981). Researchers also attested that the narrative typical of historic areas or elements can enhance the enjoyment of place (Sussman and Hollander, 2014; Lynch, 1981). The current research provides empirical support to these ideas and reveals that such a narrative can also lead to affective benefits.

What is more, the current findings have highlighted the importance of the materiality of place (in Eran's words, "feeling the ground"), which makes the experience multisensorial, evocative, and imaginative. Similarly, according to Cresswell "experiencing place is different from reading about past in a book or as displayed in a painting" (2014, p. 120). Such a materiality can offer a positive distraction, sense of safety, and sense of belonging. In addition, it is noted that such intriguing effect is different from the soft, passive fascination provided by natural settings (Kaplan and Kaplan, 1989), as it also includes active engagement, interest and curiosity.

6.3.1.2.2 Street art

The role of street art also emerged from the qualitative data, and presents some similarities with the role of sense of history. On one hand, street art offered a source of distraction, similarly to the one triggered by historic elements. On the other hand, street art is something that made participants proud and attached to Bristol. These points are discussed below.

First, it emerged that graffiti can represent "something nice to look at" during walking, because some of them "change all the time" and sometimes they are "big and bold". Talking of a piece of graffiti, some elements of fascination emerged in relation to street art:

> *It also helps with my walk, because I focus on that for quite a bit, and I think a lot about it (Julia, HW-N-20).*

Participants also noted that they felt fascinated by the creativity and efforts that gave origin to graffiti:

> *The creativity of Bristol… This huge street art, which must have taken lot of design, lot of planning... but again, the willingness to do something well, and to the cultural life of the city, I find it quite inspiring, that is still happening (Sarah,* HW-U-*53).*

The quote above also highlights that street art too can stimulate feelings of awe and pride, similarly to sense of history. In fact, street art was perceived by some participants as part of Bristol's culture, which is what made participants so interested and proud of it. Talking of the graffiti in Rupert Street (Figure 6.18), Eran explains:

I like them, because historically Bristol used to be a slavery centre, the Tobacco factory, the Harbour etc. and because of that, it is still nowadays a centre for hip-hop and afro dance. I don't really listen to that music, but I like the artwork, because it makes me think of this history (Eran, MW-U-41).

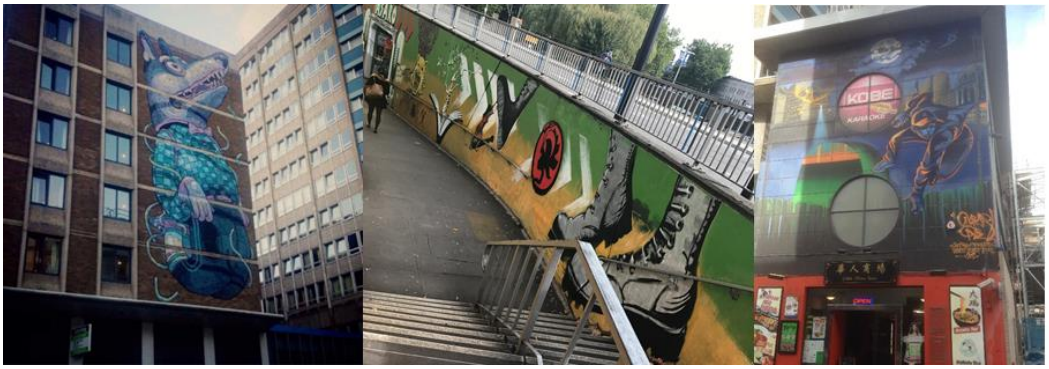


Figure 6-18: Participants' photographs representing interest in street art

Street art is emblematic of Bristol, and participants seemed to be very proud of it. For example, Grace refers to Rupert Street as "the artistic road", and James is proud of Rupert Street, which he suggests "is one the best roads in the world". In fact, many participants noted that the street art is one of the main areas that they show to family and friends visiting Bristol. Participants also noted that street-art presents a crucial community-driven aspect (see also Section 6.3.1.3).

These findings confirm research by Gatersleben and Uzzell (2007) that boredom can represent an important limitation of walking journeys. It emerged that the distraction and interestingness of elements such as street art is crucial during the walking experience and offer a positive contribution. In addition, street art appeared to stimulate sense of belonging and place attachment, which in turn triggered positive affect. This confirmed the important role of place attachment in the affective experience (see Ratcliffe and Korpela, 2016).

6.3.1.2.3 The importance of variety

Finally, the interviews highlighted the importance of variety during the affective walking experience. Variety gives character to place and makes walking more engaging. Variety in architectural styles, nature and built elements turns walking into an urban exploration. When Grace was asked what her favourite aspect of her walk was, she explained that coming across a lot of "different buildings, architectures, and trees, flowers" is something that she particularly enjoys of Bristol. Architectural variety,

including the mix of old and new is a theme that emerged particularly, as it triggers curiosity and enjoyment:

> *What caught my attention was that although the buildings fit together, they don't in a way! […] I really like that. And I think it makes it look quirky, and I think that's why I like it. Because it gives character. Especially with the church in the background, you wouldn't expect them to be together, but they are [laughs]. (Debbie, HW-U-32) (Figure 6.19).*

Figure 6-19: The mix of old and new during the affective walking experience

James also explained why variety is important for cognition:

> *Variety is quite important, otherwise it just feels a bit… I don't know, maybe that's the way you think as well, if you see things that look a bit different, they make your mind sort of travel a bit, whereas if you think things are just the same, you sort…your brain takes on shortcuts and everything is the same (James, MW-U-37).*

Hence, variety is stimulating and can expand thoughts and reflection, while monotony can limit creativity and thoughts. In line with it, many participants found housing estates "rough", "ugly", and "boring" because "every house looks the same" and "there is nothing to look at". In fact, some participants noted that walking around modern

buildings like Millennium Promenade feels like being “in a plastic box” where “nothing is natural” and feels “monochrome”, even if “is all very nicely done”. Some people stated that the modern built environment of Bristol can be “bland”, “basic”, and “uniform” sometimes, “not that interesting”, as “everything looks built for purpose”. While variety is stimulating, participants felt that the lack of variety is boring and uninspiring. Participants felt that in Millennium Promenade they were not stimulated to “think what they are or how they are built”, as the buildings are strongly unimaginative for many. Variety also includes details, “nooks and crannies”, hidden views, and “the unusual”, which also make walking more engaging (Figure 6.20). For example, Eran explained that he got intrigued by some carved shapes in an old building, which he found nice and interesting. He explained that walking is a travel mode which allows paying attention to details, differently from cycling. This way, walking becomes an exploration, and noticing new details becomes almost an adventure.

Figure 6-20: Walking makes individuals discover "Nooks and crannies"

In addition, it is also the quirky and the humour that catches people’s attention and triggers curiosity and imagination. Charlotte became amused by humorous elements that she saw as pieces of art (Figure 6.21):

> *This ‘fun lane’, that thing just made me laugh, just quirky little things like that, like this fun lane, and when you’re walking in the city centre there’s always*

quite a bit of graffiti and stuff, and arts on the floor, and I really like that […] This one... There seems to be quite a lot of humour around Bristol […] (Charlotte, MW-N-*23).*

Figure 6-21: Humour around Bristol

With this regard, the mobilities literature described a strength of walking being the way it offers the chance to "capture particularly treasured views unobtainable by other modes of transport" (Edensor 2000, p .85). Because of its slow and irregular pace, walking allows pedestrians to be more sensitive to their surroundings and to experience their five senses (Edensor, 2000). Similarly, according to Baugh (2010, quoted in Gatrell, 2013, p. 203) walkers enter into "intimate proximity with the streets, an intimacy which is multisensorial, as walkers feel the air, the smells, and the noises.

Additionally, environmental psychologists attested that architectural variety supports restoration. Lindal and Hartig (2013) examined how specific architectural characteristics of urban residential settings might be related to restoration, and concluded that architectural variation is positively associated with cognitive restoration. In line with Lindal and Hartig's (2013) findings, the interviews revealed that detailed architecture stimulate interest and offer a soft distraction, while the lack of details leads to negative feelings.

6.3.1.3 Connection with community (sense of belonging)

It emerged that, during walking, individuals pay a lot of attention to what other people are doing. Notwithstanding the discussion of Section 6.2.3, which considered how crowds of people can have negative effects on the restorative walking experience, it can also be the case that when a sense of community permeates the physical environment walking becomes engaging and pleasant. Sense of community can be embodied in a high presence of pedestrians on the streets, and can pervade the physical environment through tangible elements such as shop windows or art installations. It emerged that when individuals perceive traces of other people's care and involvement, they feel more connected with the environment.

The presence of litter and tags was one of the main factors that negatively influenced the affective walking experience (Section 6.2.4). Conversely, walking in areas where windows, buildings and streets are well taken care of makes individuals feel more comfortable and enables a connection with the environment. Rachel explained that she perceives a strong difference when she walks in areas with a strong sense of community as opposed to areas with a "lack of care":

> *This is when my change of the walk, goes from being nice to being not so nice. You just notice the change, you can feel it in the houses, in the general sense... lack of community really. When I'm walking in Lockleaze, the thing that I notice the most is that there's this lack of care, and people just throw things. I never felt uncomfortable, I never had a bad experience, I don't think it's dodgy or anything, but it's this general ambience of not having pride in your area (Rachel, HW-N-34).*

She went on explaining that seeing a well-kept garden with sunflowers makes her smile because she could see the 'effort' put in by members of the community and "the pride put in their house" (Figure 6.22):

> *It's the second year that they've done it, ok it's not to my taste sometimes, but they have… cared, and there are a few houses that are a bit tacky in my eyes… But you know you've made an effort, so that's what matters (Rachel, HW-N-34).*

Figure 6-22: A well-kept garden triggers sense of community

Thus, experiencing a sense of community is independent of a particular aesthetic value, and visual beauty is not the only predictor of a positive walking experience. Similarly, Grace reported that walking in Cotham Hill, which "feels like a community of its own", is her favourite part of her commute to work, while a high-street shop such as Sainsbury's, which is not part of a community, "is not the same":

> *The shops are just lovely, they are looked after, and the whole street is lovely. You have the charity shops, and then some vintage/fancy shops on the other side, and then a hardware shop that has been there for ages, and has some old and new bits. It feels like a community all of its own. And then you see a Sainsbury's, and you know, not the same thing. I prefer independent shops (Grace, MW-N-50).*

Similarly, seeing people socialising, doing sports, or generally in a good mood, improved participants' affect. Talking of her walk through St Werburghs, Michelle explained that seeing people enjoying themselves improves her affective state (Figure 6.23):

> *There is always people around, stuff happening. Shops, cafes… It feels that people are happy there and relaxed, it is not like the stressful shopping area. People are just chilling, people aren't rushing. Just more like looking at people enjoying themselves, it is like… wow! Walking there is kind of engaging. It feels like people made an alive system, it feels like their environment, it is a nice dynamic (Michelle, 25).*

Figure 6-23: Spaces to socialise contribute to a positive affective walking experience

In addition, in some cases the presence of other people socialising, drinking coffee, or busking can improve perceptions of a physical setting. For example, when Charlotte walked through the Bearpit – an area that she generally labels as unsafe and edgy – she felt comforted by the presence of people drinking coffee, skating, and chatting (Figure 6.24):

> *There is such a big mix of people in the Bearpit. I was standing there watching people and there were people having lunch break from work, there were families, teenagers, and I thought that I really like the fact that everyone comes together, it is like a small community, as weird as it is [laughs]. And I think it is strange how in an area that I feel quite unsafe, there are parts that are very nice, where people feel comfortable to sit down and drink coffee. I don't know, it is like knowing that people around me are ok people and they are socialising (Charlotte,* MW-N-*23).*

Figure 6-24: Presence of people improves safety perceptions in the Bearpit

The importance of having a "mix of different people" heavily emerged especially with reference to College Green (PedMixed). Several interviewees noted that in College Green different types of people ("working people, but also skateboarders... It is a nice contrast!") co-habit the space in a harmonious way. In addition, it emerged from the interviews that when people play music or perform in public spaces, environments become more enjoyable. Rachel reported that she does not like to walk in the Horsefair (CommTraf) or Broadmead because "there is no colour, no character". However, music performances and art installations can make these environments more interesting:

> *People have started to do busking, and they started to do performances there, I wouldn't go there to see those performances, but god it's good to have that there to keep the spirit! Because… when the Gromits have been there, and Shaun the Sheep[14], that has made it fun (Debbie, HW-U-32).*

In walking-related research, there is a well-developed literature on the effects of perceived sense of community on walking experience and walking habits (Wood, Frank

[14] The Gromits and Shaun the Sheep are animations produced by the Bristol-based studios Aardman Animations. A Gromit public charity art trail with 80 giant artist-decorated fibreglass sculptures of Gromit was displayed on the streets of Bristol and the surrounding area in summer 2013. Similarly, a Shaun the Sheep art trail was displayed in Bristol in summer 2015.

and Giles-Corti, 2010; Lund, 2003; Lund, 2002). In 2010, Wood stated that sense of community was positively associated with leisurely walking, even if the direction of causality is not clear. The current findings showed that sense of community can make walking more pleasurable (see Chapter 7 for the influence on walking behaviours). However, in restorativeness and affective walking research there does not appear to be evidence on the role of sense of community on the affective and restorative walking experience (see Chapter 8, Section 8.5 for future research recommendations).

6.3.2 Urban nature is restorative

Natural elements and areas in the urban realm emerged as key factors that support the affective walking experience. It is the calmness and quietness of blue and green nature that particularly contribute to positive feelings, especially to stress recovery. For example, the Harbourside was one of the favourite areas where participants reported they enjoyed walking, thanks to the fact that the water is "relaxing", "stable", and "quieter" (Figure 6.25):

> *I really like being next to water, it is a nice feeling. It's more relaxing… when you're there, there's nothing that makes you worried. Water is stable, quieter, when you see water is relaxing, not rushing, while on the road people are hurrying (Eran, MW-U-41).*

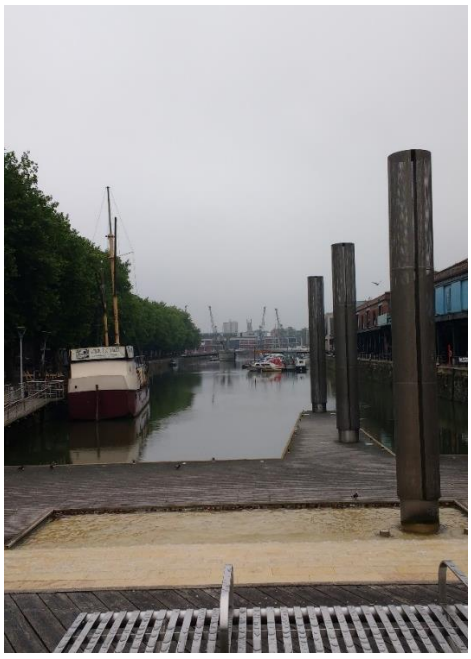


Figure 6-25: The stillness and quietness of water

Similarly, walking in parks is also relaxing:

> *It is much calmer, and I can actually think, or not think actually. I free my mind basically (Layla, HW-U-18).*

And:

> *I take like a… nature trail, there I walk slower, it is very quiet and there are not many people. I walk slower because it is quiet, and the air is like clean, so it is a nice place to be, so I walk slow, not fast like in the city centre (Rachel, HW-N-34).*

The openness of natural spaces, and the feeling of "being outside", "in open air", opposed to the claustrophobic feel of built settings, is another important feature:

> *I walked to Cabot Tower, and again, it was this sort of 'aaah… breathing space again', quite a large, green space (James, MW-U-37).*

This feeling was described as liberating and relaxing, with features of being away and compatibility (Kaplan and Kaplan, 1989) emerging. Specifically, nature emerged as more compatible than urban settings, as it enables freedom, as "you can listen to music and do whatever":

> *It is liberating to get a clear view of the sky, or to be able to see green, or the colours of autumn or seasons, it feels like you're out and you're free (Rachel, HW-N-34).*

In addition, it was also nature details emerging as positive wellbeing elements. Participants noted "the leaves are starting to change", "drew drops on the leaves", "a taste of the sky, when there's a beautiful sunrise, or sunset, or the sun is coming off the clouds and it is not just raining", and "water droplets escaping from the wall". These elements make walking more pleasant and provide feelings of fascination and being away (Figure 6.26):

> *So, I have to walk through St Andrews park, I love that bit of my walk, 'cause you really get a sense of the seasons change. And I've seen this in the depth of winter, and in the peak of summer, just brings me back to reality of the seasons. Whenever I walk in St Andrews I'm like… aware of the season. That's*

why I like it. And there's the old leaves now, so it is like… "Oh! We're getting into autumn!" and I love autumn (Rachel, HW-N-34).

Figure 6-26: Noticing details of nature and the change of seasons

Hence, nature details give the chance to take notice of surroundings and to get a sense of time. Eran also put into words the feeling of sensing time:

I really like big trees, because they've been there for longer time, they grow and again make the history there, they've been there for a very long time. It's so interesting they made that park long time ago, and it's nice that it was made for people to relax and have a good time (Eran, MW-U-41).

In addition, as noted in Section 6.3.1.1, personal experiences and associations have a deep influence on affective and restorative responses to nature. Charlotte, who is originally from an English coastal village, explains that she now misses spending time on the beach, and being away from home made her realise her attachment for nature:

I like to spend time on the beach. We don't have much choice, because there is not much to do, but I do spend most of my time [at the beach], and I really miss it. Now being in the city I had the realisation of what it actually means (Charlotte, MW-N-*23).*

Also, the interviews revealed the importance of safety, solitude, and maintenance in nature restoration. It emerged that when green spaces are crowded, they can lose restorative value. Talking of Castle Park (Park condition), Henry explains:

> *When I was there I didn't like it. 'Cause it was so busy, all people sitting on the grass, so many people, and they were doing drugs, or… circus tricks, so many cyclists, you literally had to look around, 'cause they would run over you. If it was empty, it would be the best place to go for a walk (Henry,* HW-N-*18).*

Some participants described Castle Park as "scruffy", "unsafe", or "abandoned", and some highlighted that it does not feel like "a real park":

> *No matter where you are there, there is always a building around you. You don't really feel immerse in nature. You still know where you are, you can't really escape anything (Debbie, HW-U-32).*

These findings partially explain why the stress recovery in the Park setting was not significant (see Chapter 5), as some participants might have perceived the setting not as a "real park" that offers proper seclusion and solitude, but rather as an unsafe and poorly maintained environment.

Generally, these findings confirm previous ideas on the restorative value of blue urban spaces (e.g., White *et al.*, 2010; Karmanov and Hamel, 2008), and of walking in urban parks (e.g., Van den Berg, Jorgensen and Wilson, 2014). In addition, results also confirmed the role nature connectedness (Mayer *et al.*, 2009) and place attachment (Ratcliffe and Korpela, 2016) in the restorative experience of nature. Finally, the current findings highlighted the importance of safety for restoration to take place, thus confirming previous ideas (Gatersleben and Andrews, 2013).

6.4 Chapter Summary

This chapter has presented the set of qualitative results, from Phase 2 of the data collection, that involved photo-elicited interviews based on actual walks (including filming and/or photographing whilst walking) within Bristol. The main aim was to address RQ2: *What are the barriers and enablers of a positive affective walking experience in city centre environments?* This body of findings further explored results from the experimental phase of research (Phase 1, Chapter 5). Specifically, the interviews conducted after walking within urban settings applied ideas around the affective walking experience to a real-world scenario through the discussion of

participants' real-life experiences. In this way, it was possible to interpret and explore in more detail the quantitative results on the role of motor traffic, historic character and, partially, the different ways students and employees experienced restoration. The previous Chapter 5 highlighted that, within the experimental design, students reported higher affective benefits in the park setting and in the pedestrianised areas than employees, but became more stressed in CommTraf than employees. However, the quantitative analysis did not fully explain the reasons for these findings, and questions remained on whether age, familiarity, and residential location played a role. The interview phase contributed to explaining these findings. The key findings related to RQ2 are summarised below.

First, the interview phase revealed that urban walking can be restorative *per se*, as it can divert from negative affective states and aid relaxation and distraction. Walking was defined as "a good way to de-stress" and "clear thoughts", findings which confirm previous ideas from the mobilities literature (e.g*.,* Calvert, 2015). However, several barriers which limit the potential for the walking experience to support affect and restoration were identified, and these include motor traffic, city busyness, and poor aesthetics. In relation to motor traffic, it was found that noise and fumes related to motor traffic represent a source of stress, frustration, and cognitive fatigue; a finding which highlights the multisensorial nature of the affective walking experience, and includes not only the visual but also auditory and olfactory dimensions. Also, motor traffic was found to cause interruptions to the walking flow; with uninterrupted flow being a crucial aspect of the wellbeing experience of walking (e.g*.,* Calvert, 2015; Gatrell, 2013; Middleton, 2011). Finally, pedestrians can feel intimidated and threatened by motor traffic, with safety concerns emerging. In addition, further barriers other than motor traffic emerged. Turning to the busyness of the city (e.g*.,* lack of space, heavy auditory and visual stressors), it was found that this limits walkers and causes cognitive loads. Finally, poor aesthetics makes walking unpleasant and raises safety concerns among pedestrians. Together, these results can explain why the simulated walk in CommTraf led to negative affective outcomes, as opposed to the walks in the additional four settings.

Second, it emerged that engagement and connection with place positively contribute to the positive affective walking experience. These ideas mirror Relph (1976) and Tuan's

(1977) conceptualisations of place as the product of personal experiences and involvements (see Chapter 3). It was found that personal associations with physical elements can trigger positive affect, excitement, and curiosity, thus confirming theoretical ideas in restoration (e.g., Ratcliffe and Korpela, 2016) and environmental affect research (Russell and Lanius, 1984) (see Chapter 8 for extensive discussion). In fact, the interviews revealed that some physical elements trigger personal memories and associations, which contribute to comfort and familiarity.

In addition, the interview phase highlighted that experiencing a connection with Bristol's identity contributes to the affective walking experience. It emerged that some elements of the built environment trigger a sense of history in individuals. While Phase 1 highlighted that historic settings seem to support the affective walking experience, the interviews revealed that such positive influence is partially attributed to the sense of history, the sensation of "feeling the ground" experienced by participants in some settings. This contributes to fascination and being away, as sense of history triggers interest and provides a distraction from everyday routines. Some individuals imagine particular stories in relation to historic elements, and use imagination and creativity to think about the past, thus confirming the idea that place is a container of experiences and a centre of meaning (Sussman and Hollander, 2014; Smith, 2006; Hayden, 1997). Historic elements also provide sense of comfort and sense of belonging. Some interviewees felt "secure" and "comforted" in historic areas, and others also felt proud when walking in some areas, as some historic symbols such as the Harbourside "represent part of the pride of being a Bristolian". It also emerged that street art stimulates imagination and pride, as it represents an important aspect of Bristol's contemporary culture. Finally, the importance of connecting with the community also emerged. Social liveliness of streets, in the form of community events and people socialising and drinking coffee in public spaces contribute to hedonic tone, curiosity, and engagement. Also, cleanliness of streets and decorations contribute to sense of safety and sense of community.

Third, findings also partially addressed RQ1 and RQ2 on the differences in the affective outcomes of walking in city centre environments between the student and employee population. In fact, it emerged from the interviews that for some participants nature triggered feelings of nostalgia towards home and positive memories of childhood and

teenage-hood. Specifically, students tended to have deeper positive associations with nature, due to the fact that they were originally from rural or coastal towns, and/or the fact that they spent significantly less time than employees in urban environments. These personal associations seemed to have influenced outcomes of nature restoration.

Theoretical and practical implications, recommendations for future research, and limitations related to the current chapter will be discussed in the final Chapter 8. The next Chapter 7 links the findings above with the concept of walking intentions, thus addressing RQ3. It presents the final set of quantitative and qualitative results, and discusses the relevance of the overall thesis findings for transport-related literatures.

CHAPTER 7

7. THE INFLUENCE OF THE AFFECTIVE WALKING EXPERIENCE ON WALKING INTENTIONS[15]

Chapter 7 Research Questions

RQ3: To what extent does the affective walking experience influence walking intentions within city centre environments?

Chapter Hypotheses

H6: Walking intentions will show statistically significant variation between settings

H7: Walking intentions will be influenced by simulated affective walking experiences (Δstress and Δhedtone)

H8: Walking intentions will be influenced by perceptions of attractiveness and interestingness

Box 7-1: Chapter 7 Research Questions and Hypotheses

7.1 Introduction

Chapter 5 presented findings from the experimental study that explored the affective walking experience through virtual exposure to five urban settings. Key findings were that settings elicit different affective outcomes, with benefits associated with the walks in a park (Park), a pedestrianised mixed part-green-part-built environment (PedMixed), a pedestrianised historic environment (PedHist), and a pedestrianised modern environment (PedMod). Negative effects were associated with the walk in a commercial area with traffic (CommTraf). In addition, Chapter 6 explored with qualitative research

[15] Part of this chapter is based on Bornioli, Parkhurst, and Morgan, 2017 (c) 2018 Taylor & Francis Group, London, UK. Used with permission.

All images in the current chapter were produced by the research participants. Permission to re-use the images was obtained from participants by signature of the consent form.

the elements related to physical settings features and personal characteristics that relate to the affective walking experience. It emerged that motor traffic, city busyness, and lack of aesthetic value have a negative effect on affective variables, and these partially explain the negative affective outcomes related to CommTraf. On the other hand, a connection with place, triggered either by personal experiences, Bristol's identity, and sense of community, together with the presence of nature, positively contribute to affect during walking.

Building on the above findings, the aim of the current chapter is to explore whether the affective walking experience influences walking intentions, and in doing so addressed the last research question (RQ3) of the PhD: 'to what extent does the affective walking experience influence walking intentions within city centre environments?' A mix of quantitative and qualitative research was employed to address RQ3. Specifically, the online experiment included one question on walking intentions measured on a 5-point Likert scale ('*If this environment was on the way to your workplace/study place, would you be more willing to walk to work/university*?' – see Section 4.4.4 within Chapter 4 for a reminder). ANOVA was employed to explore the relationship between walking intentions and setting conditions (PedHist, PedMod, PedMixed, CommTraf, Park), thus addressing Hypothesis 6. Regression analysis was used to explore the relationship between *walking intentions* (DV) and a series of independent variables: affective variables related to the walking experience *(Δstress* and *Δhedtone*), environmental perceptions (*attractiveness* and *interestingness* scales), walking habits (the two dummy variables: *walks to work*, e.g.*,* participants who walk to work/place of study, and *heavy walkers*, e.g.*,* participants who walk for 30 minutes at least 4 days a week), *age* (continuous variable) and the dummy variable *female* (comparison group = male), hence addressing Hypotheses 7 and 8. While the quantitative analysis assessed causal relationships between walking intentions and the remaining variables, the qualitative study – photo and video-elicited interviews – explored in more detail the mechanisms behind walking intentions.

Results from the quantitative analysis are illustrated in Section 7.2, together with selected qualitative data. Section 7.3 draws together these results along with the qualitative data collection phase of the research and discusses them in relation to the literature. A summary is presented in Section 7.4.

7.2 Results

7.2.1 Descriptive statistics: walking intentions

Descriptive statistical analysis of the variable *walking intentions* showed that PedHist, PedMod, PedMixed, and Park were associated with positive walking intentions, while CommTraf was associated with low walking intentions (Table 7.1).

Table 7-1: Walking Intentions (5-point scale)

Setting	N	M	SD
CommTraf	76	2.55	1.01
PedHist	70	3.41	1.09
PedMod	73	3.43	.98
PedMixed	75	3.88	.95
Park	73	3.98	.95

Draws from Bornioli, Parkhurst, and Morgan, 2017a. (c) 2018 Taylor & Francis Group, London, UK. Used with permission.

A one-way ANOVA was conducted to test for possible statistically significant differences between settings. Before running the ANOVA, assumptions of normality and homogeneity of variance were tested. First, the Shapiro-Wilk Test indicated that walking intentions was not normally distributed. As illustrated in Chapter 5, one-way ANOVAs are generally "robust" to violations of normality when sample sizes are large (e.g., degrees of freedom > 40) and when group sizes are equal or close to equal (Field, 2009, p. 359), hence it was decided to proceed with the ANOVA. Second, assumptions of homogeneity of variances were met (Levene's test, $p = .121$).

The one-way ANOVA identified a significant main effect with a large effect size of setting, $F(4, 262) = 21.587$, $p = .000$, $\eta_p^2 = .210$. Post hoc analyses using the Scheffe post hoc criterion for significance indicated that walking intentions in the Park setting were significantly higher than in CommTraf ($p = .000$), PedHist ($p = .009$), and PedMod ($p = .014$), but not different from PedMixed. In addition, walking intentions in CommTraf were significantly lower than in PedHist ($p = .002$), PedMod ($p = .000$), PedMixed ($p = .000$) and Park ($p = .000$). These between-groups differences are illustrated in Figure 7.1.

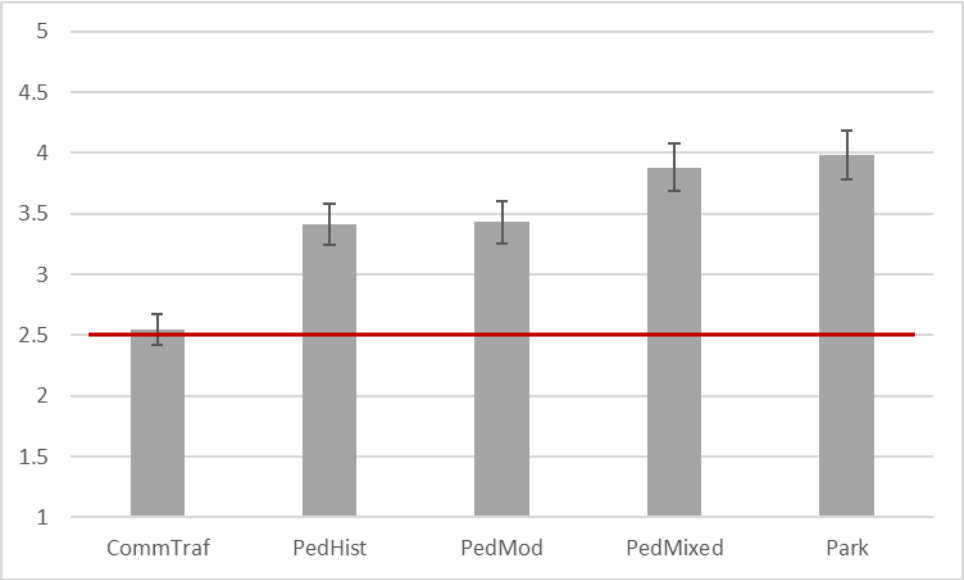


Figure 7-1: Walking intentions per setting. Minimum = 1; maximum = 5; midpoint = 2.5.

The interview phase highlighted that the two settings with greenery (PedMixed and Park) were favoured, and the presence of green and blue emerged as a crucial element in shaping participants' perceptions. Discussing the walk in the park, Charlotte notes that this is her favourite setting among the five areas to go for a walk.

> *It is so relaxing… that would be probably my favourite place of all to walk, more green, more secluded. Nicer to walk through, definitely (Charlotte, MW-N-23.)*

With reference to the pedestrianised mixed green and built area (PedMixed), the presence of natural elements was not the only feature that emerged: the sense of history, the level of upkeep, and perceived safety were also identified as very important:

> *I would spend my day here. I would happily go throughout, and actually go there and walk around it. You've got the cathedral which is so pretty and once again it is the thing about history, you've got the grass, is well kept, and the floor is clean, nice, everything is just very pleasant. And it feels prestigious because of how everything is well kept. And I could imagine teenagers hanging out or doing drugs, but I wouldn't be worried at all (Julia,* HW-N-*20).*

The interviews also highlighted that motor traffic is one aspect that marks the difference in perceptions and, as a consequence, in walking intentions. Comparing the commercial area with traffic with a parallel, pedestrianised street in the same area of Broadmead,

Charlotte explains that she would choose to walk in the area without traffic, as it feels quieter:

> *I would rather walk here, that in the Horsefair [*e.g.*, CommTraf], it feels a bit…less manic. It feels less busy, I quite like it. I prefer to have shops on both sides, than have the road in the middle, I like that there's no road there. Crossing over is a nightmare, buses and stuff. It feels less manic, more quiet (Charlotte, MW-N-23)*

The general busyness of the commercial area with traffic, with big buildings, a multitude of shops, and people, is a further element that deters participants from walking:

> *Yeah, I don't like walking in this bit. Primark is so big, good for shopping, but too big. It's food places everywhere… I'd definitely prefer to walk in the first two [*e.g.*, PedHist and PedMod], here there's loads of people everywhere (Mark, MW-N-22)*

The importance of maintenance, cleanliness, and safety also emerges in the discussion around the pedestrianised modern environment. When Sarah was asked if she likes to walk in PedMod, she explained:

> *It is clean, there is no litter. That makes it enjoyable to walk through. It is important. It looks nice, it may not be as interesting… but it looks taken care of, and safe. Safety is important (Sarah, HW-U-53)*

The quote above also highlights the importance of interestingness. In line with Sarah's point, Mark explains that he likes PedHist because it has got 'character':

> *It's lovely, it's the complete opposite [of PedMod], but it's got character, the buildings, history. For walking and meeting purposes I prefer Corn Street [*e.g.*, PedHist] than the city centre [*e.g.*, CommTraf] (Mark, MW-N-22)*

Similarly, according to Henry PedHist is both visually pleasant and 'different' from the rest of the city:

> *It is such a nice place to see visually. Around Bristol it is so grey, then you get to see these different types of buildings, which you don't get to see often. Especially the cobbled street. It is fun to walk in! (Henry, HW-N-18).*

7.2.2 Multiple regression analysis

Multiple linear regression analysis was carried out to explore the association between *walking intentions* and a series of independent variables: affective appraisals, environmental perceptions, walking habits, and socio-demographics. The aim was to test H6 (walking intentions will show statistically significant variation between settings) and H7 (walking intentions are influenced by affective walking experiences - Δstress and Δhedtone). No specific hypothesis was formulated regarding the effect of socio-demographics and walking habits on walking intentions.

The correlation matrix provided in Appendix 11 displays relationships between walking intentions and its potential predictors. Walking intentions was significantly correlated with attractiveness ($p < .001$), interestingness ($p < .001$), Δstress ($p < .001$), and Δhedtone ($p < .001$), but not with walking habits, mode to work, age, and gender. All correlation coefficients were found to be below .8, hence multicollinearity was excluded (Field, 2009).

Two multiple regression models were computed. In the first model, environmental perceptions, walking habits, and socio-demographics were included as potential predictors. In the second model, affective variables were also included. The first model assessed whether walking intentions were influenced by attractiveness, interestingness, walking habits, and socio-demographics (Model 1, Table 7.2). The model was significant, $F(6, 351) = 22.109$, $MSE = 132.651$, $p = .000$, $R^2_{adj} = .298$, with attractiveness ($p = .000$) and interestingness ($p = .000$) being significant predictors of walking intention. Age, gender, walking mode to work, and walking levels were not significant.

Table 7-2: Model 1: Walking intentions[16]

	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
	B	Std. Error	Beta		
(Constant)	1.012	.281		3.599	.000
Attractiveness	.295	.077	.282	3.827	.000
Interestingness	.364	.084	.314	4.332	.000
Age	.004	.004	.055	1.200	.231
Female[1]	-.164	.112	-.067	-1.462	.145
Walks to work[2]	.132	.101	.060	1.316	.189
Heavy walker[3]	.208	.134	.071	1.552	.122

Comparison groups:
1 = Male
2 = Other modes (cycling, public transit, car)
3 = Non-walker (e.g., walks less than 4 days a week)

In the second multiple regression model, affective variables were included (Model 2, Table 7.3). The model was significant, $F(8,206) = 11.113$, $MSE = 88.906$, $p = .000$, $R^2_{adj} = .350$, thus with a higher fit compared to Model 1. The variable *walking intentions* was influenced by Δstress, Δhedtone, and interestingness, with attractiveness no longer identified as significant. Walking habits and socio-demographics were also not significant.

[16] Strictly, an ordinal model should be used when the dependent variable takes the form of ordered categories. Hence the results should be treated as indicative.

Table 7-3: Model 2: Walking intentions with affective experiences[17]

Model	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
	B	Std. Error	Beta		
(Constant)	1.633	.382		4.276	.000
Δstress	-.061	.025	-.172	-2.407	.017
Δhedtone	.070	.031	.171	2.254	.025
Interestingness	.267	.109	.229	2.441	.016
Attractiveness	.195	.103	.185	1.894	.060
Age	.003	.005	.043	.711	.478
Female[1]	-.061	.146	-.025	-.421	.675
Walks to work[2]	.112	.123	.052	.908	.365
Heavy walker[3]	.134	.152	.051	.883	.378

Comparison groups:

1 = Male

2 = Other modes (cycling, public transit, car)

3 = Non-walker (e.g., walks less than 4 days a week)

When Δstress and Δhedtone were included, attractiveness was not significant, thus indicating a possible mediation by Δstress or Δhedtone. Mediation is taking place when four conditions are satisfied. First, the IV significantly affects the mediator; second, the IV significantly affects the DV in the absence of the mediator; third, the mediator has a significant unique effect on the DV, and fourth, the effect of the IV on the DV shrinks upon the addition of the mediator to the model (Preacher and Hayes, 2004). In order to test whether attractiveness was mediated by Δstress and Δhedtone, the Sobel test was conducted. The test indicated mediation by Δstress, $t = 3.222$, $p = .001$, and by Δhedtone, $t = 6.274$, $p = .000$.

7.3 Discussion

The current set of analysis address RQ3: To what extent does the affective walking experience influence walking intentions within city centre environments? A mix of quantitative and qualitative analysis was employed to answer the research question. The findings have confirmed the experimental hypothesis H6, as different settings elicited different perceptions of walking intentions. Specifically, the ANOVA identified

[17] Strictly, an ordinal model should be used when the dependent variable takes the form of ordered categories. Hence the results should be treated as indicative.

three categories of walking intentions and relative settings (Figure 7.1): the two settings with greenery were associated with high walking intentions, the two pedestrianised settings were associated with medium walking intentions, and the commercial area with traffic with low walking intentions. Hence, while Chapter 5 showed that the simulated affective walking experience varies depending on settings, this chapter adds to those findings in demonstrating that walking intentions also vary between settings.

Second, H7 was also confirmed, as walking intentions were predicted by affective walking experiences (Δstress and Δhedtone; Table 7.3). The relationship between walking intentions and affective walking experience was explored with regression analysis, and results showed that Δstress and Δhedtone are significant predictors of the intention to walk to work more often. Unsurprisingly, the two settings which stimulated the highest walking intentions – PedMixed and Park – also elicited stress reduction and an increase in hedonic tone (see Chapter 5). These findings confirm the idea that affective experiences influence behaviours or intentions (Russell, 1988; Russell and Lanius, 1984). According to Russell, affective experiences and affective perceptions of settings influence behaviours, and elicit either *approach* (desire to stay and explore) or *avoidance* (desire to leave) (Mehrabian and Russell, 1974). These ideas were applied to the mobile context, specifically to walking, and it was shown that affective experiences of walking influence intentions to walk to work or place of study: a positive affective experience in terms of relaxation and pleasure (hedonic tone) elicits approach – e.g., intentions to walk more often – while a negative affective experience elicits avoidance – e.g., low intentions to walk more often.

Previous research by Gatersleben and Uzzell (2007) found that positive affective appraisal of trips in terms of excitement and relaxation are associated with a positive attitude towards the trip, even though no significant association was detected between affect and intentions. The current research extends their work, and shows that positive affective experiences in terms of pleasure and relaxation significantly predict walking intentions. Hence, the present research also confirms findings by Johansson, Sternudd, and Kärrholm (2016) that assessed that affective valence – pleasantness – positively influences intentions to choose a route, while low valence contributes to intentions to avoid it. While Johansson, Sternudd, and Kärrholm assessed affective walking experiences in terms of arousal (degree of activation) and valence (degree of

pleasantness), the approach taken within the current research considered several dimensions of affect – stress, hedonic tone, energy. The current results showed that experiences of relaxation and happiness are related with higher walking intentions; both dimensions are located in the right-hand side of the circumplex model of affect – positive valence – even though relaxation has low activation and happiness has high activation. Hence, the findings support Johansson, Sternuddm and Kärrholm's conclusion that valence is positively associated with walking intentions, while it seems that the degree of activation (arousal) is less important and does not directly influence walking intentions. In addition, the current results have shown that stress appraisal is not the only relevant affective dimension, with pleasure experiences (hedonic tone) also predicting walking intentions. This confirms Gatersleben and Uzzell's (2007) claim that stress is not the only relevant affective dimension during mobile experiences.

In addition, Hypothesis H8 was confirmed, as perceptions of interestingness and attractiveness were among the predictors of walking intentions. This finding confirms previous studies that attested that aesthetics is positively associated with walking intentions (Johansson, Sternudd, and Kärrholm, 2016; Sinnett *et al.*, 2011). However, and to the researcher's knowledge, previous research has not assessed the influence of 'interestingness' on walking levels or walking intentions, hence this finding is novel. One exception is the theoretical model of walkability by Ewing and Handy (2009), which includes *imageability* as predictor of walkability. *Imageability* refers to "the quality of a place that makes it distinct, recognizable and memorable" (Ameli *et al.*, 2015), a conceptualisation which is arguably related to interestingness. However, previous empirical research operationalised *imageability* based on objective criteria such as presence of public gathering places, landscape views and vistas, historic buildings, iconic or distinctive architecture, articulated, non-rectangular buildings, and outdoor dining opportunities (Ameli *et al.*, 2015), rather than on people's perceptions. Differently, the current research assessed interestingness based on people's perceptions and experiences, thus looking at the walking experience. In addition, in the current study, when affective experiences were included in the model, attractiveness was mediated by Δstress and Δhedtone. This shows that attractiveness of physical features has an effect on affective experiences, rather than directly on walking intentions.

Hence, the idea that affective appraisals of traveling should receive more attention from scholars (Pez and Whalen, 2010; Gatersleben and Uzzell, 2007) is corroborated. This finding also supports recent criticisms of the deterministic assumptions of walkability research moved by geographers (Davison and Curl, 2014; Andrews *et al.*, 2012). Andrews *et al.* (2012) have suggested that the walkability literature has 'disembodied' walking, and this is limiting the understanding of walking behaviours; according to these authors, looking at walking as a meaningful activity enables researchers to understand "why and where people walk" (2012, p. 1927). Following suggestions by Andrews and colleagues, this research has looked at walking as meaningful experience, specifically focusing on the affective dimension, and such perspective has uncovered additional aspects related to physical surroundings that influence walking intentions. During the interview phase, looking at the affective walking experience enabled identifying several micro-scale characteristics of the built environment that influence walking intentions. These are framed within the three overarching themes identified in Chapter 6 – barriers, presence of nature, and connection with place – and are discussed below.

7.3.1 Barriers and the importance of safety

The quantitative analysis has shown that the commercial area with traffic was associated with low walking intentions. The qualitative phase highlighted that this is related to the three barriers that were discussed within Chapter 6 – namely motor traffic, city busyness, and poor aesthetics. Interviews showed that these barriers deter walking as mediated by negative affective experiences. For example, Sarah explains that heavy traffic is an influential element in her route choices:

> *R: What about the parallel street, the Horsefair [*e.g.*, CommTraf]?*
>
> *S: I do choose some of my routes to avoid heavy traffic. Fumes annoy me. (Sarah, HW-U-53).*

The same was true for Michael, who 'deliberately chose a route that avoided the main road', and for Debbie, who prefers to avoid busy routes and chooses an under passage through a park where she can 'almost not hear any traffic':

> *I kinda take the less busy routes, I guess, so I try to stay away from it, and I go under in St James Park, under the roundabout. And I find it really*

peaceful… You can walk there and you can almost not hear any traffic, just grass. I think it is actually quite nice and relaxing (Debbie, HW-U-*32).*

These results support previous research that attested that the presence of motor traffic is an important barrier to the enjoyment of walking (Gatersleben and Uzzell, 2007), and that can also deter walking (Belon *et al.*, 2014). With this regard, the recent project Street Mobility and Network Accessibility (Mindell, 2017) showed that major roads and other transport can deter people from walking, and this can be related to waiting times at crossing points or to safety concerns. In addition, several authors attested that higher walking levels are associated with pavements that provide a separation from traffic. In the limited literature on the impact of micro-scale features on walking, it is generally indicated that motor traffic and poor pedestrian infrastructure negatively influence walking intentions. Conversely, the presence of greenery, high quality scenery, maintenance and upkeep, separation from motor traffic, and presence of interesting features are positively associated with walking intentions. For instance, Adkins *et al.* (2012) conducted a mapping exercise to identify walkability perceptions related to specific street segments; results showed that arterial streets are the most important feature that decreases attractivity of walking, while presence of greenery and of pavements that provide a separation from traffic positively influence perceptions. Along similar lines, a recent study by Cain *et al.* (2017) illustrated that pavement obstacles and hazards are negatively associated with walking. Importantly, these factors were associated with walking independently of macro-level walkability, thus confirming that walking levels might be increased by addressing micro-scale urban design features. Hence, the current results confirm the negative association between motor traffic and walking intentions; importantly, the results presented in the current thesis add that motor traffic deters waking because it makes individuals 'annoyed' and not relaxed.

Other than motor traffic, participants reported that they prefer to avoid busyness and crowds. When the researcher discussed with James his route to Bristol train station, he explained that he avoided a busy, pedestrianised area (Broadmead) because even though it is shorter, it takes longer due to the crowds:

R: Why you didn't walk through Broadmead to go to the station?

J: I avoided that, simply because of how many people are there. Every time I've done that, it took me longer, because it was so busy, while I chose this

one [Castle Park, e.g.*, Park condition] because it is quite quiet. If I've got the choice, I would definitely choose the quiet route, without doubt (James,* MW-U-*37).*

Similarly, Charlotte reports that walking in busy areas like CommTraf is stressful, hence she prefers to avoid it:

Walking through busy areas, like the centre, full of people, people are so rude, I don't like walking [if] there's someone in front of me, slowing me down… pavements are quite small in Bristol, and that's quite annoying, they get crowded, some of them in Broadmead, that stresses me out a lot, especially where the bus stops are (Charlotte, MW-N-23).

Similarly, scaffolding and construction sites that obstruct the pavement represent another feature that makes participants avoid certain routes. Talking of how a scaffolding occupied the pavement, Julia explained that she felt uncomfortable and she would prefer to avoid it (Figure 7.2):

Walking through that I felt so uncomfortable. It's just not… the nicest thing in general. I wouldn't want to walk behind it any single day. And there was no one on top of it when I took the photo, but if there were people walking on top of that, I would have actually crossed the road, so I wouldn't have to walk underneath it. Which is still a lot of hassle (Julia, HW-N-*20).*

Figure 7-2: Construction sites and scaffolding reduce walking space and deter waking

Hence, while the previous chapter has illustrated that crowds and physical obstacles are perceived as barriers to the enjoyment of walking (Section 6.2.3), the current chapter adds that these elements can also limit intentions to walk. Cain *et al.* (2017) have already assessed that pavement obstacles and hazards are negatively associated with walking levels, and the importance of large and high-quality pavements was also highlighted by several previous studies (e.g., Cain *et al.*, 2017; Belon *et al.*, 2014). Hence, this research shows that the negative influence of these aspects on walking intentions is related to the negative affective outcome that these elements trigger.

Julia also explains that building height influences the walking experience and her intentions to walk, with big tower blocks making her feel small, and hence putting her off walking (Figure 7.3):

> *But if I look at a grey building […] it is so tall, it is like towering you, and it just doesn't evoke like a good atmosphere. To me, I wouldn't look at it and think 'I would want to go in that place'. I wouldn't wanna walk next to it, just how tall it is…! It makes you feel small! It is not a nice feeling. Because no one wants to feel small (Julia,* HW-N-*20).*

Figure 7-3: "Tower blocks" make some participants feel small and deter walking

In line with it, research by Cain *et al.* (2017) found that walking levels are associated with designs with buildings at moderate height (3–5 stories) and entrances directly onto the sidewalk. What is more, according to Ewing and Handy's (2009) theoretical model of walkability, *human scale* – "the degree to which physical elements' fit of human size and walking speed" (2009, p. 76) – contributes to walkability of settings. The current research confirms that building height has a negative impact on the walking experience, and that it represents a barrier to walking intentions. Importantly, it was shown that this is related to the fact that participants can feel "small" and "uncomfortable" next to buildings with a large mass.

Poor aesthetics is another crucial element that affects travel choices. Talking of street cleanliness, Henry explains (Figure 7.4):

> *I would always choose to walk where it is clean, that is much more inviting to walk, than all the rubbish and stuff (Henry, HW-N-18).*

Figure 7-4: Litter can make walking unpleasant and deter walking intentions

Ewing and Handy (2009) advanced the idea that tidiness of settings is an important predictor of walkability. Belon *et al.* (2014) confirmed this idea empirically, as they attested that poor aesthetics (e.g., litter and debris, vandalism, and graffiti) were among the factors that prevented participants from undertaking physical activity. In line with this, the current results highlighted that poor aesthetics – abandoned buildings, litter, or tagging – can deter people from walking because it makes some people concerned

and stressed. In fact, previous research has outlined that safety concerns have an impact on walking intentions (Ferreira *et al.*, 2016).

To sum up, this section has highlighted that several barriers to walking have a negative influence on walking intentions, and this is partially related to the negative affective valence of such elements: traffic 'annoys' people, city busyness is 'stressful' and 'uncomfortable', and poor aesthetics is unpleasant and raises fear – e.g., safety concerns. The next two sections 7.3.2 and 7.3.3 illustrate how nature and interestingness encourage walking.

7.3.2 Nature and the importance of quietness

The quantitative analysis highlighted that walking intentions were highest in the settings with greenery and/or blue elements – the park and PedMixed. During the interviews, the presence of natural areas in the city was discussed in detail, and nature emerged as a motivator for people to walk. Julia, who took a photograph of a pocket park adjacent to the road where she was walking (Figure 7.5), reflects on the contrast between the two areas:

> *J: This is obviously a really busy road, on the left there's all the shops and the bus stops, and loads of people, it is a city you know, and it is so strange to me that on the other side of the road there is this green bit, with people sitting on the benches and reading books. And I just think that the difference between areas is just amazing. And I was thinking that I'd rather be on that side, I'd rather be walking through there where it is quite open, there is not many people, there's trees and grass, rather than dirty roads where I'm walking on. And people waiting for the buses, or coming out of the shopping centre.*
>
> *R: If you had the option of walking in a park or in a street…*
>
> *J: Yeah, definitely the park (Julia,* HW-N-*20).*

Figure 7-5: A quiet green space constrasts with a busy road

Similarly, Charlotte took a photograph of a green path (Figure 7.6) and explained that she prefers a green route:

> *E: This one… there is a way where I can walk on the road, but It is a bit manic with the traffic and stuff, so I chose to walk through there (Charlotte, MW-N-23).*

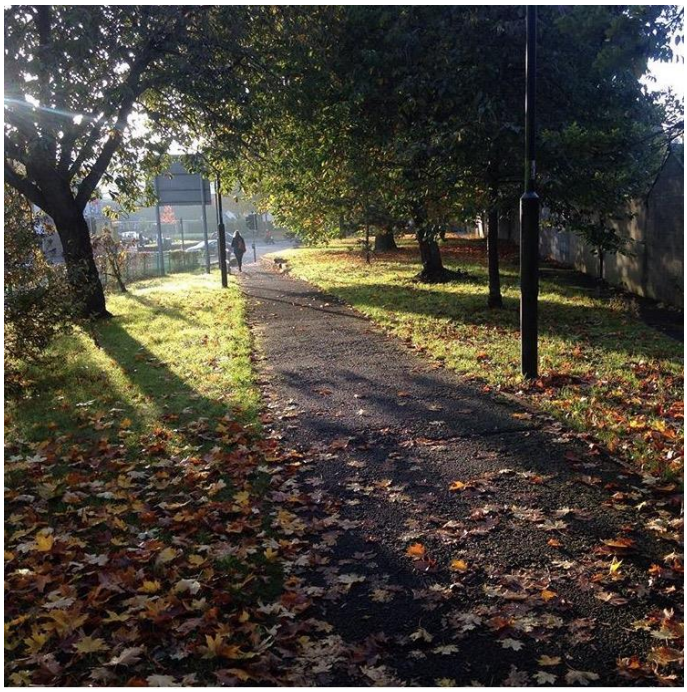


Figure 7-6: Green routes are preferred over roads with traffic

Charlotte also explains that during the weekend, she prefers to walk in green areas because it is not as busy and crowded:

> *E: We go to Devon quite a bit, that's like open, I'd rather go to a forest, than in the city.*

R: Why?

I just think it's prettier, when you're walking in the city centre with cars everywhere, and there/s always roadworks going on, it is definitely manic. So I prefer quieter routes, which feel more relaxing (Charlotte, MW-N-23).

Hence, this confirms previous works that attested that the presence of trees and greenery are positively associated with higher walking levels (Cain *et al.*, 2017) and intentions (Johansson, Sternudd and Kärrholm, 2016). Moreover, while previous research concluded that the presence of green spaces encourages individuals to walk more (Ferreira *et al.*, 2016), the interview phase suggests that the presence of green elements also influences choices of routes.

In addition, the interviews highlighted that one of the reasons why the presence of natural elements is related to higher walking intentions is quietness. As highlighted by the quotes above, the quietness of green spaces, as opposed to the busyness of the city, appears to be among the crucial elements that made participants prefer green areas over urban settings. Julia explained that in the green area there are 'people sitting on the benches and reading books' and the area 'is quite open' and not crowded; Charlotte explained that green areas as 'prettier' and not 'manic' like the city centre. Similarly, when discussing his preferences among urban walking settings, Michael explains that he prefers quieter routes where he can 'think about things' (Figure 7.7):

I suppose I prefer the quietest areas. Particularly for walking, I can think about things… I prefer water, plants, trees and sceneries (Michael, HW-N-*41).*

Figure 7-7: Green areas are often quiet and more suited for walking

Hence, the current research shows that greenery and presence of natural areas in cities positively influence walking intentions, thus confirming previous research (Cain *et al.*, 2017; Johansson, Sternudd, and Kärrholm, 2016). Importantly, the current findings add that this is partially related to their perceived quiet and relaxing atmosphere. Similarly, recent research by Ferreira *et al.* (2016) attested a positive association between affective appraisals of neighbourhoods and walking behaviours. When neighbourhoods are perceived as relaxing, participants are likely to walk longer distances than when it is perceived as stressful; the presence of green areas contributes to the perceived relaxing character of the neighbourhood, thus indirectly affecting duration of walking trips. Hence, the current findings are not surprising considering the importance of relaxation and quietness in the walking experience; previous research that found that the affective strengths of walking are related to aspects such as 'no stress' and 'relaxation' (Gatersleben and Uzzell, 2007), and that during walking people spend time thinking, reflecting, and relaxing (Calvert, 2015; Crust *et al.*, 2011). Calvert also suggested that green and rural settings are more suited for reflection during walking because they generally present fewer interruptions to the walking flow compared to the city (2015).

Hence, the current research highlights that the relaxing character of natural settings encourages walking.

7.3.3 Connection with place and the role of interestingness

The results also highlighted that relaxation is not the only affective outcome related to walking (see also Section 7.3.4 on personal characteristics). As shown by the regression analysis, walking intentions are also positively influenced by hedonic tone and perceived interestingness. Along these lines, Debbie explains that the 'city bustle' is also important during walking. During the interview she reported that she enjoys walking because it is engaging and interesting, and the researcher asked if she also enjoys walking in green areas:

> *R: Do you also like parks? Would you choose a quiet park if you had the chance to?*
>
> *D: Ehm… I'd probably do a bit of both. I like the bustle as well (Debbie,* HW-U-*32).*

Hence, interesting surroundings contribute to walking intentions. Participants reported that particular architectural features attract their attention during walking. For example, Julia described the photograph of an old building that she took (Figure 6.16 in previous chapter) and explained that detailed architectures make walking more interesting, and increase her desire to walk more, while "tower blocks" (e.g., brutalist concrete buildings) deter her from walking. Similarly, Mark reported that he doesn'*t* like to walk around housing estates because they are 'boring' and that he would rather take the bus:

> *R: Any area in Bristol that you don't like?*
>
> *M: I don't like housing estates, because every house looks the same, it is so boring. I'd always prefer to take a bus instead. It is just not fun, there is nothing to look at, nothing to do. Just not nice, really. No particular great views, so you can't stand back for a second. And there is so much traffic (Mark, MW-N-22).*

In addition, the sense of history described in Chapter 6 also emerges as element that encourages walking. Talking about Temple Meads, Julia photographed the station

building (Figure 7.8) and explained that the sense of history that permeates the space encourages her to walk:

> *This is the bit where I walk up and I feel I'm in a fairy tale, going to a castle. And if every bit of Bristol was like this, I would walk constantly. It's just incredible. The floor is like old, but not in the sense old no one looks after it, more in the sense of… it's got its own story. And you've got the stony walls, and everything is so like… old and rustic, but it is so pretty…. The ending of my walk is just incredible. And I feel incredibly safe and I'd happily be here the whole time (Julia,* HW-N-*20).*

Figure 7-8: Historic areas encourage walking and support sense of safety

Ewing and Handy (2009) suggested that *imageability* contributes to walkability of settings. The concept of *imageability* was first advanced by the American urban planner Kevin Lynch as one of the key success factors of a city; Lynch (1981) suggests that *imageability* favours the relationship between cities and users, as individuals can attribute meanings to environments that are distinct and memorable. Imageability was operationalised by Ewing and Handy as the proportion of historic and interesting buildings; more recently, an empirical research assessed imageability based on presence of public gathering places (courtyards, parks and plazas); landscape views and vistas (natural and manmade); historic buildings; iconic or distinctive architecture; articulated, non-rectangular buildings; and outdoor dining opportunities (Ameli *et al.*, 2015). Their

research confirmed empirically that these features are associated with walking levels; current findings support the idea that presence of historic and/or distinctive buildings contributes to walking intentions, and highlight that this mechanism is related to the exciting and interesting nature of such elements.

Beyond architectural features, the general liveliness of settings also has a positive effect on walking intentions. For example, Christmas markets in the centre make walking more interesting for some participants. Layla took a photo of those (Figure 7.9), and explains:

> *And this one…. They've got the German markets coming up, I love Christmas so much, I really like when they start putting Christmas lights and stuff, love it so much. It makes it quite messy walking around, my friend works in the centre and she hates it, but me I definitely go more in the centre during Christmas time (Layla,* HW-U-*18).*

Figure 7-9: Some participants feel encouraged to walk in the centre during Christmas[18]

[18] The participant decorated the picture with festive symbols to highlight her passion for Christmas decorations

Chapter 6 has illustrated that interesting and lively surroundings are associated with positive affective responses; this chapter also shows that interestingness contributes to walking intentions. Likewise, Brown *et al.* (2007) suggested that micro-qualities such as the presence of other people, city monuments, a fountain where children played, etc. encouraged walking. These views are in accordance with findings by Paez and Whalen (2010) and Ferreira *et al.* (2016) on the importance of the social atmosphere of environments. The former attested that in environments perceived as sociable, students desire to walk more often to university. Similarly, Ferreira and colleagues found that when participants considered the place as stimulating, they walked to more destinations and spent more time walking. The current results show that interestingness – architectural features and social liveliness – make walking more pleasant, less boring, and safer, and these outcomes, in turn, encourage walking. While the online experiment did not include measurements of excitement/boredom experiences, the interview phase highlighted that these affective dimensions are an important aspect of walking. Hence, this research confirms previous research attesting that feelings of boredom can represent an important limitation of walking journeys (Gatersleben and Uzzell, 2007).

7.3.4 Personal characteristics

The regression analyses showed that socio-demographic characteristics and walking habits do not influence walking intentions. Johansson, Sternud, and Kärrholm (2016) found that walking habits are positively associated with walking intentions, with habitual walkers being more likely to be willing to walk. The current results did not replicate their finding and showed that walking intentions do not depend on whether individuals are heavy walkers and/or walk to work or university regularly. This could be related to the fact that, in the research reported in the current thesis, 40% of participants' travel mode to work was walking, and 60% of participants were classified as 'heavy walkers', e.g., walk at least 4 times a week. Hence, it is possible that statistical analysis could not detect a significant association between mode to work and walking intentions. In parallel, results showed that waking intentions are not related to age and gender, confirming findings from Johansson, Sternudd and Kärrholm (2016).

However, the interviews highlighted that past experiences, familiarity, and preferences have an impact on walking intentions. For instance, Charlotte discusses her preferences

for green paths and notes that she does not feel comfortable with the city 'etiquette', which is different from the etiquette of her hometown.

> *E: This one… is a bit manic with the traffic and stuff, so I chose to walk through there [*e.g.*, the green path, see also Figure 7.6].*
>
> *R: So if you have the option, you'd go for the more green area.*
>
> *E: Yeah, I'd go there rather than through the centre. The centre is manic, loads of people, it reminds me a bit of London sometimes.it is like a different etiquette in the city, people like crazy at crossing roads and stuff, in my town we just wait for the green man and stuff, while in Bristol it is like… They don't care, there's so much rush in the city centre, that's why I prefer that way (Charlotte, MW-N-23).*

The quote above highlights that past experiences represent a benchmark that people constantly refer to. Previous chapters have illustrated theoretical ideas on how environmental affect is influenced by past experiences (Chapter 2, Russell and Lanius, 1984) and these were also supported by empirical findings (Chapter 6, Section 6.3.1.1). The present chapter has added to these ideas the finding that walking intentions and behaviours are also influenced by such previous experiences. As noted by Russell and Lanius, evaluations of city environments are likely to differ substantially between individuals that migrate to cities from rural areas and longer-run city dwellers (1984). In the same way, Charlotte's perception of city busyness is affected by the fact that she lived in a rural town for most of her life, and this also seems to have an influence on walking behaviours.

7.4 Chapter Summary

The current chapter has addressed RQ3 of this PhD research: 'To what extent the affective walking experience influence walking intentions within city centre environments?'. The three hypotheses were confirmed. First, an ANOVA showed that walking intentions varied between settings (thus confirming H6). Second, multiple regression models confirmed that walking intentions were influenced by affective walking experiences (Δstress and Δhedtone) (H7). Third, multiple regression models also showed that walking intentions were influenced by perceived attractiveness and

interestingness of the route (H8). These findings were further explored during the interview phase, and further insights were gained.

Elements of the built environment that can deter walking intentions include motor traffic, city busyness, and poor aesthetics. These elements trigger stress and cognitive fatigue, and as a consequence they can discourage walking. Enablers of walking intentions were also identified, ad these included presence of nature and interestingness. Specifically, walking in natural spaces provides for opportunities to relax, hence can stimulate walking intentions. Interesting surroundings (e.g., detailed buildings, historic features, and social liveliness) make walking more engaging and encourage intentions to walk. Finally, personal characteristics can also influence walking intentions; despite walking habits did not significantly predict walking intentions, past experiences and personal associations can influence walking intentions.

The next chapter draws together the findings from Chapter 5, 6, and 7 and presents an integrated discussion of findings. Theoretical and practical implications, limitations, and suggestions for future research will also be outlined.

CHAPTER 8

8. INTEGRATED DISCUSSION AND CONCLUSIONS

8.1 Introduction

The overall aim of the current PhD research was to explore how several characteristics of built environments can contribute to psychological wellbeing during walking. In addition, another goal was to assess whether and how walking intentions are influenced by psychological wellbeing outcomes of walking. These aims relate to the global needs to improve the psychological wellbeing of individuals that live and/or spend a considerable amount of time in cities (e.g., UDMH, 2017; Peen *et al.* 2010) and to increase levels of walking in urban settings. This thesis has focused on affective states as a proxy of psychological wellbeing, and it has defined psychological wellbeing as the presence of positive affect and the absence of negative affect (e.g., Ekkekakis, 2013; Ekkekakis and Petruzzello, 2000; Russell, 1980). The central argument of the current thesis was that certain characteristics, such as the absence of motor traffic and architectural style, can support positive affect during walking and also encourage walking intentions.

In order to address the above aims, this research has drawn together elements of literature within the fields of mobilities and environmental psychology on environmental affect. The goal was to "illuminate the ways in which mobilities can sustain health and wellbeing" (Gatrell, 2013, p. 104), thus addressing Gatrell's (2013) call. The current research has focused specifically on the effects of walking on affective variables in response to environmental exposure. In fact, due to the simulated nature of the experiment (see Chapter 4), there was no actual physical activity involved, hence the physiological benefits of walking on wellbeing (Ekkekakis, 2013; Robertson *et al.,* 2012) were controlled for, as were the potential effects of social company. Hence, it is worth emphasising that the current findings relate to the engagement with place, rather than to the psychophysiological benefits of walking as physical exercise.

The current research has combined environmental psychology and mobilities literatures in order to inform a critical realist study of the affective benefits of walking in urban

settings, thus addressing RQ1a (Chapters 2 and 3). The current mixed-methods research methodology was developed building on such integration (Chapter 4); in particular, the methodology aimed to explore the role of 'environments', rather than mere 'settings', on the affective walking experience. The current empirical findings confirmed the main argument that some built settings do support psychological wellbeing during walking (Chapters 5 and 6). Hence, the notion that built environments are generally bad for wellbeing was challenged. Specifically, it emerged that the absence of motor traffic and the presence of historic architectural styles can both support wellbeing during walking. In addition, it was found that the affective walking experience, in terms of stress and hedonic tone experiences, has an impact on walking intentions (Chapter 7).

This research has uncovered a variety of findings which are relevant from both practical and theoretical perspectives. The current chapter provides a concluding discussion of such key findings in Section 8.2. Sections 8.3 and 8.4 present theoretical contributions and policy implications respectively. Section 8.5 reflects on the limitations of the current research and suggests future avenues of research. A summary of conclusions is presented in Section 8.6.

8.2 Aims and Key Findings

Research questions 1 and 2 aimed to explore the moderating role of different city centre environments on affective variables during walking, addressing respectively the *extent* of such a role (RQ1) and the specific *barriers and enablers* of a positive affective walking experience (RQ2). The mixed quantitative and qualitative analysis showed that some urban settings support affective outcomes during walking, and specific barriers and enablers of the positive affective walking experience were identified. These are illustrated in Sections 8.2.1 and 8.2.2 respectively. In exploring potential differences between the two study populations (RQ1 and RQ2), this thesis has also looked at how personal characteristics influence affective experiences. It was found that familiarity and place identity can influence affective walking experiences (Section 8.2.3). In addition, RQ3 explored the extent to which the affective walking experience can influence walking intentions. Through the mixed quantitative and qualitative analysis, it was confirmed that the affective walking experience has an impact on walking intentions. Comprehensive findings related to RQ3 are summarised in Section 8.2.4.

Figure 8.1 illustrates the key findings of the current thesis. It was found that the positive affective walking experience is enabled by the absence of barriers, connection with place, and presence of nature (RQ1 and RQ2). In addition, it was found that the affective walking experience influences walking intentions (RQ3).

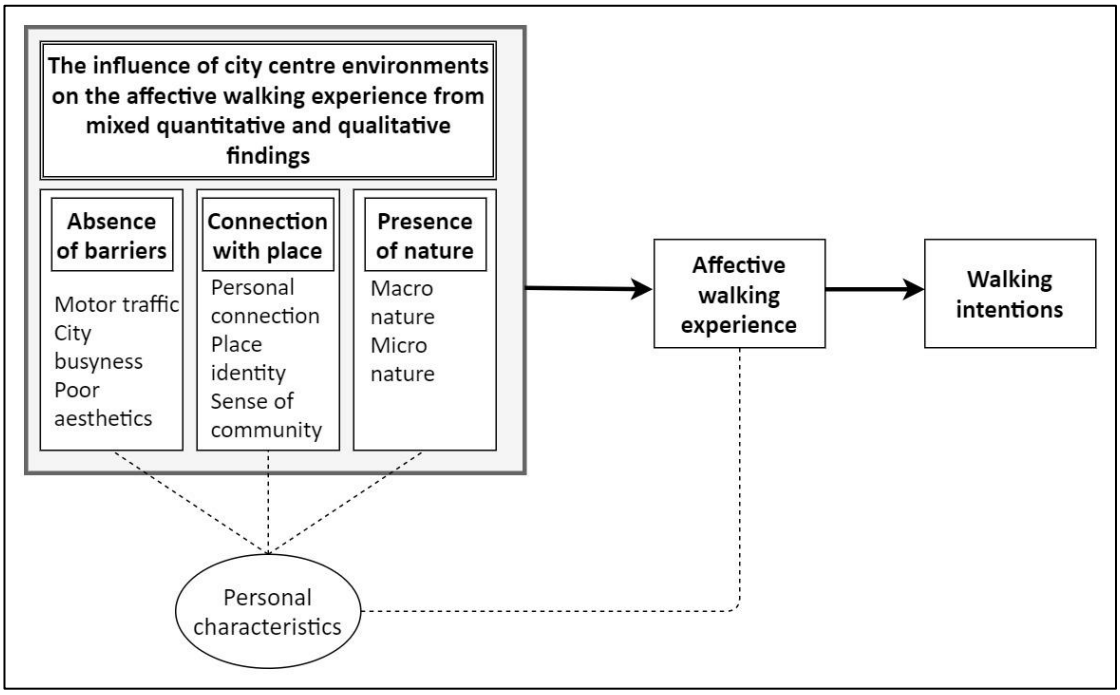


Figure 8-1: Thesis findings

8.2.1 Barriers of a positive affective walking experience

Chapter 5 has shown that a simulated walk along a road with motor traffic increased stress, decreased hedonic tone, and was perceived as not restorative, attractive, or interesting by research participants. Conversely, walking in pedestrianised areas had a neutral or positive affective response, and was associated with positive perceptions of restorativeness, attractiveness, and interestingness. Importantly, there was a significant difference between CommTraf and the three pedestrianised settings in terms of hedonic tone, stress, and perceived restorativeness. Taken together, these results indicate that the absence of traffic contributes to positive affect. Also, even though the absence of traffic does not seem to promote stress recovery per se, it emerged that it might still have an important role.

The negative affective experience in CommTraf is consistent with previous studies that assessed the restorative effects of walking in areas with heavy motor traffic (e.g., Kinnafick and Thøgersen-Ntoumani, 2014; Van den Berg, Jorgensen and Wilson, 2014;

Johansson, Hartig, and Staats, 2011; Hartig *et al.*, 2003). In addition, the current research found a significant difference between the simulated walk in CommTraf and in the park setting in stress recovery, hedonic tone, and perceived restorativeness, thus confirming that walking in green areas is preferred over walking in a commercial area with traffic (e.g*.,* Van den Berg, Jorgensen and Wilson, 2014; Johansson, Hartig, and Staats, 2011).

Importantly, it has to be noted that the only simulated walk that did not support positive affect was the one in the traffic area; in fact, the walks in PedHist and PedMod supported hedonic tone, and the walk in PedMixed supported hedonic tone and stress recovery. This is a novel finding, as the current study is the first research examining affective and restorative experiences in built pedestrianised settings and to compare affective experiences experimentally in a broad set of urban areas with and without traffic. One exception is the very recent 2017 study by Stigsdotter *et al.*, which compared the effects of walking in a forest and in a partially pedestrian route in the historic centre of Copenhagen on psychological and physiological variables. This study found that the urban walk was as physiologically restorative as a walk in a forest, but that the same urban walk was not associated with a psychological change, as measured by the POMS scale. Therefore, the current research confirms Stigsdotter *et al.'*s (2017) finding that walking in pedestrianised settings does not necessarily have a negative effect on psychological wellbeing.

The qualitative results within Chapter 6 confirmed that the presence of motor traffic is one of the common denominators for those studies that identified negative psychological effects following walks in urban settings (e.g*.,* Johansson, Hartig, and Staats, 2011). It emerged that the walk in CommTraf triggered stress and attentional fatigue because of traffic. While it the negative effects of motor traffic on wellbeing are well-known (e.g., Rivas, Kumar and Hagen-Zanker, 2017), the current thesis has examined them through the lens of restorativeness research. First, it emerged that stress and attentional fatigue are partially due to noise and air pollution. This finding also confirms the importance of the aural and olfactory senses for affect and restoration (e.g*.,* Conniff and Craig, 2016; Shaw *et al.*, 2015). Second, the interruptions to the walking flow, which is a crucial aspect of the wellbeing experience of walking (e.g*.,* Calvert, 2015; Gatrell, 2013; Middleton, 2011), also cause stress and attentional fatigue. Third, these negative outcomes are due to safety concerns and power dynamics related

to traffic, with perceptions that cars represent a danger and that drivers "always win", thus confirming Taylor's (2003) idea that pedestrians need to be alert all the time in urban environments.

The interviews (see Chapter 6) highlighted that participants noted the difference between areas with traffic and pedestrianised streets in terms of the affective walking experience. This was due to the absence of the barriers related to motor traffic. In fact, pedestrianised areas were perceived as less noisy and air-polluted, with more freedom of movement, and characterised by fewer safety concerns. Using Kaplan and Kaplan's terminology (1989), pedestrianised settings emerged as more *compatible* walking spaces than areas with traffic. Specifically, in pedestrianised areas there appears to be stronger *compatibility*, e.g., higher fit between individuals' desires and the characteristics of the environment.

Other than motor traffic, additional barriers to a positive affective walking experience emerged, and these included the busyness of the city environment and poor aesthetics. City busyness, which refers to the feeling that "the city never seems to rest", was firstly accentuated by the lack of space on pavements due to pedestrian crowds, narrow or low-quality pavements, and/or other objects that obstruct walking (e.g., scaffolding fixed to the pavement). It was found that such lack of space tended to make walking uncomfortable and frustrating, thus confirming the importance of walking infrastructure quality for the walking experience (e.g., Gatersleben and Uzzell, 2007). Second, the multitude of stimuli in the urban setting – such as signs, shops, and tall buildings – enhanced perceptions of crowding, thus increasing stress levels. The negative effects of such elements were discussed by Evans (2003, 1984), and the current research offers empirical support to such claims. Finally, poor aesthetics – litter, fly tipping, overflowing bins, and tagging – make walking unpleasant and trigger safety concerns about "the wrong types of people that might hang out in the area". Generally, these findings confirm that the quality of pedestrian infrastructures, including crossing points, pavement quality, and separation from motor traffic, is crucial for a positive walking experience (Sinnett *et al.*, 2011; Gatersleben and Uzzell, 2007). In addition, these findings highlight the importance of perceived safety for affective and restorative experiences (see Gatersleben and Uzzell, 2007), a topic which has received limited

attention in relation to restorativeness (an exception being Gatersleben and Andrews, 2013).

8.2.2 Enablers of the positive affective walking experience

Chapter 5 also illustrated that some urban settings support affective outcomes. First, a simulated walk in a pedestrianised green environment with green and historic elements supported stress recovery, increased hedonic tone, and was perceived as restorative, attractive, and interesting. Second, a simulated walk in a pedestrianised historic environment increased hedonic tone and was perceived as restorative, attractive, and interesting. Third, a simulated walk in a modern pedestrianised environment was perceived as restorative, attractive, and interesting. As illustrated in Chapter 5, these results reveal that some urban settings can represent walking environments that support wellbeing and restoration. These findings are in line with previous studies that identified positive affective responses to walking in 'attractive' settings. For example, both Van Den Berg, Koole, and Van Der Wulp (2003) and Karmanov and Hamel (2008) found that simulated walks through a street along a canal with low traffic led to significant improvements in depression, anger, and tension in two groups of students. Similarly, in 2016, Gidlow *et al.* ascertained that following a real walk in a "quiet residential streets with low levels of traffic" (2016, p. 23) with no green or blue element, participants reported an improvement in mood.

Therefore, the results from the current study contradict the idea that walking in *all* urban settings has negative effects on psychological wellbeing variables, a notion which is widespread in the literature (e.g., Van den Berg, Jorgensen and Wilson, 2014; Hartig *et al.*, 2003). Staats *et al.* (2016) already noted that a street with traffic is not representative of the range of urban settings. In fact, in the study they compared perceived restorativeness among several environments (a shopping mall, a café, a park, and a street with traffic) and found that a street with traffic was perceived as significantly less restorative than the other settings. However, the current research differs from Staats *et al.*'s (2016) study as it looked specifically at walking.

The qualitative analysis presented in Chapter 6 contributed to explaining these results through the identification of the enablers of the positive affective walking experience. In addressing RQ2 (*What are the barriers and enablers of the positive affective walking*

experience in city centre environments?), the results revealed that some settings can support affective and restorative outcomes. This is partially due to the absence of barriers (see previous section), but also because some physical elements encourage individuals "to stay in touch with the environment". Such a *connection* between individuals and place also seems to contribute to a positive affective walking experience.

Overall, the current findings confirm the idea that "people create, renew and transform meaning in places" (Cresswell, 2014, p. 120), be it personal meanings or collective meanings related to past and present histories. However, these findings add to the literature by indicating that such a connection enhances the psychological wellbeing benefits of walking. The idea that a connection with place can enhance the psychological wellbeing benefits of walking is supported by recent research that examined the role of 'engagement with outdoor environments' and how this can influence wellbeing outcomes of walking (Duvall, 2013, 2011). In his experimental study, Duvall (2011) assigned awareness plans to one group of participants, with the aim of creating interest in the physical environment. Tasks included focusing on senses during walking or imagining scenarios and stories related to the setting. Results showed that being engaged with a setting during walking was associated with improved attentional functioning and reduced frustration, as opposed to the no-engagement condition, and with higher psychological benefits (Duvall, 2011). Similarly, this research has attested that when surroundings are meaningful to individuals, it is more likely that benefits will arise from walking. This result explain why historic architectures can, for some individuals, enhance a positive affective walking experience (RQ2b).

In line with this idea, the Five Ways to Wellbeing report by the New Economics Foundation (Aked *et al.*, 2008, p.8), lists 'take notice' as one of the evidence-based actions to improve personal wellbeing:

> *Be curious. Catch sight of the beautiful. Remark on the unusual. Notice the changing seasons. Savour the moment, whether you are walking to work, eating lunch or talking to friends. Be aware of the world around you and what you are feeling. Reflecting on your experiences will help you appreciate what matters to you.*

Hence, the current thesis provides empirical evidence to these claims. The relevance of the affective walking experience echoes findings by Guell and Ogilve (2013) that showed

that ‘wellbeing’ is among ‘the most prominent narratives’ of traveling. Their research attested that enjoying natural scenery or interesting built features, and experiencing relaxation and ‘me-time’ were very important aspects of commuting practices, and on the other hand, the ‘lack of wellbeing’ was a major issue in participants’ accounts. Within the current research, several elements that trigger this connection emerged, and these expand on Guell and Ogilve’s (2013) findings; these include historic architectural styles, urban design variety, presence of nature, personal associations, and social liveliness. These are summarised below.

8.2.2.1 Historic architectural styles

The pedestrianised historic street and the pedestrianised setting with green and built elements were associated with positive affective ratings and environmental perceptions. These results confirm previous research that spending time in an “historic-panoramic site” was perceived as restorative (Fornara, 2011). In addition, the research confirmed Roe and Aspinall’s (2011) finding that a walk in Stirling historic centre had affective benefits. While in their study the benefits took place among individuals with poor mental health, and not among individuals in the good mental health group, in the current research the benefits were detected among both students and employees – but were stronger among students.

The qualitative phase revealed that these outcomes appeared to be partially related to the sense of history – “feeling the ground” – that some individuals experience during walking in historic areas. This was triggered by older buildings, historic elements such as period lampposts, cobbled pavements/roads, and urban archaeology features. For example, “an old buoy” offered a distraction during walking, triggered curiosity, and made a participant wonder about the history behind it. Hence, these findings confirm the idea that place is a container of experiences and a centre of meaning (Sussman and Hollander, 2014; Hayden, 1997; Lynch, 1981, 1972). Importantly, these findings reveal that there exists an association between personal experiences of place and wellbeing, and also show that the psychological wellbeing benefits of engaging with and producing place (e.g., Cresswell, 2014; Edensor, 2000). In fact, the fields of urban planning and heritage studies hold that historic places offer an engaging and symbolic narrative linked to the relational value of cultural heritage (Smith, 2006; Hayden, 1997). The current research has shown that such narratives can relieve attentional fatigue and provide a

distraction from everyday routines, thus facilitating restoration. Hence, the high relational value of settings rich in historic elements can partially explain why the PedMixed had similar affective outcomes to the Park setting despite the lower level of greenery in the former, and why the PedHist setting scored relatively better than PedMod (see Chapter 5).

On a deeper level, it emerged that the sensation of "feeling the ground" also contributed to a sense of safety and comfort. In some cases, being exposed to historic architectures triggers place attachment and pride in individuals. These outcomes are related to the details of older architectures, their unique "character", and the association with Bristol's history and culture. Therefore, the current research confirms ideas from urban planning on the role of old buildings and historic elements in the city. Kevin Lynch and Jane Jacobs suggested that old buildings are a precious resource for cities, while other scholars also attested that old buildings help with urban orientation and cognition (Evans, Smith, and Pezdek, 2002; Lynch, 1981; Appleyard, 1979, 1969; Jacobs, 1961). The current research extends these ideas and shows that these features can also support psychological wellbeing during walking. This finding echoes ideas by Fornara and colleagues that historic architectural styles can support affect and restoration because these reflect individuals' place identity (Cerina, Fornara, and Manca, 2016; Fornara, 2011) (see also Section 8.2.3).

It was also found that the historic element aids the affective walking experience especially when combined with green elements. In fact, the pedestrianised setting with a mix of historic and green elements (PedMixed) was the setting associated with the best affective walking experience (see also Section 8.2.2.3). In addition, the interviews highlighted that walking along Bristol's Harbourside had a high restorative value, in that it contributed to stress recovery and to positive affect. The interviews revealed that part of its psychological wellbeing value resides in the fact that the Harbourside is a historic symbol of Bristol. The sense of history that permeates the area also contributed to the affective walking experience. Such positive effect on wellbeing also holds for official street art. For some individuals, experiencing street art during walking triggers positive feelings of pleasure and curiosity, but also pride and attachment – due to the association with Bristol's history and culture. However, it emerged that the distinction between

street art and tagging can be unclear, and individuals can perceive the same piece of graffiti as either an enabler or a barrier to a positive affective walking experience.

8.2.2.2 Urban design variety

Variety in the built environment is an additional element that contributes to the affective walking experience. The interview phase revealed that the positive affective walking experience in the PedMixed setting was partially related to its urban design variety, that included natural and historic elements but also a mix of people (see Section 8.2.2.4). The interviews also highlighted that architectural variety, the architectural mix of old and new, the mix of natural elements and built features, panoramic and hidden views are generally stimulating and inspiring. These features make the walking journey more interesting and, for some people, make it go quicker. These findings are in line with a study by Lindal and Hartig (2013) that attested that architectural variety contributes to cognitive recovery. While Lindal and Hartig (2013) focused on building characteristics, the current research extends their finding by suggesting that urban variety also contributes to positive affect.

8.2.2.3 Presence of nature

Despite the role of nature not being the main focus of the current research, the findings confirmed that walking in natural and semi-natural settings triggers affective and restorative benefits (Kaplan and Kaplan, 1989; Ulrich, 1983). Within the experimental phase, the two simulated walks in in the settings with green elements contributed to stress recovery and increase in hedonic tone, and were perceived as restorative, attractive, and interesting, thus confirming previous findings (e.g., Roe and Aspinall, 2011; Karmanov and Hamel, 2008). However, and as noted above, stress recovery was higher in a predominantly built-up area with green and historic elements (PedMixed) than in an inner-city park, and the stress recovery was not significant in the park setting. The interview phase revealed that some participants perceived the inner-city park as unsafe, overcrowded, or poorly maintained; arguably, these negative perceptions could explain the non-significance of the stress recovery trend (e.g., Gatersleben and Andrews, 2013). In fact, interviews also revealed that the peace and quietness of natural spaces and the solitude offered by such spaces are among the crucial features that make nature restorative. Some participants noted that when natural spaces are congested their

perceived restorative value is reduced. Similarly, it emerged that maintenance of green spaces is a very important aspect of restoration, a finding that also confirms previous research on the importance of perceived safety (Gatersleben and Andrews, 2013). The interview phase has also revealed that the restorative value of walking along Bristol's Harbourside is partially attributable to the calmness and stillness of the body of water, an idea which confirms previous research on the restorative value of blue spaces (e.g., White *et al.*, 2010).

In addition, nature related details, such as flowerpots, falling leaves, or glimpses of sky all contributed to the positive affective walking experience. On one hand, this finding confirms that urban street vegetation increases perceived restoration (Lindal and Hartig, 2015). On the other hand, this echoes the importance for psychological wellbeing variables of 'taking notice' of the surroundings (Aked *et al.*, 2008), as discussed above. Partially related to this, importance of personal associations in relation to the restorative potential of natural settings (Ratcliffe and Korpela, 2016; Pretty, 2004) also emerged (see Section 8.2.3).

8.2.2.4 Social liveliness

Within the experimental phase social liveliness was controlled for – e.g., videos were filmed during relatively quiet times of the day and the number of pedestrians was similar across conditions (7 to 10 pedestrians per minute). Even though the quantitative findings say little about the role of the social element in the affective walking experience, it emerged from the interviews that the social liveliness of an area has a positive effect on hedonic tone and excitement during walking. The presence of people who socialise, sit at tables, or enjoy their lunch break can improve perceptions of a physical setting and support psychological wellbeing. In some cases, it was found that these elements can also contribute to perceived safety. Similarly, individuals felt more connected with the environment in the presence of place-making elements, live music, or community events. Wood, Frank, and Giles-Corti (2010) have already shown that sense of community is positively associated with leisurely walking; the current qualitative findings suggest that such a link might be related to the positive benefits of social liveliness on the affective walking experience (see Section 8.2.2.4).

On the other hand, there are some occasions in which the presence of others has a negative impact on the affective walking experience. First, when the number of people

is too high and personal space is invaded. Walking on crowded pavements or in crowded shopping areas was found to relate to stress. Ultimately, these circumstances can also deter walking intentions (see Section 8.2.4). In this sense, the relationship between number of people and the affective walking experience seems to be an inverted U-shape, with the highest affective walking experience reached with a medium number of other pedestrians. Second, high numbers of people in green spaces is generally negative and can prevent affective and restorative outcomes, a finding which supports Kaplan and Kaplan's (1989) ideas on the need for solitude for restoration to take place. These results also contradict Cole and Hall's (2010) finding that restoration in rural areas does not vary significantly with level of congestion, and warrant further research (Section 8.5.3).

8.2.3 Personal characteristics and Identity

Minor differences between the employee and student samples were detected. First, the simulated walk in the urban park had a larger stress recovery than employees. Second, the simulated walk in the commercial area with traffic led to a larger increase in stress among students. Third, students found the simulated walk in the pedestrianised historic environment more pleasant (hedonic tone) and relaxing than employees. The qualitative phase contributed to revealing that familiarity, personal associations, and place identity might play a role in affective experiences of walking. In fact, the interviews suggested that affective experiences were not just a matter of being familiar with the specific experimental setting, but also related to past experiences and personal associations. For some students nature was associated with personal memories of 'back home', and this might have contributed to the restorative outcome. Similarly, some students reported that historic features in PedHist and PedMixed reminded them of their native English rural towns and/or villages. Such personal associations can partially explain why in the experimental study (Chapter 5) affective experiences in Park and PedHist differed between students and employees. Other authors noted that personal memories and associations can contribute to affective and restorative experiences (Ratcliffe and Korpela, 2017, 2016; Pretty, 2004), an idea that was confirmed by this research. In the current research, the role of familiarity and place identity also emerged. In fact, the employees, who were significantly more familiar with the experimental

settings than the students (Table 4.1, Chapter 4), during interviews discussions also appeared to have a stronger urban-identity with respect to students. Despite the questionnaire not including questions on number of years and months spent in Bristol or on place identity, it can be argued that employees were more likely to have spent more years in a city environment like Bristol than students were. Subsequent enquiry supports this idea[19], as 80% of students reported that their childhood landscape was rural rather than urban, 70% reported to have spent less than one year in Bristol at the time of the survey completion and 68% defined themselves as nature-oriented. Hence, it is suggested that place identity influences affective and restorative experiences, with individuals who have an urban place identity tending to benefit from urban exposure, as opposed to individuals with a stronger nature orientation. The potential role of place identity also emerged during the interviews, with some participants reporting that experiencing a connection with Bristol's identity enhanced their affective walking experience (see also Section 8.3.1 for theoretical implications).

8.2.4 The affective walking experience influences walking intentions

RQ3 explored whether the affective walking experience influences intentions to walk specific routes (Chapter 7). Results from multiple regression analyses showed that affective experiences of stress and hedonic tone have a direct impact on walking intentions. These findings confirm the theoretical perspectives of environmental psychology that hold that affective experiences influence behaviours (Russell, 1988; Russell and Lanius, 1984). These ideas were applied to walking behaviours, and results were found to mirror research by Johansson, Sternudd and Kärrholm (2016), which showed that affective experiences influence intentions to avoid or to choose specific routes. On the other hand, walking intentions were not influenced by socio-demographics nor walking habits, a result which has important policy implications (see Section 8.4).

[19] In order to verify this idea, students who participated in the survey were contacted by the researcher in March 2017 with a short email questionnaire. This included questions on childhood landscape, number of years spent in Bristol or city environment, and place identity (urban oriented or nature oriented). 27 participants (20% of survey population) responded.

By examining the affective walking experience with qualitative research, it was possible to identify aspects of built settings that influence walking experiences and intentions. Specifically, it was shown that motor traffic can discourage people from walking and that participants often chose to avoid the main road, thus confirming previous research on the low walking levels along wide and busy roads (Cain *et al.*, 2017; Adkins *et al.*, 2012). In addition, city busyness – crowds, high buildings, scaffolding and construction works – and poor aesthetics are deterrents for walking intentions. Hence, these results are in line with previous research that attested the poor desirability of low-quality pedestrian infrastructures during walking (Cain *et al.*, 2017; Belon *et al.*, 2014; Gatersleben and Uzzell, 2007); the current research also added that these elements discourage individuals from walking.

On the other hand, enablers of walking intentions were also identified. Among these, the presence of nature encouraged participants to walk, and when they had the option of choosing between a built and green path, they tend to opt for the latter. Hence, the current results extend previous research on the positive effects of presence of natural elements on walking intentions (Cain *et al.*, 2017; Ferreira *et al.*, 2016; Johansson, Sternudd and Kärrholm, 2016). Moreover, it was shown that interesting architectures are related to higher walking intentions compared to static designs of tower blocks and housing estates, and this emerged to be especially true for older architectures, which evoke a sense of history and encourage walking. This confirms Ewing and Handy's (2009) theoretical ideas on the importance of *imageability* on walking intentions. These ideas have found little empirical application hitherto; one practical application is the research by Ameli *et al.* (2015), which assessed quantitatively that the presence of 'historic buildings', 'iconic or distinctive architecture' and 'articulated, non-rectangular buildings' contribute to walkability (Ameli *et al.*, 2015). Thus, the current thesis has confirmed their findings and has provided for a qualitative account of the reasons why these architectural features encourage walking intentions (see also Section 8.2.2.1). The current findings also highlighted that general liveliness related to social activities and place-making contribute to walking intentions, thus confirming previous research (Brown *et al.*, 2009).

Hence, it is argued that affective experiences represent an accurate proxy of walking experiences and, subsequently, of walking intentions. This also confirms claims by

geographers that built environments should not be the only focus of walkability research (Davison and Curl, 2014; Andrews *et al.*, 2012); this research has shown that walking behaviours are the result of complex perceptions of and interactions with the environment, rather than being *determined* by physical environments. The implication, which will be discussed in Section 8.4, is that another strategy to increase walking levels, other than targeting physical features, is to target affective experiences of walking, as making places more relaxing, pleasurable, and exciting would have a positive outcome on walking intentions.

8.3 Theoretical and Methodological Contributions

8.3.1 Contributions to Theories of Environmental Affect & Restoration

The current thesis offers new theoretical perspectives on research on environmental affect and restorativeness. First, this research confirmed Russell's (2003) ideas on the nature of environmental affect. In several works, Russell claimed that affect is adaptational – i.e., influenced by past experiences – and subjective – i.e. influenced by personal associations and preferences (Russell and Lanius, 1984). However, this idea seems to have found limited empirical applications hitherto; the current thesis has contributed to provide theoretical and empirical support. First, the current findings confirmed that affective experiences emerged as adaptational. In fact, the interviews revealed that childhood landscapes represent a benchmark that influences affective experiences of different settings. Second, affective experiences also emerged as subjective, with differences in affective experiences emerging from the quantitative and qualitative analyses respectively.

Additionally, this research has applied Russell's theory of environmental affect to walking behaviours, an area which had given little attention to the role of affect (one exception is Johansson, Sternudd, and Kormall, 2016). Findings have supported the idea that environmental affect is the key to understanding the influence of environments on perceptions and behaviours and that affective experiences influence subsequent behaviours (Russell, 1984).

Second, this thesis offers a theoretical contribution to restorativeness research. The literature review within this thesis (Chapter 2) highlighted the relative lack of research

on the affective and restorative potential of attractive built settings without evident natural elements, despite several authors having stressed a need to address this issue (e.g., Staats *et al.*, 2016; Fornara, 2011;). Chapters 5 and 6 in this thesis addressed this lack of literature and showed that walking in pedestrianised settings does seem to support affect. In addition, the two pedestrianised settings with no evident nature (PedHist and PedMod) were perceived as restorative, thus indicating that there exists potential for cognitive restoration. Hence, in the current research not all built settings had a negative impact on psychological wellbeing, and it was demonstrated that a street with traffic is not representative of all urban environments (Staats *et al.*, 2016). On one hand, the current findings revealed that simulated walks in pedestrianised settings without evident nature did not aid stress recovery, a finding which supports the idea that natural environments are more restorative than built settings (Ulrich *et al.*, 1991). On the other hand, the pedestrianised settings without evident nature were rated as restorative and triggered hedonic tone. Therefore, these findings indicate that some pedestrianised settings might have the potential for restoration, a finding which warrants future research on the affective and restorative potential of the full range of urban settings (see also Section 8.5.2).

In addition, there is still limited understanding of the reasons why certain natural and non-natural environments can encourage restoration. Within the current PhD research, the qualitative account (Chapter 6) illustrated the connection between nature and stress recovery as related to two conditions, namely the absence of barriers and a connection with place. The first element is discussed below, while the latter is discussed in Section 8.3.1.1.

The absence of barriers as trigger of restoration (see Section 8.2.1) partially recalls the psycho-evolutionary hypothesis that presence of threat prevents restoration (Ulrich *et al.*, 1991; Kaplan and Kaplan, 1989; Ulrich, 1983). The current research highlighted that motor traffic, city busyness, and poor aesthetics represent threats. Second, affective benefits appeared to be enabled by several elements. Among such enablers, nature was confirmed as the crucial element that triggers stress recovery. In fact, stress recovery took place exclusively in settings with some level of greenery, a finding which confirms theoretical ideas by Ulrich (1983) and Kaplan and Kaplan (1989) on the restorative power of nature. The reasons why walking in natural or semi-natural settings aided

affect and restoration were also explored, and the peacefulness and quietness of these settings emerged as crucial aspects. In addition, walking in settings with natural elements was also linked to certain concepts presented in ART (Kaplan & Kaplan, 1989), most notably compatibility and being away. In fact, it emerged that green environments are *compatible* as they support individuals' inclinations and activities – especially related to relaxation – due to the quietness, freedom of space, and opportunities for social interactions that they offer. Also, such spaces offer the opportunity to escape everyday routines (*being away*).

8.3.1.1 Insights from human geography on the affective walking experience

A second enabler of a positive affective walking experience is 'connection' with environments (Section 8.2.2). This thesis found that feeling 'connected' with Bristol's identity and community contributed to the affective walking experience, thus offering a contribution to research on person-centred approaches to restoration. This area looks at how personal connections can aid restoration, and is gaining increasing attention in the field (e.g., Ratcliffe and Korpela, 2016; Ratcliffe, 2015). This thesis has introduced in the debate the geographical idea of place, meant as a centre of meanings and not just as mere physical context (e.g., Relph, 1976; Tuan, 1974). This perspective acknowledges that walking produces place (Edensor, 2010; Middleton, 2010) and posits the focus of attention on the different ways individuals perceive and produce place. This constructivist perspective enabled an investigation of the affective and restorative outcomes as results of the interaction between individuals and place. It was shown that personal connections with place, including memories, habits, and imagined scenarios, aided positive affect and relaxation.

In particular, the qualitative phase revealed that the restorative benefits of walking in green settings were partially explained by personal associations with the ideas of home and childhood. For some participants, nature reminded of home landscapes and was associated with positive memories of childhood and adolescence. Hence, quoting Ratcliffe (2015, p. 196), nature elements "appeared to be interpreted in the context of personal experiences and responses to them constructed via existing attitudes and memories". This suggests that psycho-evolutionary explanations do not entirely account for the restorative power of nature, and that these benefits may be contingent on other factors (Morton, van der Bles, and Haslam, 2017; Ratcliffe, 2015; Bowler *et al.*, 2010). In

other words, the assumption posited by SRT and ART that the benefits of nature exposure arise from nature itself is partially challenged (Morton, van der Bles, and Haslam, 2017). In fact, recent years have seen a tendency to explore such contingent, person-centred factors that may aid restoration, with a growing number of academic studies following (e.g., Ratcliffe and Korpela, 2017, 2016; Morton, van der Bles, and Haslam, 2017; Shaw *et al.*, 2015). The current research offers a contribution to such sub-field.

One particular theme that emerges in relation to personal associations and restoration is place identity. The qualitative phase highlighted that individuals' identities may influence such processes. In fact, it emerged that general attitudes towards the city and towards nature also affect the psychological wellbeing outcomes of walking in urban settings. Specifically, individuals who had a positive attitude towards the city tended to describe positive experiences of walking in urban settings. Conversely, among those participants that felt closer to the countryside, urban walking tended to trigger negative feelings, while walking in green areas was described as restorative. In addition, the affective benefits related to historic elements, street art, and social liveliness also highlight the potential role of identity. Engaging with elements related to individuals' place identity – in the current research, to Bristol's history, its cultural scene, and its community – triggered positive affect, including feelings of pleasure, excitement, interest, and pride. These claims are supported by a research by Morton, van der Bles, and Haslam (2017), who have suggested that the connection between individuals and environments may be framed by identity. It was found that exposure to nature images per se did not improve cognitive capacities, but cognitive benefits depended on each respondent's salient identity (urban versus rural). Importantly, these benefits took place regardless of whether images were urban or rural. Although the current research did not include measurements of place identity in the experimental phase, the qualitative findings confirm Morton, van der Bles, and Haslam's (2017) idea that identity is relevant to understanding affective and restorative processes, which was also suggested by Cerina, Manca, and Fornara (2016). These findings are also in line with recent research by Ratcliffe and Korpela (2017) that place identity predicts restorative perceptions of favourite places. Therefore, this thesis has shown the advantages of investigating

affective and restorative experiences not only as result of environmental exposure, but also of engaging with place.

8.3.1.2 Methodological contributions to environmental psychology research

Finally, the current research has also offered a new methodological insight by proposing a video-simulated walk methodology (see Chapter 4). Whereas photographic slideshows present several limitations, videos appear more realistic, as they are the media that arrives closer to the human multisensory experience (Garrett, 2011). In fact, videos are "multisensorial, capturing sound, image, movement, […] time and place" (Garrett, 2011, p. 11; see also Conniff and Craig, 2016). A methodological procedure to produce videos was also proposed, and this consisted of mounting a GoPro camera on the bike handle and pushing the bicycle at walking speed. Video length was also part of the innovation of such a methodology. In fact, videos were purposely short (e.g., 1 minute), due to 1) the length of experimental streets, and 2) the need to reflect micro qualities of urban design that might have influenced the affective walking experience. The existence of between-settings differences supports the idea that the environmental simulations were effective and triggered an affective change – despite it being acknowledged that the pre- post- test changes might have underestimated the affective benefits of walking (see Section 8.5.1). It is argued that this is an effective research methodology that can be replicated in the future.

8.3.2 Contributions to walking research

This research has offered several contributions to walking-related research. First, the current thesis has proposed the wellbeing narrative as a lens to explore the mobilities of walking, an area which has received little attention in the literature. As stated by Gatrell, the mobilities turn has had "relatively little to say about the consequences of mobility for health and wellbeing" (2013, p. 98). This thesis has shown that engaging with place during walking can be therapeutic and support affect, thus further developing ideas from the mobilities field (e.g., Calvert, 2015; Guell and Ogilve, 2013). Specifically, the current research has contributed to the literature by proposing a systematic identification of barriers and enablers of wellbeing during walking related to environments (Sections 8.2.1 and 8.2.2). In this way, the research contributes to the

body of knowledge about the value of travel time during walking (Jain and Lyons, 2008), as it has shown that the time spent walking can be therapeutic.

Second, this research has provided empirical support to the Theory of Interpersonal Behaviour (Triandis, 1979), which is one of the main psychological models applied to the context of travel behaviour. Specifically, as illustrated in Chapter 7, it was confirmed that affect – the experiences of stress and hedonic tone during walking – are among the predictors of walking intentions. Figure 8.2 illustrates how the current findings confirm and integrate the TIB. The blue shapes represent the current research findings, with the blue arrows illustrating the causal relationships identified within this research. In addition, the blue rectangle on the left-hand side summarises the research findings (thus summarising previous Figure 8.1) and identifies the elements related to built environments that influence affect during walking. Finally, Figure 8.2 also includes additional predictors of the affective walking experience as identified by previous research; these were not part of the current researcher's scope, but include physical activity (e.g., Calvert, 2015; Gatrell, 2013; Robertson *et al.*, 2012) and social interactions (e.g., Gatrell, 2013; Sinnett *et al.*, 2011).

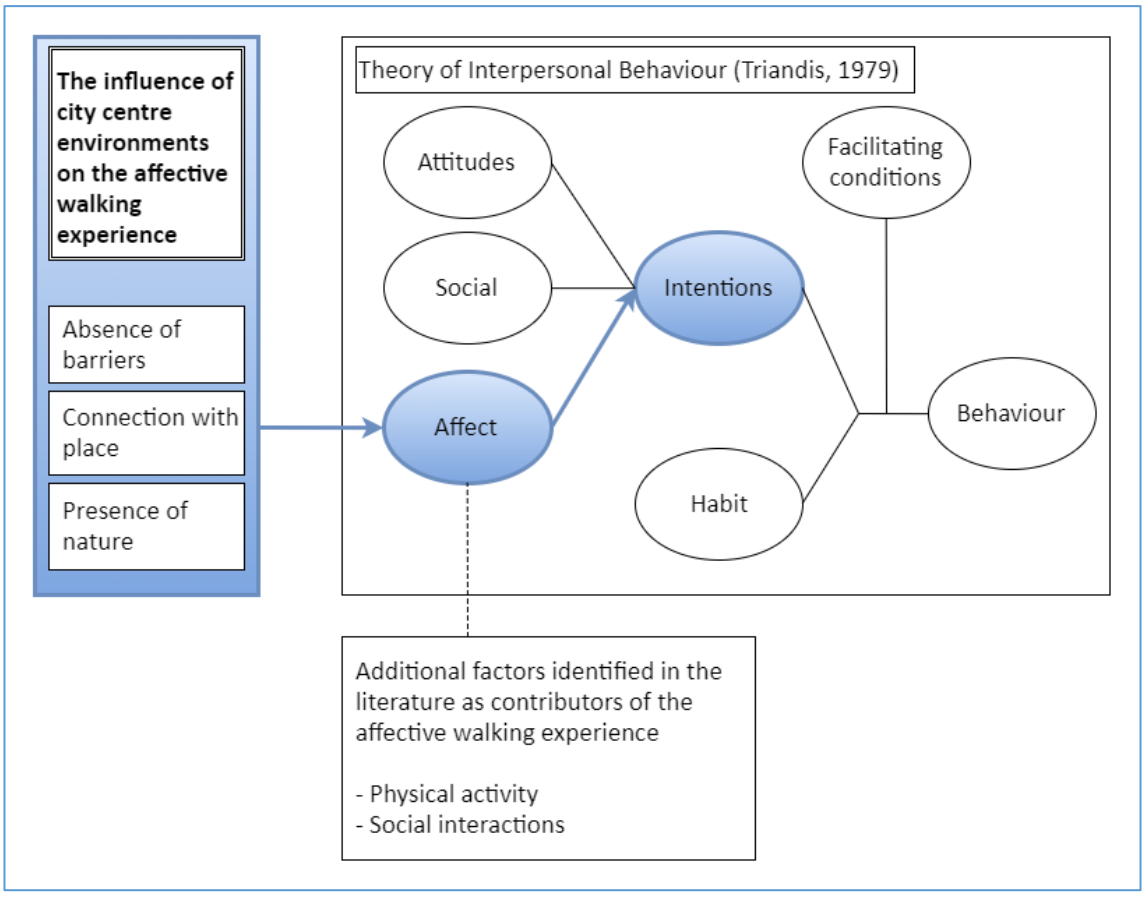


Figure 8-2: TIB integrated by the current findings. Adapted from Triandis 1979

Third, the current thesis offers methodological implications relevant for walking-related research. In fact, an interdisciplinary methodological approach to measure emotional experience of walking was proposed and conducted, and this was informed by the environmental psychology literature and the mobilities field – thus partially addressing RQ1c. Such a combination of methods included experimental measurements and qualitative interviews supported by visual data. Within the experimental phase, a simulated video-walked methodology was designed (see Chapter 4 and Section 8.3.1.2), which had the advantage of isolating the environmental exposure from the physiological effects of walking. Within the qualitative phase, several methods were piloted, and these included the use of a mobile EEG recorder and of a video-recorded walk (see Chapter 4). The final qualitative method involved interviews that followed a real participant walk, recorded by photographs and/or videos. Such a quasi-mobile interview methodology allowed witnessing the mobile experience of place (e.g., Evans and Jones, 2011; Brown and Spinney, 2010) whilst, at the same time, avoiding the 'there-ness' of mobile methods (Merriman, 2013; see Chapter 4). This combination offered quantitative assessment of the psychological wellbeing benefits related to the engagement with place (e.g., Gatrell, 2013) whilst, at the same time, enabling a deeper analysis of the processes behind the psychological wellbeing benefits of walking. In fact, the interpretation of results took place at several stages: first, quantitative results from the experimental design were analysed and interpreted as standalone dataset (Chapter 5). Second, the qualitative data from the interview phase were interpreted building on the quantitative results (Chapter 6). Third, mixed results were considered and discussed together in Chapters 7 and 8. Arguably, this interdisciplinary mixed-methods strategy represents a useful approach that can be applied to future research. In fact, similar mixed-methods approaches have been successfully adopted by recent research that has explored cycling among older populations (Jones *et al.*, 2016) and pedestrian mobility among older adults (Tilley *et al.*, 2017).

Finally, this research offers theoretical and methodological contributions to the field of walkability research. Walkability research tends to assume that physical features have a direct impact on walking behaviours (Andrews *et al.*, 2012). However, the approach of the current research – based on actual participants' walking experiences, rather than on observational research based on questionnaires – enabled the exploration of processes

behind walking behaviours more critically. The quantitative analysis in Chapter 7 has shown that the impact of environmental perceptions on walking intentions was mediated by affective experiences, thus in line with Mehrabian and Russell's (1974) idea of approach and avoidance. This is an important finding, as it sheds some light on the reasons why these physical elements encourage or discourage walking. In other words, physical features have an impact on walking intentions by influencing affective variables. It is the affective experience that guides walking intentions, with positive experiences – e.g., relaxing and/or pleasant journey – encouraging future walking, and negative experiences – e.g., stressful and/or unpleasant – discouraging future walking. In this sense, the perspective adopted in this thesis, which was informed by geographical debates and theories of environmental affect, provided a platform for more critical analysis of the relationship between individuals and settings. The theoretical stance, together with the mixed-methods approach, has contributed to move beyond systematic measurements that are widespread in the walkability literature, and has offered a more nuanced understanding of walking intentions, as called for by previous scholars (Davison and Curl, 2014; Andrews *et al.*, 2012). Specifically, this research indicates that users' perceptions and affective states should not be considered as 'biases' to be avoided (Andrews *et al.*, 2012), but rather as predictors of perceptions and behaviours to be included in walkability assessments. Two methodological implications follow: first, it is suggested that the use of real-time and/or experimental approaches should support more traditional observational studies within walkability research. Second, observational studies should take into account affect-related variables such as place attachment when assessing walkability of settings, with surveys including these measures.

8.4 Policy Implications

Several policy implications are identified. These are relevant for urban design and planning policies to increase urban walking. Findings and policy recommendations were also shared with Bristol City Council to inform the 2017 Bristol Transport Strategy. Importantly, results have shown that socio-demographics and walking levels do not influence walking intentions, hence the policies below have the potential of increasing walking levels across social groups. The non-significance of socio-demographics and

walking levels also confirms research by Panter *et al.* (2016) that attested with a natural experiment that new walking infrastructure encouraged both walkers and non-walkers to walk more.

The following sections outline the policy implications related to urban barriers (Section 8.4.1), architectural style (Section 8.4.2), presence of nature in urban settings (Section 8.4.3), and social liveliness of urban settings (Section 8.4.4). Finally, theoretical and practical implications are considered through an exemplar walking route that was developed by the researcher (Section 8.4.5).

8.4.1 Motor traffic, city busyness, and poor aesthetics

Results clearly indicated that walking in pedestrianised settings has benefits for psychological wellbeing, while walking in areas with motor traffic is associated with a negative affective experience. Hence, the current thesis strengthens the case for development of traffic-free areas in urban settings. In addition, and when this is not possible, further measures on car traffic could be considered by policy makers. First, it was shown that noise and pollution from vehicles represent a significant proportion of the stress impact of traffic. Hence, noise and pollution from vehicles, especially buses and trucks, could be reduced in order to decrease the negative impact of motor traffic on pedestrians (e.g., Taylor, 2003). It seems that electric vehicles could bear a smaller negative impact on walkers' psychological wellbeing than internal combustion engine vehicles, thanks to the reduced auditory and gaseous emissions impacts. Therefore, future research is warranted on the role of electric vehicle sound and/or added sound on the affective walking experience (see Section 8.5.1 for an extensive discussion of future research needs).

Second, the results imply that improvements to walking infrastructure can contribute to improve the affective walking experience. For instance, better separation between pavements and roads (where possible) could be introduced in order to increase pedestrians' perceived safety, for example with street pillars or street trees. In addition, safety could be improved at crossing points, for example with raised platforms. Also, waiting times for pedestrians at road crossings could also be reduced in order to aid the walking flow. In this sense, there is reason to believe that smart transportation systems,

such as Pedestrian User-Friendly Intelligent crossings, could aid the walking experience and increase the psychological wellbeing benefits of walking.

In addition, urban design improvements could also contribute to the affective walking experience. These include enlargement and improvement of pavements and prioritisation of pedestrians during road maintenance and constructions; interventions which would minimise the discomfort for pedestrians during walking. Finally, results indicate that general cleanliness and maintenance of streets and public areas is crucial to support affect during walking, hence these should be enhanced.

8.4.2 Architectural style

The current findings revealed the value of historic architectural styles – defined as pre-Modernism architectures – and/or elements of the urban fabric for psychological wellbeing. Hence, the results strengthen rationales for preservation and conservation of historic areas, buildings, and historic street furniture. In addition, policy makers could improve interpretation and awareness of such elements, for example by increasing the incidence of interpretation plaques in the urban setting, or by introducing education programmes that promote the value of historic elements. Also, walking itineraries in historic areas could be recommended by policy makers. Similarly, policies could encourage walking and spending time in historic parks and gardens.

Moreover, it emerged that not only historic architectures, but also culture-specific designs that reflect place identity support wellbeing by triggering curiosity, interest, and pride. Therefore, culture-specific designs and elements – e.g., street art and maritime heritage in the case of Bristol – are particularly encouraged.

In addition, policy makers could also encourage walking in historic areas such as old towns or historic parks, thus promoting heritage urban trails.

8.4.3 Nature in the city

The qualitative results confirmed that incorporating green and blue elements in cities is a successful strategy to improve psychological wellbeing (e.g., Nordh *et al.*, 2009). These elements include parks, small parks, canals and bodies of water, but also micro natural elements such as flowerpots, bushes, and street trees. Second, it is noted that

maintenance of natural spaces is essential for the psychological wellbeing benefits to be realised. In fact, natural spaces that are perceived as dangerous, abandoned, or unpleasant are unlikely to support affective benefits. Third, it was shown that overcrowding can prevent such affective benefits to occur. Hence, levels of crowdedness should be kept under control, and one obvious strategy to achieve a managed number of park users is to provide for additional natural spaces in the city.

8.4.4 Social liveliness

Social liveliness generally contributes to positive affect in terms of hedonic tone, excitement, and sense of safety. Therefore, spaces to socialise should be a priority for city designers. These include active frontages, outside seating, and public squares. Results also highlighted that sense of community triggers positive feelings, hence place making, community events, exhibitions, busking etc. could be promoted. Generally, the current findings confirm recent urban design recommendations on healthy streets. For example, RIBA advised on the importance of the safety and attractiveness of urban places (Roberts-Hughes, 2013). TfL (2017) also advises on a 'whole-street' approach based on ten indicators of a healthy street – among which streets should be safe and relaxing, not too noisy, easy to cross, and provide for things to see and do. Similar claims have been moved by the New Urbanism movement (Talen, 2016), which recommends that "streets and squares should be safe, comfortable, and interesting" (2016, p. 4). In addition, the DfT's manual on street design (2007) suggests that "streets that are welcoming and interesting encourage more people to walk" (2007, p. 6) and that "safe, clean, comfortable pavements encourage people to walk and enjoy the experience" (p. 20). However, despite the notion that streets and urban places should support wellbeing becoming widespread, there are few specific recommendations on how to make places healthier. Therefore, on one hand this research provides empirical evidence that supports these claims. On the other hand, it extends these ideas by providing detailed policy recommendations and suggestions. Box 8.1 summarises recommendations for urban design.

Box 8-1: Recommendations for urban design

Recommendations for urban design

Motor traffic and pedestrian infrastructure:

- Development of traffic-free areas in urban settings;
- Reduction of noise and pollution from vehicles;
- Introduce better separations between pavements and roads, e.g. street pillars or street trees;
- Improve safety at crossing points, with e.g. raised platforms;
- Reduce waiting times for pedestrians at crossing points;
- Improve pavement quality (e.g., width and conditions);
- Improve general cleanliness and maintenance of streets and public areas.

Architectural styles:

- Enhance preservation and conservation of historic areas, buildings, and historic elements such as lampposts;
- Improve interpretation and awareness of such elements, e.g. with interpretation plaques;
- Design walking routes in historic areas, including in historic parks;
- Encourage design and architectures that reflect local identity and genius loci;

Natural elements in cities

- Improve maintenance of natural spaces;

Social liveliness

- Introduce active frontages, outside seating, and public squares;
- Promote place making and community events, e.g. exhibitions, busking, etc.

8.4.5 Healthy walking routes

The previous sections 8.4.1 to 8.4.4 suggested practical interventions and improvements that can be applied to urban settings in the medium to long-term. However, when such interventions are not feasible (e.g. in the short-term, or due to financial or practical constraints), additional strategies to increase walking levels and to promote healthy walking are required. One approach consists in identifying existing walking areas that,

based on the current findings, can support walkers' psychological wellbeing, and then to promote them as healthy walking routes. The process of selecting such healthy walking routes can be based on the criteria that were identified by the current thesis: absence of motor traffic, city busyness, and poor aesthetics; place identity, sense of community, and presence of nature. Healthy routes can then be promoted as incorporated into commute to and/or from work, or as lunchtime walks that can contribute to psychological wellbeing recovery.

It is given below an example of healthy walking route in Bristol city centre. The circular route (1.1 mile; 21-minute walk) was informed by the research findings, and goes through quiet traffic-free or light traffic areas that have a mix of natural elements, historic architectural styles, and social liveliness. The route also presents high-quality walking infrastructure (e.g. crossing points and pavements).

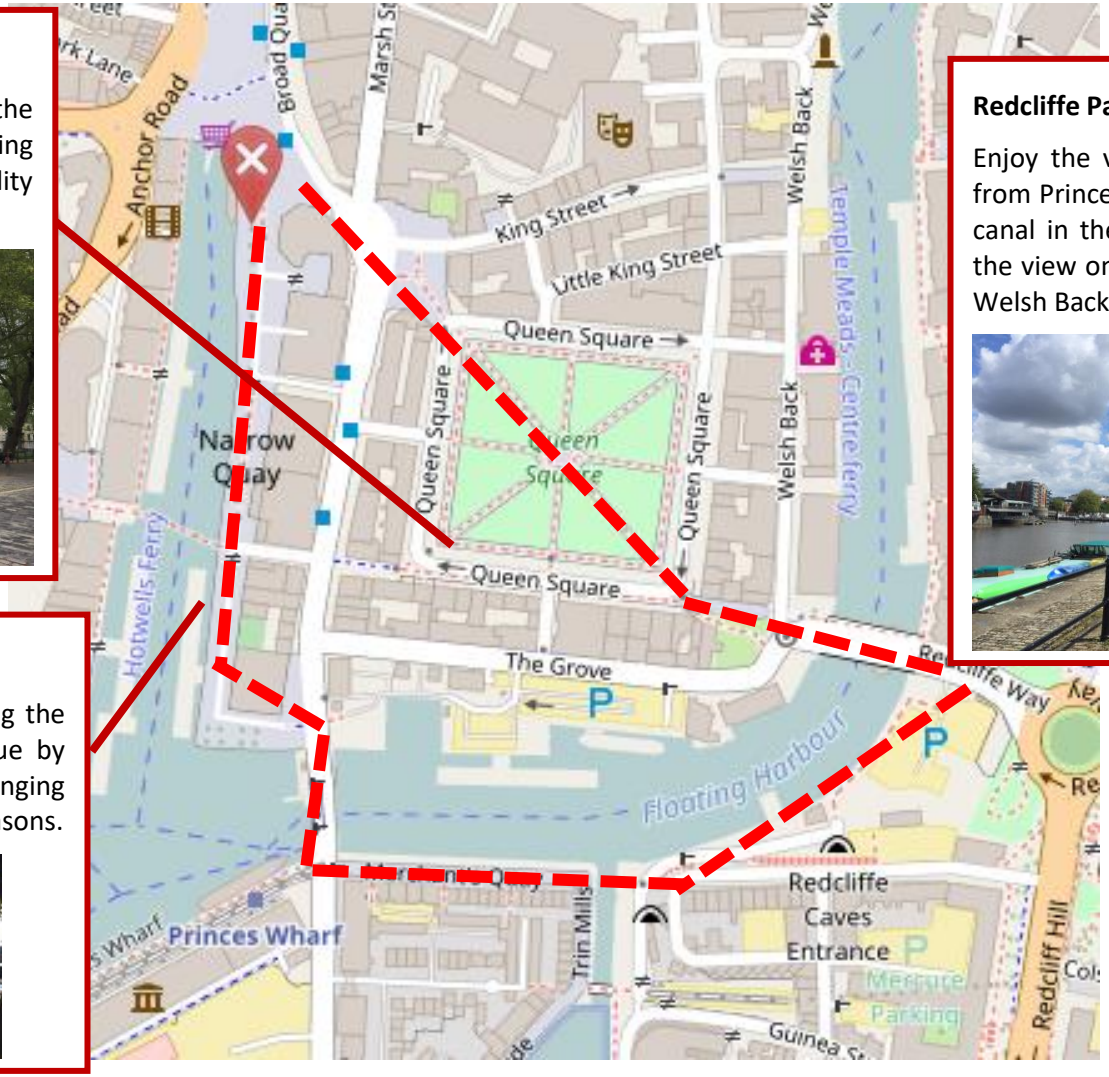
Figure 8-8-3: Wellbeing walk in Bristol city centre Used with permission of the copyright holder© OpenStreetMap contributors

Queen Square

Walk through the garden in the historic square, also taking advantage of the high-quality pedestrian crossing

Broad Quay

Notice the canal and walk along the cobbled street. Read the plaque by Pero's Bridge. Notice the changing colours of leaves in different seasons.



Redcliffe Parade

Enjoy the view of the Harbourside from Princes Bridge. Walk along the canal in the traffic-free area. Enjoy the view on the historic buildings in Welsh Back.

8.5 Final Reflections, Limitations, and Future Research Recommendations

This section reflects on the limitations of this research and suggests avenues for future research based on the research findings and the limitations of the current research.

8.5.1 Studying interaction with environments during a simulated walk

The first point relates to the simulated nature of the experiment. As explained in Chapter 4 and summarised in the current chapter, using a simulated experiment had several advantages. Importantly, it allowed controlling for the physiological effects of physical activity, thus isolating the 'setting effect'. In addition, an online experiment allowed collecting a large amount of responses and reaching the required sample size, while the required 'n' would have been challenging to reach with a field experiment. Compared with the use of photographic slideshows (e.g., Berto, 2005; Staats and Hartig, 2004; Van den Berg, Koole and van der Wulp, 2003), videos have the advantage of containing real sound, which has an important role in restorative outcomes (Conniff and Craig, 2016), and of reproducing the feeling of movement. However, it is acknowledged that the sensory experience of watching a video is limited compared to the real experience of walking. Even though videos did contain sound, other sensory stimuli such as smell and touch (e.g., physical interactions with vehicles) were excluded, and they might represent an important aspect of affective and restorative experiences (Shaw *et al.*, 2015).

Despite this, differences between areas with and without motor traffic were significant and mostly had large effect sizes. In addition, similar research that compared field and laboratory experiences suggests that results are generally consistent (e.g., Johansson, Hartig, and Staats, 2011). Nonetheless, authors have noted that simulations are likely to underestimate restorative and affective benefits (Mayer *et al.*, 2009). Hence, the current post-test assessments of affect might have *underestimated* both the negative effects of walking in areas with motor traffic and the benefits of walking in green areas, thus filtering the real-world affective walking experience. This could also explain why the stress decrease in the park setting was not significant. However, it is argued that such effects were not *overestimates* of actual psychological wellbeing effects. Therefore, as stated in Chapter 4 the measurements can be considered underestimates of real affective walking experiences. Future research

could replicate the current study using a real-world setting. Researchers could seek an opportunity for a natural experiment, for example a road closure or traffic-free development intervention, and assess affective outcomes with and without traffic or before-after intervention. This would verify whether the negative affective outcomes can be isolated to the motor traffic factor.

Finally, related to the researcher-produced videos, it is worth noting that it is particularly challenging and time consuming to produce "objective" videos with similar external conditions (e.g.: weather, time of the day, time of the year, levels of pedestrian traffic). Filming was piloted between September and October 2015, and videos had to be filmed at the same time of the day in order to obtain similar levels of pedestrian flows and similar light conditions, and with similar weather conditions. Additionally, there are unpredictable and uncontrollable factors that have to be taken into account, such as road closures or temporary events. For example, a food market takes place weekly in Corn Street (PedHist), and several events are held periodically in College Green (PedMixed). Hence, it was crucial to avoid such events that drastically change road layout and, therefore, the walking experience. Therefore, these aspects have to be taken into account in future research.

8.5.2 The role of motor traffic and architectural styles

With reference to the role of motor traffic within the experimental phase, it is acknowledged that there are additional factors related to the built environment, other than motor traffic, that might have explained the negative affective outcome in the CommTraf setting. In fact, the qualitative phase revealed that the negative affective outcome in the commercial setting with traffic was attributable to the presence of motor traffic but also to feelings of city busyness and poor aesthetics. A natural experiment assessing the affective walking experience in the same street with and without motor traffic, or before and after pedestrian developments, seems especially suited to isolating the effect of motor traffic on the affective walking experience.

In addition, future research could attempt to verify the impact of smart city technologies on the affective walking experience. These could include, for example, assessment of whether walking in environments with electric vehicles and/or automated vehicles is less stressful than walking in presence of traditional non-automated fuel ones. Future research could also test

the impacts on psychological wellbeing of pedestrian smart transportation systems, for example by testing whether pedestrian intelligent crossings, in-pavement lighting, and similar technologies support psychological wellbeing during walking.

Future experimental research could also further explore the role of historic character in the restorative experience. The lack of significant differences between the pedestrianised historic environment and the pedestrianised modern one could be explained by the fact that the modern setting was still a high-quality setting that can partially support wellbeing too, which is a finding in itself. Nonetheless, the current study did find that a setting with historic elements and little or no natural elements was associated with immediate affective benefits, thus confirming the potential of historic elements to support affect. The affective benefits and perceived restorativeness in PedMixed, PedHist and, partially, PedMod, also warrant further research on the affective potential of the full range of urban settings, other than streets with traffic – including modern environments. Given the general lack of experimental studies assessing the psychological wellbeing benefits of walking in attractive urban settings, further research on the topic is needed. Different kinds of environment in each category could be taken into account to extend these findings, and different research designs and measurements could be implemented (see Section 8.5.5). For example, future research could measure affective and restorative outcomes in different types of historic settings and in different cultural contexts.

In addition, the current findings revealed that static and imposing architectures do not support psychological wellbeing during walking, while detailed, dynamic, human-scale designs seem more suited. Previous research found that the height of development in a locality has a negative impact on restoration (Lindal and Hartig, 2013). Therefore, future research could extend these findings by examining in detail how different architectural characteristics – e.g., size, materials, colours, etc. – influence psychological wellbeing, with the aim of identifying healthy architectures.

The current findings also offer potential relevance to procedures for transport economic appraisals. UK national transport analysis guidance already seeks to consider the wider social and economic impacts of transport interventions. DfT (2014b) includes *Journey quality* as one category of social impacts; journey quality is defined as “a measure of the real and perceived physical and social environment experienced while travelling” (DfT, 2014b, p. 21). According

to DfT (2014b), *Journey quality* might have an impact on travel choices. Specifically, journey quality currently includes three sub-categories: *care* (cleanliness, level of facilities, etc.), *views* (pleasantness of external surroundings), and *stress* (frustration, fear of accidents, and route uncertainty) (DfT, 2014b). However, according to DfT, "quantifying and monetising the journey quality benefits of walking schemes is a developing research area" (2014b, p. 25). Currently, walkers' journey quality is assessed based on a list of criteria: street lighting, kerb level, crowding, pavement evenness, information panels, benches, and directional signage. For example, street lighting is currently valued 3.7 p/km. In this regard, the current thesis has identified a series of elements that can impact journey quality; additional elements that emerged from this thesis that should be monetised, including pedestrianisation schemes, noise and air pollution, quality of pavements, cleanliness of streets, historic and identity elements, active frontages, and public spaces. Therefore, it is argued that the list of criteria currently in use in transport appraisals is not exhaustive of the potential benefits of journey quality, and that such a quantification might represent an underestimate of the value of built environment impact on the walking experience. Future research could quantify the value of these elements and inform transport appraisal procedures.

8.5.3 Natural settings and restoration

The results showed that stress recovery is not just a matter of park size. Nordh *et al.* (2009) attested that the amount of grass surface is the primary element that increases restoration likelihood, but that park design and features can also have an influence. Hence, the current results confirm this idea. In addition, due to the fact that the effect of nature on affective outcomes was not the focus of this research, measures of perceived and actual naturalness (e.g., amount of green surface) were not included, while these might have an impact on affective outcomes. Assessing how perceived naturalness and park design influence restoration could therefore also be an avenue for future research.

Second, within the current research the pedestrianised setting with green and historic elements scored as the most restorative. In addition, the interviews revealed that the Harbourside area has high restorative value too. Previous research has found that spending time in urban green cemeteries supports restoration (Evensen, Nordh, and Skaar, 2017). Importantly, the two cemeteries taken as case-study areas were 19th century historic

cemeteries; hence, it is speculated that the restorative benefits might have been also related to the historic character of cemeteries. Future research could explore whether the combination of green/blue and historic elements aids restoration looking at further examples of historic parks and green or blue settings with historic elements – e.g., maritime heritage.

Third, the interview phase revealed that when green spaces are crowded, restorative effects might be lower. Future research could further explore the relationship between number of people and the affective walking experience and quantify the optimal level of social liveliness that enables affective and restorative benefits. The topic is worthy of attention in both urban settings and natural contexts, with the former being important for urban planning and design policies, and the latter to inform natural space management.

Finally, Chapter 6 highlighted the role of personal associations, nature connectedness, and place identity in affective outcomes. It is advised that person-centred processes of restoration (Ratcliffe and Korpela, 2017, 2016) should receive more attention from scholars. Qualitative approaches seem to be particularly suited to explore both the reasons why nature is restorative and the restorative potential of built settings in relation to personal associations.

8.5.4 Limitations related to research participants

There are also some limitations related to research participants. One aspect is related to the fact that participants were volunteers, and most of them were either heavy or medium walkers. It is possible that by interviewing light-walkers or non-walkers further themes (especially barriers to a positive walking experience) would have emerged. However, this is countered by the view that existing experienced walkers could offer the best insight on the affective walking experience, hence the analysis was rich and thick (Braun and Clarke, 2006), thus respecting high quality standards for qualitative research. In addition, research participants were relatively young adults. The mean age within the experimental phase was 35, and 31 within the interview phase. Therefore, findings on barriers and enablers to a positive affective walking experience may not be entirely generalizable to specific populations such as older adults, women, and ethnic minorities. For example, older individuals may prioritise functional, standard pavements over old pavements such as cobblestoned designs (e.g., Tilley *et al.*, 2017), while ethnic minorities might have different perceptions over the historic features of the urban realm. Because of this, future research on the affective walking

experience could focus on specific socio-demographic groups such as older people (e.g., Tilley *et al.*, 2017), women, or ethnically diverse groups.

A further limitation is related to the employee sample within the experimental phase. This study employed a sample of individuals working in Bristol in addition to the student sample in order to obtain a broader picture of the affective walking experience. It is noted that involving general populations, as opposed to psychology student populations, entails challenges. First, it is time-consuming to recruit working adults. Second, issues of incompletion can arise. In fact, among employees there was a significant proportion of missing values in the affective scales (14%), possibly due to participants' poor familiarity with psychometric affective scales. Hence, 98 cases were excluded from the analysis because scales were incomplete – e.g., more than one item was missing in a 4-item scale. When one single item was missing, a strategy of simple mean imputation within each participant was adopted, which is "the most desirable method for imputing both the random and non-random missing items in the psychometric scale construction" (Siddiqui 2015, p. 1). It is acknowledged that such a procedure might have affected some of the results. However, a series of separate analyses with different imputation methods was carried out, and results did not vary.

Despite this limitation, the existence of minor between-groups differences stresses that employees offered a further insight on the restorative experience, and supports the idea that research should involve different socio-demographic groups other than students in order to uncover further aspects and experiences related to affective outcomes (see Chapters 5 and 6). Specifically, the existing literature on restorative environments is heavily based on university participants, notably students and, to a lesser extent, university staff (see for example Van den Berg, Jorgensen and Wilson, 2014; Johansson, Hartig, and Staats, 2011; Karmanov and Hamel, 2008; Hartig *et al.*, 2003). Psychology students represent an optimal convenience sample for psychology studies, and the advantages are clear in terms of recruitment and practicalities. Participating students often receive financial vouchers or academic credits in exchange of participation, with Undergraduate programs sometimes including participation in research credit requirements. On the other hand, involving students in research has the limitation of poor generalisability of results (e.g., Bowler *et al.*, 2010). If the current study was solely based on a student sample, several nuances would have been missed out. Hence, notwithstanding the limitations of employing employee samples, it is

argued that, first, student or academic groups should not be over-represented in experimental studies, and it should be preferable to target more diverse populations. In other words, it is argued that a more critical (e.g., post-positivist) approach should be taken in the study of affect and restoration. By acknowledging that different groups have different characteristics, further aspects of restorative processes might be uncovered.

Second, it is crucial to be transparent about study participants' characteristics and to avoid assuming that results (e.g., from student and/or non-student populations) are generalizable to broader populations. Third, researchers should include measures of socio-demographics, spatial variables, but also measures of personal attitudes and values in order to be fully aware of the characteristics of the research sample. In fact, the qualitative phase suggests that the affective walking experience can be influenced by variables such as levels of nature connectedness, sense of community, or place-related variables (e.g., number of years spent in city environments and/or rural settings; place attachment and place identity). Future research could, for instance, assess how affective and restorative experiences in natural and urban contexts are influenced by residential location, sense of community, place attachment, and place identity (Ratcliffe and Korpela, 2017). In particular, Morton, van der Bles, and Haslam's (2017) research on the role of identity in cognitive restorative processes could be extended to an investigation of how identity influences affective restoration.

8.5.5 Measurements

There are also some limitations related to the measurements within the experimental study. First, the energy subscale within the UWIST MACL scale (Matthews, Jones, and Chamberlain, 1990) had fairly low but acceptable reliability ($\alpha = .503$) within the current research, and possibly related to this no time-energy interaction nor between-settings differences were detected. Consequently, energy was not considered when interpreting results, and was not included in the subsequent regression analyses (Chapter 7). Future research should consider this limitation relative to the UWIST MACL scale when selecting the affective scale for the study. Despite this limitation, it is argued that the chosen scale is still a more valid alternative to traditional and popular scales such as the POMS (Profile of Mood Scale) (see Chapter 4). In fact, in his guide on measurement of affect for health-behavioural research, Ekkekakis (2013) illustrates that many existing studies on affective benefits of physical activity do not offer a

clear rationale for the choice of the affective scale. According to the same author, scholars often rely on the traditional scales such as the POMS despite these often being "not grounded onto solid theoretical basis" (Ekkekakis, 2013, p. 210). Consequently, it is recommended that future research should make informed, transparent choices on affective scales. In this regard, it is noted that excitement, rather than energy, may be a relevant variable for the study of affective experiences of walking in urban settings. Hence, the affective states *excitement* and *boredom* may be included in future research.

Second, quantitative findings are based on self-reported data, which may be subject to response bias. Nonetheless, previous research indicates that self-reported and physiological measures are generally consistent (Johansson, Hartig, and Staats, 2011). The use of electroencephalogram (EEG) was piloted within the current PhD research, but it presented several challenges that went beyond the scope of a PhD project (see Chapter 4). Future non-PhD research could extend these findings employing physiological measurements such as EEG (Tilley *et al.,* 2017; Aspinall *et al., 2013*). However, researchers have noted the challenges related to the use of physiological measurements, as these are not always consistent with participants' verbal accounts (Osborne and Jones, 2017; Tilley *et al.,* 2017; Spinney, 2015). Hence, physiological measurements are best supported with participant interviews. Here is it is notable that recent research has accompanied mobile EEG measurements with verbal accounts to assess mobile experiences of walking (Tilley *et al.*, 2017) and cycling (Jones *et al.*, 2016). Therefore, mixed-methods designs that also include qualitative research are especially recommended. In addition, it is acknowledged that the quantitative phase of this research has measured immediate affective states, while these may not reflect enduring, medium-term affective states. Therefore, future research could include stimuli with a longer time span in order to assess medium-term affective benefits.

Third, within the quantitative phase no stressor was used, and the analysis was based on the natural stress levels of participants. This decision was also justified by the general poor psychological wellbeing of urban populations (Peen *et al.*, 2010), as it was expected that participants would be generally stressed and in need of restoration. This was partially confirmed, as participants were in a neutral affective state pre-test – even though not acutely stressed. In addition, this choice was guided by the pragmatic epistemological stance of the thesis. In fact, the use of stressors is widespread in the literature on restorative environments

and aims to ensure that research participants' mental state is heavily depleted pre-test in order to assess the potential of settings to aid recovery. Stress-inducing tools include the completion of a cognitive task – in when testing cognitive restoration (e.g., Berman, Jonides and Kaplan, 2008) or the viewing of a particularly disturbing video – when testing affective restoration (e.g., Van den Berg, Jorgensen and Wilson, 2014). Some researchers have used vignettes and asked participants to imagine being in a stressful mental state (e.g., Staats and Hartig, 2006), while other studies involved participants who were likely to be in a depleted mental state – e.g., right after resit exam (Karmanov and Hamel, 2008). However, it is questioned whether such an artificial stress/fatigue state actually reflects a realistic scenario. Arguably, practical relevance of examining recovery from natural/chronic stress, rather than artificially-induced acute stress, is stronger. In fact, the current research tested the influence of a simulated walk on general affective states, rather than exclusively focus on a depleted mental state. However, future research could investigate the psychological wellbeing effects of walking in attractive urban settings following artificial stress induction in order to verify the potential of attractive urban settings to specifically support recovery from heavily depleted mental states.

8.5.6 Reflections on the photo-elicitation method

The use of photo and video-elicitation was very effective in uncovering affective appraisals related to the built environment and related walking intentions. It is argued that the use of photographs highlighted details, experiences, and memories that a traditional interview method would have likely failed to uncover, thus confirming Tilley *et al.*'s ideas (2017). Compared to a verbal reference, watching the videos made it easier to participants to identify the specific areas. Also, even when one area was not known to participants, the discussion was facilitated by the visual aid, and it was possible for participants to rationally evaluate the affective quality of a setting. Discussing the videos that were used during the online experiment allowed interpreting the affective appraisals identified within the experiment (Spinney, 2015). Similarly to interpreting bio-sensing data (Spinney, 2015), the discussion enabled a deeper understanding of the psychometric ratings, allowing identifying the elements of the surroundings that caused a specific affective response. With regard to RQ3, the photo-voice approach provided a deeper insight into how environments influence

affective states and how the quality of walking influences walking intentions. While walkability research stands on the deterministic assumption that physical characteristics produce walking behaviours, the qualitative approach offered a more critical analysis of the complex relationship between individuals and place (Chapter 7).

The photo-elicitation implementation was easy and straightforward, as the entirety of the sample owned a smartphone and was familiar with the use of technology. Photographs were shared before the interview via web-sharing providers. To this end, communication with participants was crucial, as it was to give clear instructions on the task. However, it is acknowledged that the mechanisms might not be effective when different groups are involved, such as older citizens, young people, or groups not familiar with technology. The use of photographs also facilitated the interview by reinforcing the participant's rapport and offering informality. In a way, the impression is that sharing personal photographs with the researcher can contribute to break the ice and build trust between participants and researcher, thus confirming previous ideas (Hurworth, 2004).

The issue of photographs as representation was carefully considered by the researcher. However, no issues of "credibility" (Guell and Ogilve, 2013) emerged. However, it has to be stressed that the interview discussion was crucial to capturing a specific narrative from the photographs, as photographs as standalone data would have meant little without participants' explanations. In this sense, interviewees' verbal interpretations were crucial to fully catch the value of the information (Frith and Harcourt, 2007).

In some cases, participants noted that photographs did not fully reflect their experience and perceptions and failed to capture their experiences, as already reported by Guell and Ogilve (2013), For example, in some cases the photographs failed to depict the amount of motor traffic, which looked in the picture "more quiet than it was", or a "lovely road [which] doesn'*t* look as good from the picture". Hence, it is recommended that future research should give priority to participants' verbal accounts alongside photographs.

The issue of disruption of normality was also object of reflection during the interviews. Participants acknowledged that they looked at things differently than they normally would:

> *I noticed many more things. Obviously I always knew I didn't like it [the trash on the street], but I don't normally take that much interest in my surroundings, and I*

found this in the whole walk, there is a lot of things that normally I wouldn't have… things I look at, but I wouldn't know why I look at, which was very interesting (Julia, HW-N-20).

Similarly, Guell and Ogilve (2013) noted that in some cases participants 'discovered' enjoyment through the photographing task, with photographs privileging a new perspective on commuting. Therefore, the researcher carefully considered the role of the photo-task. However, it is argued that the task enabled participants to consciously identify the object of affect, but never influenced the affective appraisal itself. In other words, the affective outcome would have taken place even in absence of the photo task, and the exercise contributed to 'break the frame' and aid reflection (Harper, 2002). As Julia explained, there are things she looks at, but she "wouldn'*t* know why" she looks at. According to James, the process made him think consciously of what he was thinking unconsciously:

It was quite interesting to take pictures actually. It was good, fun, it worked quite well; it made me think of what I was looking at, of what I was thinking. Quite a good process. It is quite subconscious, but then you consciously think of what you're thinking about (James, MW-U-37).

Therefore, future research based on photo-elicitation should take these issues into account and carefully consider, during both the interview phase and analysis, how the photographic task might affect participants' accounts.

Finally, it is argued that the exercise made participants reflect on the value of walking and its surroundings. Analogously to Guell and Ogilve's (2013) experience, the photographing task made participants more aware of the surroundings and in some cases it made them (re)discover the joy of walking. This is something that might have a positive impact in the future:

I guess next time I'll go for a walk I'm not gonna phone people, and have a look around really! It was very good for me as well! (James, MW-U-37).

Hence, the use of photo-elicitation methods in future research is encouraged, both in walking-related research and in restorativeness research.

8.5.7 Contingent factors

Finally, there are some contingent factors related to timing of data collection that might have influenced results. First, data collection was conducted when the MetroBus[20] city centre improvements were taking place in Bristol. It is acknowledged that the redevelopment scheme heavily affected the walking experience in some city centre locations, and this might have negatively influenced participants' perceptions reported during the interviews – even though experimental settings were not affected by roadworks. Second, the timing of data collection might have influenced affective and restorative benefits of nature contact. In fact, this took place between summer and early autumn, a time of the year when weather conditions generally aid the walking experience, as opposed to winter months. Also, nature details are particularly noticeable and pleasant during that time of the year – e.g., changing colours of leaves, long hours of daylight, etc. – hence it is possible that if data collection had taken place during winter months, participants' accounts might have been different. Third, experimental stimuli and following interviews focused on walking experiences with daylight, with little discussion on how such experience changes in different times of the day. Therefore, future research could examine the affective walking experience in different times of the year – e.g., winter months – and of the day – e.g., after dark. Suggestions for future research are summarised in Box 8.2.

[20] The MetroBus scheme aims to build a rapid public transport system in Bristol. Road works affected the city centre; they started in 2015 and will conclude in 2018.

Box 8-2: Suggestions for future research

Suggestions for future research

Further explore the affective walking experience in urban settings:

- Replicate the current study using a real-world setting, for example with natural experiment (e.g., road closure or traffic-free development intervention)
- Verify the impact of smart city technologies on the affective walking experience (e.g., pedestrian smart transportation systems, automated and/or electric vehicles).
- Further explore the role of historic character in the restorative experience experimentally in different types of historic settings and in different cultural contexts.
- Explore perceptions of street art and effect on psychological wellbeing.
- Further explore the affective potential of the full range of urban settings, other than streets with traffic – including modern environments.
- Examine how different architectural characteristics – e.g., size, materials, colours, etc. – influence psychological wellbeing.
- Quantify value of enablers and barriers of the affective walking experience related to built environments and inform transport appraisal processes.

Further explore nature restoration:

- Assess how perceived naturalness and park design influence restoration.
- Explore whether the combination of green/blue and historic elements aids restoration looking at further examples of historic parks and green or blue settings with historic elements – e.g., maritime heritage.

- Explore the relationship between number of people and the affective walking experience and quantify the optimal level of social liveliness that enables affective and restorative benefits.
- Use of qualitative approaches to explore both the reasons why nature is restorative and the restorative potential of built settings in relation to personal associations

Participants:

- Focus on specific socio-demographic groups such as older people (e.g., Tilley *et al.*, 2017), women, or ethnically diverse groups.
- Do not over-represent student or academic groups in experimental studies, and it should be preferable to target more diverse populations
- Be transparent about study participants' characteristics and to avoid assuming that results (e.g., from student and/or non-student populations) are generalizable to broader populations.

Measurements and procedures:

- Include measures of socio-demographics, spatial variables, but also measures of personal attitudes and values in order to be fully aware of the characteristics of the research sample, e.g., assess how affective and restorative experiences in natural and urban contexts are influenced by residential location, sense of community, place attachment, and place identity
- Critically consider and justify the choice of the affective construct and psychometric scale (see Ekkekakis, 2013).
- Measure the affective states *excitement* and *boredom*.
- Employ mixed-methods designs with physiological measurements such as EEG supported with participant interviews
- Include stimuli with a longer time span in order to assess medium-term affective benefits.

- Investigate the psychological wellbeing effects of walking in attractive urban settings following artificial stress induction in order to verify the potential of attractive urban settings to support recovery from heavily depleted mental states.

Further employ photo-elicitation methods, both in walking-related and in restorativeness research:

- Give priority to participants' verbal accounts over photographs per se.
- Take into account issues of normality and carefully consider, during both the interview phase and analysis, how the photographic task might affect participants' accounts.

8.6 Conclusions

To summarise, the current thesis made the following contributions to knowledge. First, it has critically examined existing ideas of environmental affect and mobilities and has drawn them together, showing the strengths of such combination (e.g., Gatrell, 2013; Chapters 2 and 3).

Second, the thesis has reviewed empirical evidence on the affective outcomes of walking in urban settings (Chapter 2) and has developed and offered novel empirical, experimental assessment of affective outcomes of walking in different urban settings with and without evident natural elements (Chapter 5). In fact, experimental comparisons between natural *versus* built settings are abundant in the literature (e.g., Roe and Aspinall, 2011; Staats and Hartig, 2006: see Chapter 2 for a detailed literature review); however, to the author's knowledge a comparison of affective and restorative potential among urban settings had not been undertaken hitherto. The current thesis attempted to fill this gap, and revealed that some built walking settings without evident nature can support the affective walking experience and also be perceived as restorative.

Third, the thesis has offered an empirically-based characterisation of barriers and enablers of a positive affective walking experience in built settings based on theories of environmental affect and mobilities (Chapter 6). In relation to the main hypotheses of the current research,

it was shown that absence of motor traffic and presence of historic architectural styles can contribute to the affective walking experience and to restoration.

Finally, the work presented within the current thesis has shown how ideas of environmental affect can inform walkability debates and active travel policies (Chapters 3 and 7). This thesis has assessed empirically the relationship between affective walking experience and walking intentions (Chapter 7), thus contributing to the limited existing literature (e.g., Johansson, Sternudd, and Kärrholm, 2016). Specifically, this research has applied approach-avoidance behaviour theory (Mehrabian and Russell, 1974) to walking behaviours and has shown how these can work in practice. In other words, this research has examined the policy implications of affective and restorative outcomes, and has revealed that a positive affective walking experience can encourage walking.

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APPENDIX 1: OTHER METHODS CONSIDERED FOR PHASE 1

Other methods considered for Phase 1 included psychogeographic methods – e.g.: the use of geo-located data with Geographic Information Systems (GIS) technologies – and intercept surveys. These methods are briefly reviewed below.

The use of geo-located data is becoming increasingly popular within psychogeographic to assess perceptions of different settings and affective responses to place. Methods include the use of existing affective data extracted from social networks (Seresinhe *et al.*, 2017; Seresinhe *et al.*, 2016) and sports tracking applications (Ferrari and Mamei, 2011), but also the production of primary data (Nold, 2009; Ettema and Smajic, 2015; Stanton-Fraser *et al.*, 2012; Hosang, 2016; BMW Guggenheim Lab, 2013). With reference to the production of primary data, some scholars designed their own mobile phone applications to rate wellbeing and affect via psychometric questionnaires (Ettema and Smajic, 2015; Stanton-Fraser *et al.*, 2012; Hosang, 2016), while other studies measured geo-located physiological responses such as galvanic skin response with the support of mobile tools and GPS (Nold, 2009; Jones *et al.*, 2016). In very recent years, several research projects have been designed to investigate the relationship between urban environments and affect using mobile apps; these include, amongst others, London Mood (2014), Urban Mind Project (2015), and a National Geographic project by Daniel Raven-Ellison (2017).

The use of geo-located data has several advantages, such as allowing large recruitments (Hosang, 2016), and not restricting the analysis to a limited number of case-study areas (Hosang, 2016). The method also has high external validity, due to the fact that data are collected in situ – via ecologic momentary assessments. However, the use of geo-located data presents important limitations. First, it does not allow comparing pre and post-walk affective states, hence it is challenging to attribute affective states to specific elements of the surrounding environment. Second, it is a resource-intensive approach which requires technological skills to design mobile apps and, potentially, high costs, with data analysis being time and skill-intensive (Hosang, 2016). Third, arguably using geo-located

data does not allow focusing on the walking experience per se, as it does not give contextual information on social company, baseline affective state, time of the day, weather conditions, etc., which are likely to influence the affective response. For these reasons, the use of the method was excluded.

The use of intercept surveys as research method was also considered. Intercept surveys are a less resource and time-intensive approach than the use of geo-located data. The method allows assessing affective states and perceptions in situ, real time. However, similarly to the use of geo-located data, intercept surveys can be used to assess affective appraisals (see Fornara, 2011), rather than experiences, as they do not allow comparing pre and post-walk affective states. Given the research focus on the walking experience, the method was also discarded, and it was decided that an experimental design would better suit the research questions.

APPENDIX 2: LIST OF COMPANIES PARTICIPATING IN PHASE 1 (ONLINE SURVEY)

Company	n
Bristol City Council	70
Bristol Royal Infirmary	62
University of the West of England (Staff)	40
Burgess Salmon	43
Other	26
Total employee sample	241

APPENDIX 3: ONLINE EXPERIMENT INFORMATION SHEET

Short form (embedded in online survey)

Information sheet

Experiences of walking in urban settings

You are being invited to take part in a research study exploring the experience of walking in urban areas. You will be required to complete a short questionnaire about how you feel before and after watching a 1-minute video of a walk in an urban setting. Additional questions include your opinion about the environment depicted in the video, and your views on some urban areas.

In summary:

- Participation is entirely **voluntary** and **anonymous**
- The questionnaires and video will take **12-15 minutes** of your time
- You can **withdraw** at any time by leaving the web page (i.e., closing the web-page)
- You can **withdraw** your data by contacting the research team within reasonable time.
- By clicking the Next button you are confirming your **consent** to the use of data.
- Full information can be found in the attached file above. Please save the document.

Full information (as PDF attachment to be downloaded and stored):

Information sheet

Experiences of walking in urban settings

Thank you for agreeing to take part in this online survey. Please take the time to read about why the study is taking place and what it will involve. Feel free to ask any questions that you may have by using the contact details below.

What is the aim of the project?

The purpose of this study is to understand peoples' experiences of walking in urban areas. It will look at what are the favourite areas of the city centre of Bristol to go for a walk, and why.

If I choose to participate, what will I have to do?

If you choose to participate, you will have to complete a simple questionnaire about your experience of walking in urban areas. This will only take 12-15 minutes. You can withdraw at any time by leaving the web page (i.e., closing the web-page).

What might I gain from participating?

Participation is entirely voluntary. There are no benefits in participating in the study. Your participation in this study will provide valuable data for a PhD research program aiming to find how certain areas of Bristol are perceived by its users. The survey will also give you a chance to develop and examine your ideas about elements of our surroundings that we sometimes take for granted in our cities.

How will the information that is collected be used?

All the information provided will be kept entirely confidential. The collected information will be evaluated and used for publication but your name will not be used in any reports. If you wish, we would be happy to present a summary of our findings once the information has been evaluated.

By proceeding you are confirming your consent to the use of data. Gathered data will be treated anonymously in accordance with the Data Protection Act 1998; no IP addresses or cookies will be stored. The data may be stored for up to 10-years and used in research publications, but your data/details will always remain anonymous.

What if I wish to withdraw?

You will be given a code that you can use in the event of wanting to withdraw the data. To do so, please contact the research team quoting the code within reasonable time (e.g.: two weeks) after the survey submission in order to exclude your data from academic work.

If you wish to ask any questions about the study, you can contact the researcher using the contact details provided below.

Researcher Contacts

Anna Bornioli

@: Anna2.bornioli@live.uwe.ac.uk

T: 01173326652

University of the West of England

Coldharbour Lane

Bristol

BS16 1Q

APPENDIX 4: COPY OF QUESTIONNAIRE

Walking in Bristol research project

You are being invited to take part in a research study exploring the experience of **walking in urban areas**. You will be required to complete a short questionnaire about **how you feel** before and after watching a 1-minute video of a walk in an urban setting. Additional questions include your opinion about the environment depicted in the video, and your walking habits.

In order to complete the survey you will need a **PC** and make sure that the **sound** is switched on.

- Participation is entirely **voluntary** and **anonymous**
- The questionnaires and video will take **10 minutes** of your time
- You can **withdraw** at any time by leaving the web page (i.e., closing the web-page)
- You can **withdraw** your data by contacting the research team within reasonable time.
- By clicking the Next button you are confirming your **consent** to the use of data.
- **Full information** can be found in the attached file here: Info sheet final . You can save and store this document.

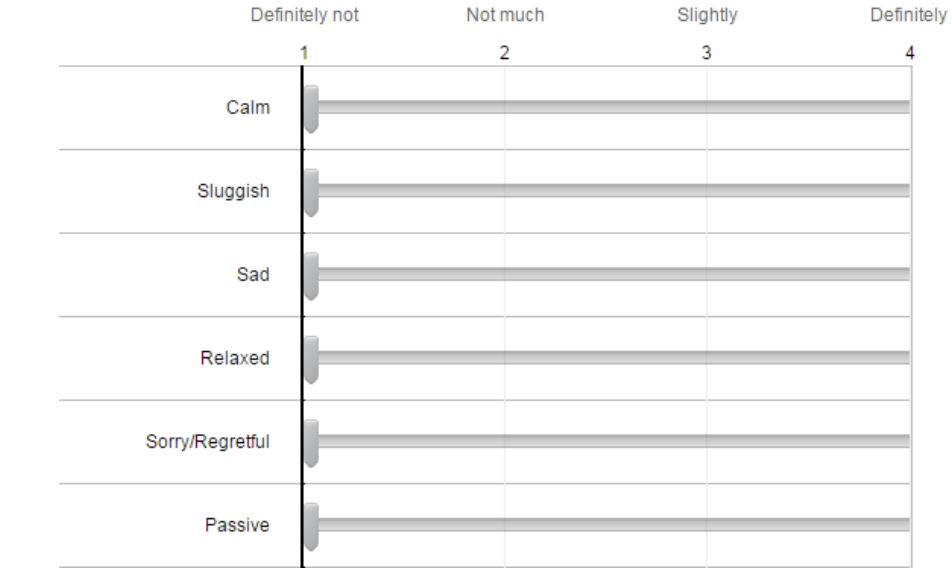
Anna Bornioli

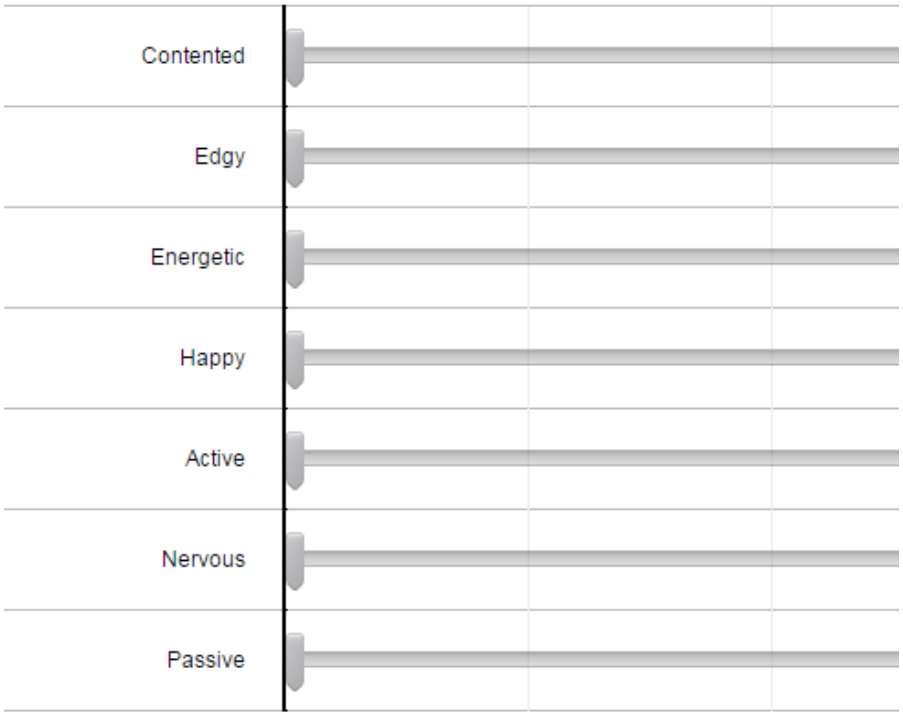
@: Anna2.bornioli@live.uwe.ac.uk
T: 01173287281

University of the West of England
Coldharbour Lane
Bristol
BS16 1QY

I'm going to ask you some questions about **how you feel now.**

In each case move the 'slide' underneath the word at the top that best explains how you feel about each of the emotions in the list on the left had side.





Please watch this 1-minute video. **Imagine you are taking a walk** in this environment during the daytime. Make sure their **sound** is switched on. If you can, please wear **headphones**.

The walk is in Corn Street, in Bristol's Old Town. During Medieval time, it used to be the commercial heart of the city. Today it hosts markets, restaurants and shops.

You just experienced an urban walk through watching the video. How does walking in this area make you feel?

In each case move the 'slide' underneath the word at the top that best explains how you feel about each of the emotions in the list on the left had side.

Definitely not	Not much	Slightly	Definitely
1	2	3	4

Sluggish

Edgy

Sorry/Regretful

Nervous

Sad

Calm

You just experienced an urban walk through watching the video. How does walking in this area make you feel?

In each case move the 'slide' underneath the word at the top that best explains how you feel about each of the emotions in the list on the left had side.

Definitely not	Not much	Slightly	Definitely
1	2	3	4

Passive

Contented

Relaxed

Energetic

Happy

Active

Are you familiar with the area depicted by the video?

- ○ I know the area well
- ○ I know the area a bit
- ○ I don't know the area

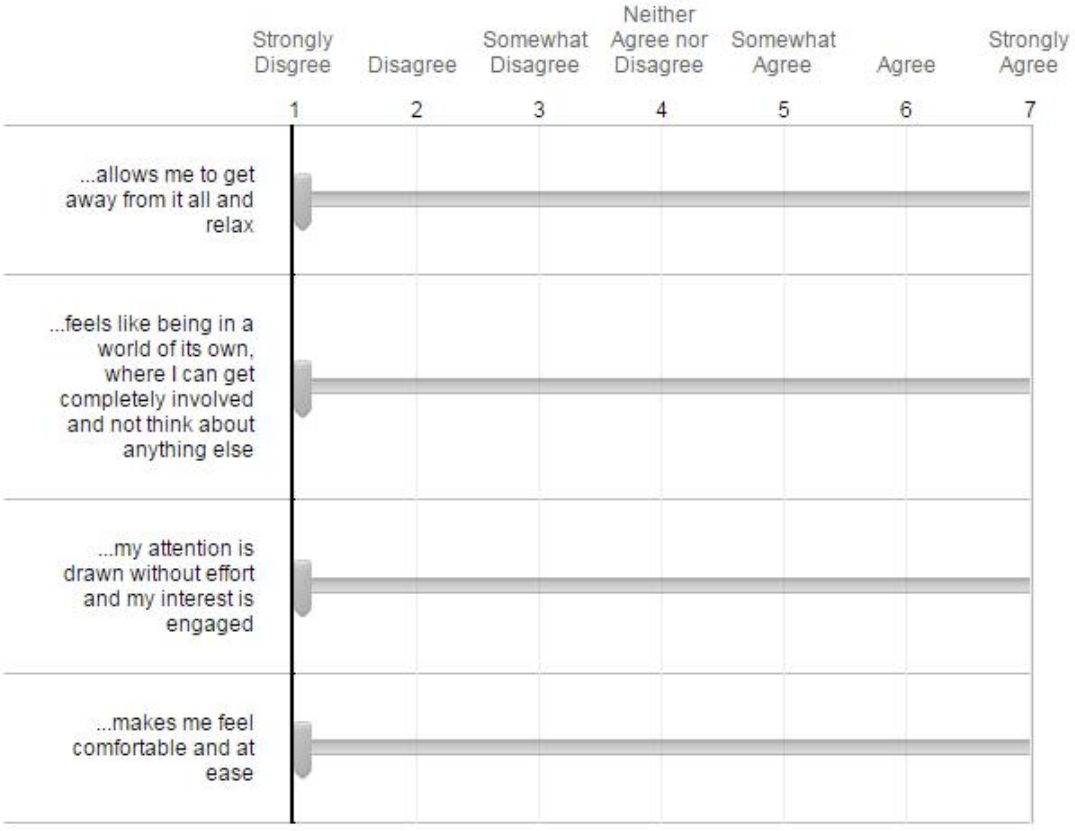
How would you define this setting:

Uninteresting	○	○	○	○	○	Interesting
Average	○	○	○	○	○	Exceptional
Dull	○	○	○	○	○	Exciting
Simple	○	○	○	○	○	Complex
Ugly	○	○	○	○	○	Beautiful
Unfriendly	○	○	○	○	○	Friendly
Unpleasant	○	○	○	○	○	Pleasant
Unenjoyable	○	○	○	○	○	Enjoyable
Repulsive	○	○	○	○	○	Inviting
Impersonal	○	○	○	○	○	Personal

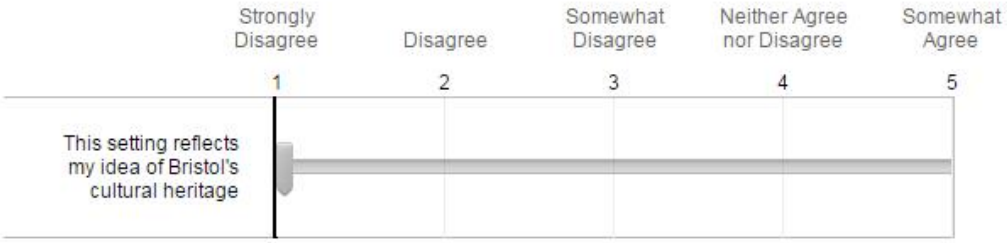
If this kind of environment was on my your way to work, would you be more likely to walk to work more often?

How much do you agree with the following statements?

Walking in this setting...



How far do you agree with the following statement?



What is your age?

Your gender:

- Female
- Male
- Other
- Prefer not to say

What is you main mode of travelling to work?

- Car
- Bus
- Train
- Bike
- Walk
- Other

Do you use any other means of travelling to work as well as the main mode stated above?

- ○ Bus
- ○ Car
- ○ Train
- ○ Bike
- ○ Walk
- ○ Other
- ○ No, I don't use any other means of transportation

How often do you walk for at least 30 minutes a day?

- ○ Every day
- ○ 2 - 3 times a week
- ○ Once a week
- ○ Less than once a week
- ○ I never walk 30 minutes a day

Please provide your full postcode (optional):

This is so we can compare the views of people living in different areas.

Please note that you cannot be identified from this information and thus your anonymity is fully protected. This information will only be used within the context of this research project and will not be shared with other agencies or organisations.

What device have you used to complete the survey?

- ○ Computer (screen no smaller than 10")
- ○ Computer (screen smaller than 10")
- ○ Tablet or smartphone

Was the audio working?

- ○ Yes
- ○ No

APPENDIX 5: LINKS TO EXPERIMENTAL VIDEOS

PedHist: https://goo.gl/LU2TSF

PedMod: https://goo.gl/kAXv5E

PedMixed: https://goo.gl/8E4Yeb

CommTraf: https://goo.gl/me9sk6

Park: https://goo.gl/DFKcWa

APPENDIX 6: INTERVIEW SCHEDULE

Section 1: Participant-led discussion:

[Encourage the participant to talk freely about the walk]

Prompts if needed:

- Tell me about your walk, how was it?
- How did you feel?
- What areas did you like the most, and why?

Section 2: Researcher-led discussion:

[If not covered during Section 1]

1. **Experiences and perceptions of environments during walking:**

[Select environment from video]

<u>How was it like to walk here? Why?</u>

- Could you please describe area (attractive/interesting/etc.)?
- What did you like and what you didn'*t* like about the surroundings? Did you enjoy the surroundings?
- What were your feelings? Was it stressful, relaxing, enjoyable…? What aspects made it stressful/relaxing/enjoyable?
- Why did you choose to walk here (during commuting or leisure)?
- Did you find the setting attractive? How would you compare it to [location b]?

2. **Leisure/free time in urban environments:**

<u>Do you spend your free time walking here (or in other environments)?</u>

- Why?
- Could you describe a recent time in which you went here to spend your free time?
- What did you like and what you didn'*t* like about spending your free time here?
- Do you have any memories about this place? Do you have a personal connection with this place? To what extent do you think that this place is significant in the history of Bristol?
- Where do you go when you need to relax?

<u>Additional questions on perceived restorative properties:</u>

- What are the things that drew you in, or captured your attention?
- To what extent did you feel you were able to lose yourself in another world?
- To what extent did it make you more thoughtful or reflective?

- To what extent did you feel refreshed and better able to concentrate on things?

3. Role of traffic and urban quality in wellbeing outcomes:

[Select from video an area of poor urban quality, or pedestrianised, or high traffic]

How was it like to walk here? Why?

- What did you think about the motor-traffic? Would it be different if motor-vehicles were not here?
- What did you think about the urban quality (the aesthetics of buildings and environment in general)?

APPENDIX 7: INTERVIEW INFORMATION SHEET

Interview Information sheet

Investigating the experience of walking in the urban environment

Anna Bornioli

PhD Student with Centre for Transport and Society, University of the West of England, Bristol

Anna2.bornioli@live.uwe.ac.uk

T: +44 (0)117 32 87281

Thank you for agreeing to receive more information about taking part in a PhD interview. Please take the time to read about why the study is taking place and what it will involve. Feel free to ask any questions that you may have.

What is the research about, and what will it do?

The purpose of this study is to understand peoples' experiences of walking in Bristol city centre. It will look at the preferred and less preferred areas to walk in, and why.

What will it involve?

I would like you to take some photographs during a walk in Bristol city centre and then to meet with me for an interview to discuss your walk. The walk can be your commuting to work, or a stroll in the centre during your free time.

You can photograph the things of the surroundings that draw your attention during the walk, that make you feel good or bad (e.g.: buildings, trees, crossing points, other pedestrians, cars, etc. Anything that affects your journey!). You can use your smartphone or camera, or if you prefer I can provide you with the equipment.

The interview will last no longer than 60 minutes and may well be shorter than this. It will start with a recap of what it will involve and with you signing a consent form to take part in it and you having the opportunity to ask me any questions you may have. It will be recorded onto a digital Dictaphone.
We can be flexible about where we do the interview: for example, at your house, at one of the UWE campuses or in a quiet café.

What will happen to the comments I contribute?

Our conversation will be written down using the recording. Then the ideas you have and comments you make may be quoted, always under a fictional name, in the final PhD report, and possibly in other documents such as academic journal papers.

If you give your consent, your recorded video, and some still images taken from it, could be used in academic journal papers and other publications, but anonymity and confidentiality will be maintained.

Will my taking part be confidential?
Yes, the final report will be completely anonymous: any of your comments that are quoted will be quoted under an alias name and any images used will not show you.

What might I gain from participating?
Participation is entirely voluntary. You may find discussing your experiences of walking interesting. In addition, you would be helping me to complete my PhD thesis. Finally, you would help to understand of the elements of Bristol that contribute to a positive or negative pedestrian experience in academic and policy making circles.

What if I wish to withdraw?
You may withdraw from the research at any time and any information you have provided will be deleted.

Who can I contact for more information?
Please feel free to contact me for further information using the details at the beginning of this information sheet.

APPENDIX 8: INTERVIEW CONSENT FORM

Interview Consent Form

Investigating the role of urban design in the walking experience

Anna Bornioli, PhD Student with Centre for Transport and Society, University of the West of England, Bristol

Please tick the appropriate boxes, and then sign the form below

☐ I have read and understood the Project Information Sheet related to this project and I have been given the opportunity to ask questions about the project.

☐ I understand that my taking part is voluntary; I can withdraw from the study at any time and I will not be asked any questions about why I no longer want to take part

☐ I agree to the interview being audio recorded.

☐ I understand that any personal details that I may provide, such as name, email address, phone number or postal address will not be revealed to people outside the project.

☐ I understand that my words, photos and videos of my journey may be quoted in publications, reports, web pages, and other research outputs but my name or other identifyung information will not be used.

☐ I understand that other researchers may have access to this data provided that they agree to preserve the confidentiality of that data and if they agree to the terms I have specified in this form.

☐ I understand that other researchers may use anonymous quotes or video recordings of my journey from any report created in this study in publications, reports, web pages, and other research outputs according to the terms I have specified in this form.

Name of Participant _____ Signature _____

Date _____

APPENDIX 9: ETHICAL APPROVAL

University of the West of England
BRISTOL

Faculty of Health & Applied Sciences
Glenside Campus
Blackberry Hill
Stapleton
Bristol BS16 1DD

Tel: 0117 328 1170

UWE REC REF No: FET.15.08.001 Bornioli

3 November 2015

Anna Bornioli

Department of Geography and Environmental Management

Faculty of Engineering and Technology

Frenchay Campus

Bristol, BS16 1QY

Dear Anna

Application title: Affective responses to walking in pedestrianised historic environments: moderating effect of setting and traffic levels

I am writing to confirm that the Faculty Research Ethics Committee are satisfied that you have clarified all the conditions and the study can now be approved, however the full contact details (i.e. full postal address) of the researcher needs to appear on the Info Sheet and also include Centre for Transport and Society.

You must notify the committee in advance if you wish to make any significant amendments to the original application using the amendment form at

http://www1.uwe.ac.uk/hls/research/researchethicsandgovernance.aspx

Please note that any information sheets and consent forms should have the UWE logo. Further guidance is available on the web: http://www1.uwe.ac.uk/aboutus/departmentsandservices/professionalservices/marketingandcommunications/resources.aspx

The following standard conditions also apply to all research given ethical approval by a UWE Research Ethics Committee:

1. You must notify the relevant UWE Research Ethics Committee in advance if you wish to make significant amendments to the original application: these include any

changes to the study protocol which have an ethical dimension. Please note that any changes approved by an external research ethics committee must also be communicated to the relevant UWE committee.

2. You must notify the University Research Ethics Committee if you terminate your research before completion;

3. You must notify the University Research Ethics Committee if there are any serious events or developments in the research that have an ethical dimension.

Please note: The UREC is required to monitor and audit the ethical conduct of research involving human participants, data and tissue conducted by academic staff, students and researchers. Your project may be selected for audit from the research projects submitted to and approved by the UREC and its committees.

We wish you well with your research.

Yours sincerely

Alistair Clark

Dr Alistair Clark

Chair, Faculty Research Ethics Committee

c.c Dr Graham Parkhurst

University of the West of England
BRISTOL

Amendment to Existing Research Ethics Approval

Please complete this form if you wish to make an alteration or amendment to a study that has already been scrutinised and approved by the Faculty Research Ethics Committee and forward it electronically to the Officer of FREC (researchethics@uwe.ac.uk)

UWE research ethics reference number:	FET/15/08/001
Title of project:	Affective responses to walking in pedestrianised historic environments: moderating effect of setting and traffic levels
Date of original approval:	*3.11.2015*
Researcher:	Anna Bornioli
Supervisor (if applicable)	*Prof Graham Parkhurst*

1. Proposed amendment: Please outline the proposed amendment to the existing approved proposal.

It is proposed the use of photographs during the interview to integrate the use of self-recorded videos (that was already approved by the committee). Participants will be instructed to take photographs during their walking journey, in particular to photograph the elements of their surroundings that catch their attention. Participants will be given the option to use their smartphone or other personal equipment to take the photographs, or to use a photo-camera provided by the researcher.

2. Reason for amendment. Please state the reason for the proposed amendment.

After conducting three interviews with videos, the researcher believes that photographs may enrich the discussion during the interview and provide more valuable information. Also, photographs will be used in case of a video-camera technical failure.

3. Ethical issues. Please outline any ethical issues that arise from the amendment that have not already addressed in the original ethical approval. Please also state how these will be addressed.

No further ethical issues are identified.

To be completed by supervisor/ Lead researcher:

Signature:	*Graham Parkhurst (by email)*
Date:	*28/07/16*

To be completed by Research Ethics Chair:

Send out for review:	☐ *Yes* ☒ *No*
Comments:	
Outcome:	☒ *Approve* ☐ *Approve subject to conditions* ☐ *Refer to Research Ethics Committee*
Date approved:	*29 July 2016*

Signature:	*Alistair Clark*(by email)

Guidance on notifying UREC/FREC of an amendment.

Your study was approved based on the information provided at the time of application. If the study design changes significantly, for example a new population is to be recruited, a different method of recruitment is planned, new or different methods of data collection are planned then you need to inform the REC and explain what the ethical implications might be. Significant changes in participant information sheets, consent forms should be notified to the REC for review with an explanation of the need for changes. Any other significant changes to the protocol with ethical implications should be submitted as substantial amendments to the original application. If you are unsure about whether or not notification of an amendment is necessary please consult your departmental ethics lead or Chair of FREC.

APPENDIX 10: KRUSKAL WALLIS OUTPUTS

A Kruskal-Wallis H test showed that there was a statistically significant difference in hedtone score between the different setting groups, $\chi^2(4) = 41.203$, $p = .000$, and in stress scores between the different setting groups, $\chi^2(4) = 62.276$, $p = .000$.

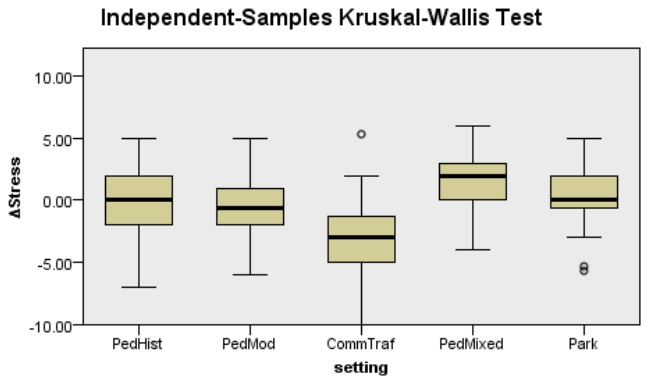
Test Statistics[a,b]

	Energy	Hedtone	Stress
Chi-Square	4.358	41.203	62.276
df	4	4	4
Asymp. Sig.	.360	.000	.000

a. Kruskal Wallis Test

b. Grouping Variable: setting

Δstress graphs and pairwise comparisons (SPSS outputs)



Total N	236
Test Statistic	62.276
Degrees of Freedom	4
Asymptotic Sig. (2-sided test)	.000

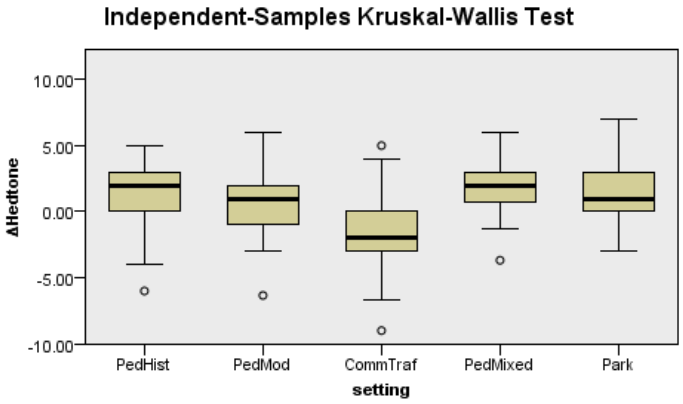
1. The test statistic is adjusted for ties.

Each node shows the sample average rank of setting.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
CommTraf-PedMod	52.915	14.020	3.774	.000	.002
CommTraf-PedHist	67.177	14.524	4.625	.000	.000
CommTraf-Park	-79.580	13.617	-5.844	.000	.000
CommTraf-PedMixed	-104.266	13.947	-7.476	.000	.000
PedMod-PedHist	14.263	14.524	.982	.326	1.000
PedMod-Park	-26.665	13.617	-1.958	.050	.502
PedMod-PedMixed	-51.352	13.947	-3.682	.000	.002
PedHist-Park	-12.402	14.136	-.877	.380	1.000
PedHist-PedMixed	-37.089	14.453	-2.566	.010	.103
Park-PedMixed	24.687	13.542	1.823	.068	.683

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Δhedtone graphs and pairwise comparisons (SPSS outputs)



Total N	237
Test Statistic	41.203
Degrees of Freedom	4
Asymptotic Sig. (2-sided test)	.000

1. The test statistic is adjusted for ties.

Each node shows the sample average rank of setting.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
CommTraf-PedMod	52.915	14.020	3.774	.000	.002
CommTraf-PedHist	67.177	14.524	4.625	.000	.000
CommTraf-Park	-79.580	13.617	-5.844	.000	.000
CommTraf-PedMixed	-104.266	13.947	-7.476	.000	.000
PedMod-PedHist	14.263	14.524	.982	.326	1.000
PedMod-Park	-26.665	13.617	-1.958	.050	.502
PedMod-PedMixed	-51.352	13.947	-3.682	.000	.002
PedHist-Park	-12.402	14.136	-.877	.380	1.000
PedHist-PedMixed	-37.089	14.453	-2.566	.010	.103
Park-PedMixed	24.687	13.542	1.823	.068	.683

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

APPENDIX 11: SPSS OUTPUTS

Mixed ANOVA (2 groups x 5 settings x 2-time stages) – Section 5.2.5.3

Stress

Multivariate Tests[a]

Effect		Value	*F*	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
time	Pillai's Trace	.010	2.496[b]	1.000	239.000	.115	.010	2.496	.350
	Wilks' Lambda	.990	2.496[b]	1.000	239.000	.115	.010	2.496	.350
	Hotelling's Trace	.010	2.496[b]	1.000	239.000	.115	.010	2.496	.350
	Roy's Largest Root	.010	2.496[b]	1.000	239.000	.115	.010	2.496	.350
time * setting	Pillai's Trace	.294	24.856[b]	4.000	239.000	.000	.294	99.422	1.000
	Wilks' Lambda	.706	24.856[b]	4.000	239.000	.000	.294	99.422	1.000
	Hotelling's Trace	.416	24.856[b]	4.000	239.000	.000	.294	99.422	1.000
	Roy's Largest Root	.416	24.856[b]	4.000	239.000	.000	.294	99.422	1.000
time * Participgroup	Pillai's Trace	.000	.003[b]	1.000	239.000	.957	.000	.003	.050
	Wilks' Lambda	1.000	.003[b]	1.000	239.000	.957	.000	.003	.050
	Hotelling's Trace	.000	.003[b]	1.000	239.000	.957	.000	.003	.050
	Roy's Largest Root	.000	.003[b]	1.000	239.000	.957	.000	.003	.050

time * setting * Participgroup	Pillai's Trace	.054	3.408[b]	4.000	239.000	.010	.054	13.634	.848
	Wilks' Lambda	.946	3.408[b]	4.000	239.000	.010	.054	13.634	.848
	Hotelling's Trace	.057	3.408[b]	4.000	239.000	.010	.054	13.634	.848
	Roy's Largest Root	.057	3.408[b]	4.000	239.000	.010	.054	13.634	.848

a. Design: Intercept + setting + Participgroup + setting * Participgroup
Within Subjects Design: time
b. Exact statistic
c. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: STRESS
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	*F*	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	36673.448	1	36673.448	11055.354	.000	.979	11055.354	1.000
Setting	108.718	4	27.180	8.193	.000	.121	32.773	.998
Participgroup	44.912	1	44.912	13.539	.000	.054	13.539	.956
setting * Participgroup	50.191	4	12.548	3.783	.005	.060	15.130	.887
Error	792.824	239	3.317					

a. Computed using alpha = .05

2-way interaction setting x time (Section 5.2.2.2)

Multiple Comparisons

Measure: MEASURE_1
Bonferroni

(I) setting	(J) setting	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
PedHist	PedMod	.1378	.38243	1.000	-.9458	1.2213
	CommTraf	1.3081*	.37708	.006	.2397	2.3765
	PedMixed	-.5056	.37708	1.000	-1.5740	.5628
	Park	-.4019	.36930	1.000	-1.4483	.6444
PedMod	PedHist	-.1378	.38243	1.000	-1.2213	.9458
	CommTraf	1.1703*	.36627	.016	.1326	2.2081
	PedMixed	-.6434	.36627	.803	-1.6811	.3944
	Park	-.5397	.35825	1.000	-1.5547	.4754
CommTraf	PedHist	-1.3081*	.37708	.006	-2.3765	-.2397
	PedMod	-1.1703*	.36627	.016	-2.2081	-.1326
	PedMixed	-1.8137*	.36068	.000	-2.8356	-.7918
	Park	-1.7100*	.35254	.000	-2.7089	-.7112
PedMixed	PedHist	.5056	.37708	1.000	-.5628	1.5740
	PedMod	.6434	.36627	.803	-.3944	1.6811
	CommTraf	1.8137*	.36068	.000	.7918	2.8356
	Park	.1037	.35254	1.000	-.8951	1.1025
Park	PedHist	.4019	.36930	1.000	-.6444	1.4483
	PedMod	.5397	.35825	1.000	-.4754	1.5547
	CommTraf	1.7100*	.35254	.000	.7112	2.7089
	PedMixed	-.1037	.35254	1.000	-1.1025	.8951

Based on observed means.
The error term is Mean Square(Error) = 3.317.
*. The mean difference is significant at the .05 level.

3-way interaction setting x time x participant group (Section 5.2.5.3.1)

Pairwise Comparisons

Measure: MEASURE_1

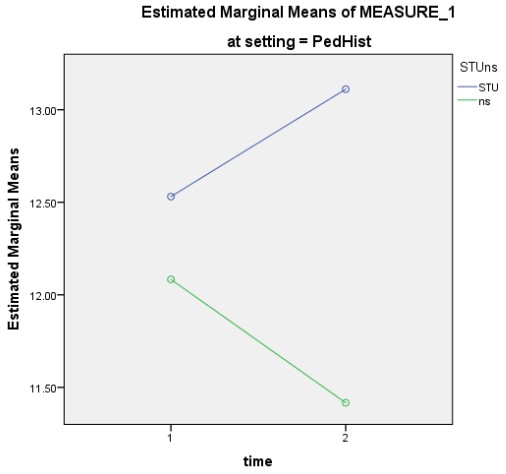
setting	time	(I) Participgroup	(J) Participgroup	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
							Lower Bound	Upper Bound
PedHist	1	STUDENTGROUP	Employeegroup	.448	.664	.501	-.860	1.755
		Employeegroup	STUDENTGROUP	-.448	.664	.501	-1.755	.860
	2	STUDENTGROUP	Employeegroup	1.694*	.733	.022	.250	3.139
		Employeegroup	STUDENTGROUP	-1.694*	.733	.022	-3.139	-.250
PedMod	1	STUDENTGROUP	Employeegroup	1.373*	.608	.025	.175	2.570
		Employeegroup	STUDENTGROUP	-1.373*	.608	.025	-2.570	-.175
	2	STUDENTGROUP	Employeegroup	1.056	.671	.117	-.266	2.379
		Employeegroup	STUDENTGROUP	-1.056	.671	.117	-2.379	.266
CommTraf	1	STUDENTGROUP	Employeegroup	.089	.589	.880	-1.072	1.250
		Employeegroup	STUDENTGROUP	-.089	.589	.880	-1.250	1.072
	2	STUDENTGROUP	Employeegroup	-1.610*	.651	.014	-2.892	-.328
		Employeegroup	STUDENTGROUP	1.610*	.651	.014	.328	2.892

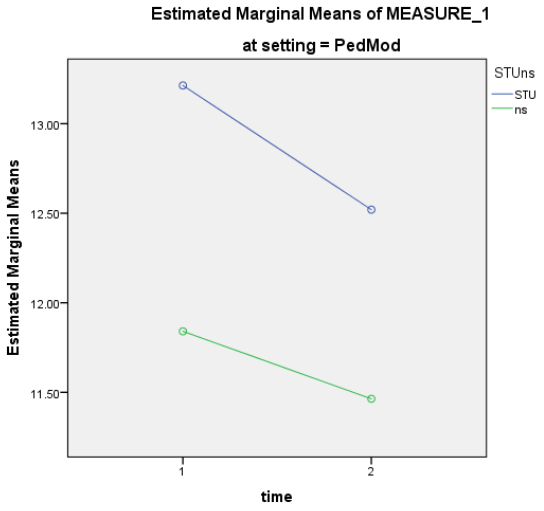
PedMixed	1	STUDENTGROUP	Employeegroup	1.178*	.589	.047	.017	2.339
		Employeegroup	STUDENTGROUP	-1.178*	.589	.047	-2.339	-.017
	2	STUDENTGROUP	Employeegroup	.594	.651	.362	-.688	1.877
		Employeegroup	STUDENTGROUP	-.594	.651	.362	-1.877	.688
Park	1	STUDENTGROUP	Employeegroup	1.167*	.562	.039	.059	2.274
		Employeegroup	STUDENTGROUP	-1.167*	.562	.039	-2.274	-.059
	2	STUDENTGROUP	Employeegroup	2.607*	.621	.000	1.384	3.831
		Employeegroup	STUDENTGROUP	-2.607*	.621	.000	-3.831	-1.384

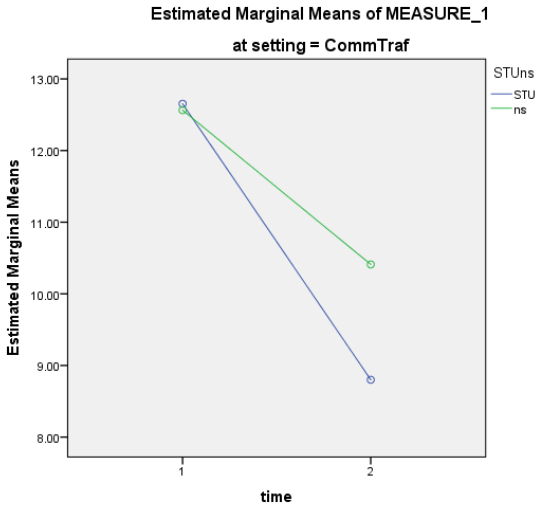
Based on estimated marginal means

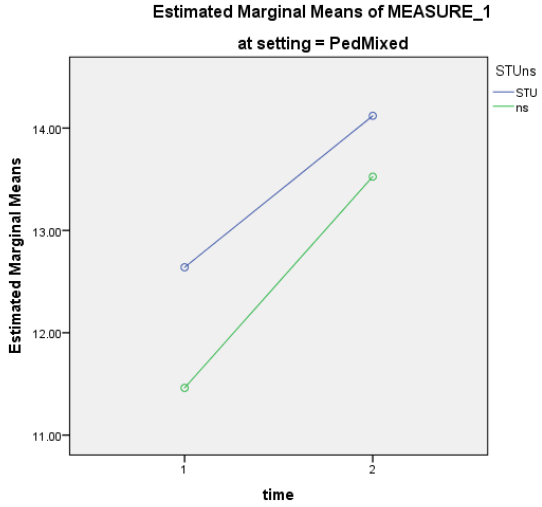
*. The mean difference is significant at the .05 level.

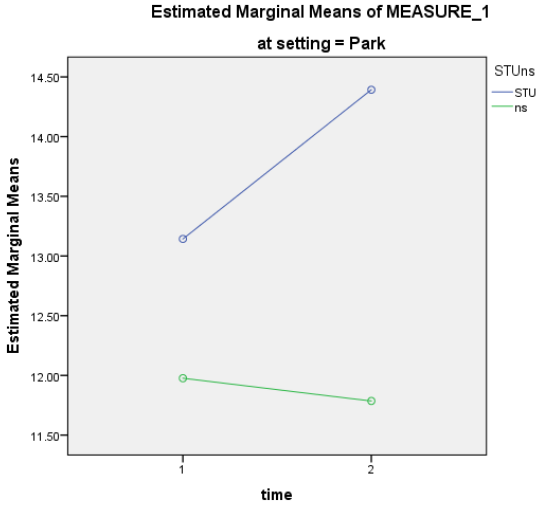
b. Adjustment for multiple comparisons: Bonferroni.


Estimated Marginal Means of MEASURE_1
at setting = PedHist
STUns
STU
ns
Estimated Marginal Means
13.00
12.50
12.00
11.50
1
2
time


Estimated Marginal Means of MEASURE_1
at setting = PedMod
STUns
STU
ns
Estimated Marginal Means
13.00
12.50
12.00
11.50
1
2
time


Estimated Marginal Means of MEASURE_1
at setting = CommTraf
STUns
STU
ns
Estimated Marginal Means
13.00
12.00
11.00
10.00
9.00
8.00
1
2
time


Estimated Marginal Means of MEASURE_1
at setting = PedMixed
STUns
STU
ns
Estimated Marginal Means
14.00
13.00
12.00
11.00
1
2
time


Estimated Marginal Means of MEASURE_1
at setting = Park
STUns
STU
ns
Estimated Marginal Means
14.50
14.00
13.50
13.00
12.50
12.00
11.50
1
2
time

Hedonic tone

Mixed ANOVA (2 groups x 5 settings x 2-time stages) – Section 5.2.5.3

Multivariate Tests[a]

Effect		Value	*F*	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
Time	Pillai's Trace	.094	23.508[b]	1.000	227.000	.000	.094	23.508	.998
	Wilks' Lambda	.906	23.508[b]	1.000	227.000	.000	.094	23.508	.998
	Hotelling's Trace	.104	23.508[b]	1.000	227.000	.000	.094	23.508	.998
	Roy's Largest Root	.104	23.508[b]	1.000	227.000	.000	.094	23.508	.998
time * setting	Pillai's Trace	.187	13.072[b]	4.000	227.000	.000	.187	52.288	1.000
	Wilks' Lambda	.813	13.072[b]	4.000	227.000	.000	.187	52.288	1.000
	Hotelling's Trace	.230	13.072[b]	4.000	227.000	.000	.187	52.288	1.000
	Roy's Largest Root	.230	13.072[b]	4.000	227.000	.000	.187	52.288	1.000
time * Participgroup	Pillai's Trace	.042	9.872[b]	1.000	227.000	.002	.042	9.872	.879
	Wilks' Lambda	.958	9.872[b]	1.000	227.000	.002	.042	9.872	.879
	Hotelling's Trace	.043	9.872[b]	1.000	227.000	.002	.042	9.872	.879
	Roy's Largest Root	.043	9.872[b]	1.000	227.000	.002	.042	9.872	.879
	Pillai's Trace	.015	.877[b]	4.000	227.000	.479	.015	3.506	.277

time * setting * Participgroup	Wilks' Lambda	.985	.877[b]	4.000	227.000	.479	.015	3.506	.277
	Hotelling's Trace	.015	.877[b]	4.000	227.000	.479	.015	3.506	.277
	Roy's Largest Root	.015	.877[b]	4.000	227.000	.479	.015	3.506	.277

a. Design: Intercept + setting + Participgroup + setting * Participgroup
Within Subjects Design: time
b. Exact statistic
c. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: HEDTONE
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	*F*	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	32739.143	1	32739.143	11102.733	.000	.980	11102.733	1.000
setting	83.335	4	20.834	7.065	.000	.111	28.261	.995
Participgroup	36.371	1	36.371	12.334	.001	.052	12.334	.938
setting * Participgroup	14.478	4	3.619	1.227	.300	.021	4.910	.382
Error	669.365	227	2.949					

a. Computed using alpha = .05

2-way interaction setting x time (Section 5.2.2.1)

Pairwise Comparisons

Measure: HEDTONE

(I) setting	(J) setting	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
PedHist	PedMod	-.189	.371	1.000	-1.240	.862
	CommTraf	.877	.367	.177	-.164	1.917
	PedMixed	-.755	.373	.442	-1.811	.302
	Park	-.666	.361	.663	-1.689	.357
PedMod	PedHist	.189	.371	1.000	-.862	1.240
	CommTraf	1.065*	.351	.027	.070	2.060
	PedMixed	-.566	.357	1.000	-1.578	.447
	Park	-.477	.345	1.000	-1.454	.500
CommTraf	PedHist	-.877	.367	.177	-1.917	.164
	PedMod	-1.065*	.351	.027	-2.060	-.070
	PedMixed	-1.631*	.353	.000	-2.633	-.630
	Park	-1.543*	.341	.000	-2.508	-.577
PedMixed	PedHist	.755	.373	.442	-.302	1.811
	PedMod	.566	.357	1.000	-.447	1.578
	CommTraf	1.631*	.353	.000	.630	2.633
	Park	.088	.347	1.000	-.895	1.072
Park	PedHist	.666	.361	.663	-.357	1.689

	PedMod	.477	.345	1.000	-.500	1.454
	CommTraf	1.543*	.341	.000	.577	2.508
	PedMixed	-.088	.347	1.000	-1.072	.895

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

3-way interaction setting x time x participant group (Section 5.2.5.3.2)

Pairwise Comparisons

Measure: MEASURE_1

setting	time	(I) Participgroup	(J) Participgroup	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
							Lower Bound	Upper Bound
PedHist	1	STUDENTGROUP	Employeegroup	.325	.649	.617	-.954	1.605
		Employeegroup	STUDENTGROUP	-.325	.649	.617	-1.605	.954
	2	STUDENTGROUP	Employeegroup	1.877*	.675	.006	.547	3.206
		Employeegroup	STUDENTGROUP	-1.877*	.675	.006	-3.206	-.547
PedMod	1	STUDENTGROUP	Employeegroup	.465	.597	.437	-.712	1.643
		Employeegroup	STUDENTGROUP	-.465	.597	.437	-1.643	.712
	2	STUDENTGROUP	Employeegroup	1.908*	.621	.002	.685	3.131

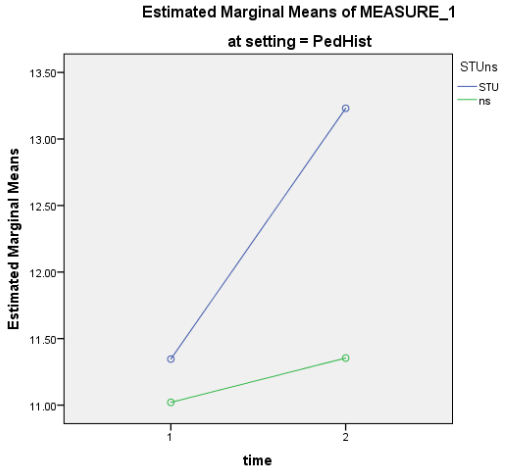
		Employeegroup	STUDENTGROUP	-1.908*	.621	.002	-3.131	-.685
CommTraf	1	STUDENTGROUP	Employeegroup	-.156	.584	.790	-1.306	.995
		Employeegroup	STUDENTGROUP	.156	.584	.790	-.995	1.306
	2	STUDENTGROUP	Employeegroup	-.010	.607	.987	-1.206	1.186
		Employeegroup	STUDENTGROUP	.010	.607	.987	-1.186	1.206
PedMixed	1	STUDENTGROUP	Employeegroup	.384	.605	.526	-.808	1.576
		Employeegroup	STUDENTGROUP	-.384	.605	.526	-1.576	.808
	2	STUDENTGROUP	Employeegroup	.792	.629	.209	-.446	2.031
		Employeegroup	STUDENTGROUP	-.792	.629	.209	-2.031	.446
Park	1	STUDENTGROUP	Employeegroup	.505	.562	.370	-.603	1.613
		Employeegroup	STUDENTGROUP	-.505	.562	.370	-1.613	.603
	2	STUDENTGROUP	Employeegroup	1.831*	.584	.002	.680	2.983
		Employeegroup	STUDENTGROUP	-1.831*	.584	.002	-2.983	-.680

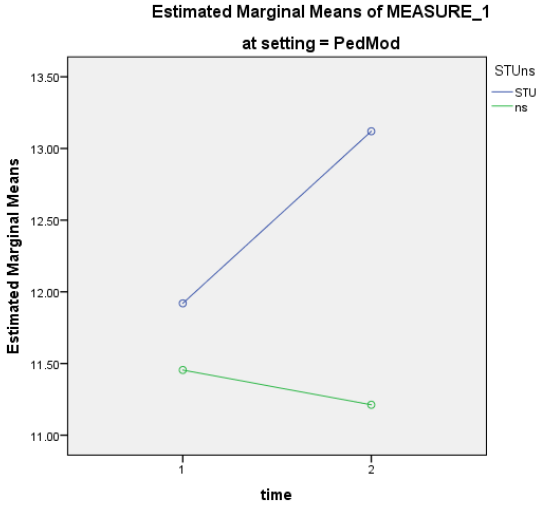
Based on estimated marginal means

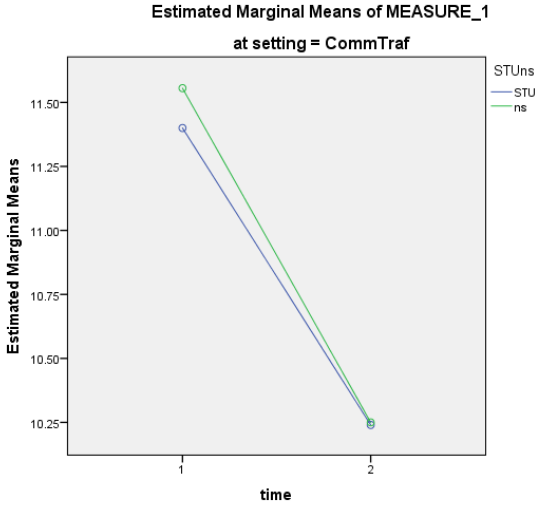
*. The mean difference is significant at the .05 level.

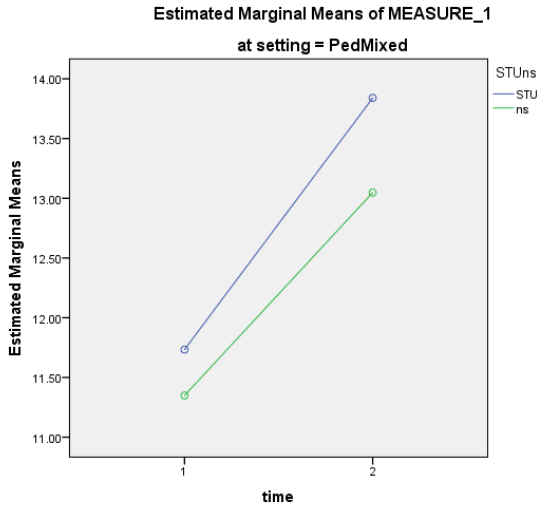
b. Adjustment for multiple comparisons: Bonferroni.

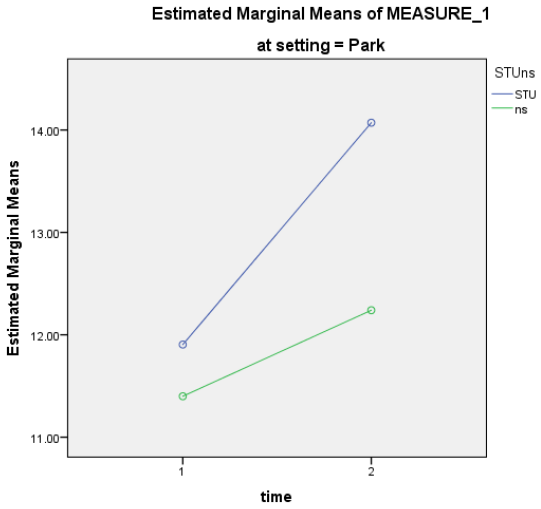
Profile Plots











APPENDIX 12: CORRELATIONS

Table 7.2: Correlations

		Walking intentions	Interesting-ness	Attractive-ness	Δstress	Δhedtone	Age	Female	Walks to work	Heavy walker
Walking intentions	Pearson Correlation	1								
	Sig. (2-tailed)									
	N	364								
Interestingness	Pearson Correlation	.529**	1							
	Sig. (2-tailed)	.000								
	N	364	380							
Attractiveness	Pearson Correlation	.505**	.775**	1						
	Sig. (2-tailed)	.000	.000							
	N	364	380	380						
Δstress	Pearson Correlation	-.430**	-.445**	-.481**	1					
	Sig. (2-tailed)	.000	.000	.000						
	N	248	254	254	254					
Δhedtone	Pearson Correlation	.446**	.529**	.562**	-.549**	1				
	Sig. (2-tailed)	.000	.000	.000	.000					
	N	232	238	238	217	238				
Age	Pearson Correlation	.034	-.013	-.095	-.046	-.163*	1			

	Sig. (2-tailed)	.522	.805	.068	.468	.013				
	N	355	368	368	248	233	369			
Female[1]	Pearson Correlation	-.010	.124*	.105*	.029	.094	-.144**	1		
	Sig. (2-tailed)	.850	.016	.040	.642	.149	.006			
	N	363	379	379	253	237	368	380		
Walks to work[2]	Pearson Correlation	.004	-.103*	-.145**	.066	-.142*	.081	-.131*	1	
	Sig. (2-tailed)	.934	.046	.005	.299	.029	.122	.011		
	N	362	378	378	253	237	367	378	379	
Heavy walker[3]	Pearson Correlation	.028	.019	-.130*	.101	-.157*	-.039	-.027	.111*	1
	Sig. (2-tailed)	.588	.706	.011	.110	.016	.456	.600	.031	
	N	364	380	380	254	238	369	380	379	381

Comparison groups:
1 = Male
2 = Other modes (cycling, public transit, car)
3 = Non-walker (e.g. walks less than 4 days a week)

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 13: DISSEMINATION OF RESEARCH

Selected oral presentations:

- August 2017: "The restorative outcomes of walking in urban settings: a person-centred approach", International Conference of Environmental Psychology (ICEP), A Coruna (Spain);
- June 2017: "The influence of built environments on the walking experience and walking intentions", 23rd International Conference Living and Walking in Cities (LWC), Brescia (Italy).
- April 2017: "Restoration in urban and natural settings and relationship with walking intentions", American Association of Geographers Annual Conference (AAG), Boston (USA);
- September 2016: "Urban heritage environments as health-enabling places", Royal Geographical Society (RGS) Annual Conference, London (UK);
- June 2016: "Restoration in different urban walking settings", IAPS Young Researchers Workshop, Alnarp (Sweden).
- June 2016: "Affective appraisals of walking in urban settings and restorative outcomes", International Association People-Environment Studies (IAPS) Bi-annual Conference, Lund (Sweden).
- January 2016: "Affective appraisals of urban walking: the role of heritage environments", 48th Meeting of the Universities' Transport Study Group (UTSG), Bristol

Conference and Journal Papers:

- Bornioli, A., Parkhurst, G., and Morgan, P. (2018). Psychological wellbeing benefits of simulated exposure to five urban settings: an experimental study from the pedestrian's perspective. *Journal of Transport and Health*, in press.
- Bornioli, A., Parkhurst, G., and Morgan, P. (2017). The influence of the built environment on walking experience and walking intentions. A case-study from Bristol, UK. *Town and Infrastructure Planning for Safety and Urban Quality. Proceedings of the XXIII International Conference 'Living and Walking in Cities' (Brescia, Italy, 15-16 June 2017)*.
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