

## Walking, places and wellbeing

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While there is a substantial body of research on the health implications of walking, the physical, emotional and social outcomes of walking have received limited attention. This paper explores the wellbeing effects of walking and how the walking environment fosters or hinders such wellbeing effects. This is done using a novel mobile data collection technique, allowing for *in situ* recording of walking experiences, combined with focus groups. The results of the study suggest that the affect level of pedestrians is highest in places with many activities going on and many people being around. However, in support of restoration theory, we find that places with lower activation levels may also foster positive feelings, especially if they contain natural elements (such as trees and water) or buildings with a more contemplative character. While perceived safety of walking locations does not directly increase the affect level, it makes people feel more active, probably because it increases people's autonomy and self-esteem.

KEY WORDS: walking, wellbeing, places

### Introduction

Walking is an everyday activity that has diverse impacts on our mental and physical state, as a result of both the activity of walking in itself as well as physical and social interactions with the environment (Ettema 2012; Middleton 2009; Andrews *et al.* 2012). The literature on transportation, geography and health studies has heavily emphasised the health benefits of walking. Soroush *et al.* (2013) show that walking has a positive effect on blood pressure and diminishes cardiovascular disease risk factors. Others (e.g. Ekkekakis *et al.* 2008) found that the level of physical activity involved in walking enhances mood and increases mental health. Without attempting to provide an overview of the health benefits of walking, we conclude that they are well documented. Given these health benefits, many studies have investigated which environmental factors (e.g. walking infrastructure, connectivity, mixed land use, perceived safety) correlate with higher walking frequencies of residents (e.g. Shay *et al.* 2009).

While environmental factors stimulating walking and the health benefits of walking are well documented, research into the effects of interactions with the environment during walking on experienced wellbeing are scarce. Such interactions (see also Ettema 2012; Middleton 2009; Ziegler and Schwanen

2011) may have outcomes in terms of physical experience (e.g. feeling energised or tired), social experience (e.g. feeling in place or threatened) and emotional outcomes (e.g. feeling proud or tranquilised).

This paper sets out to theorise and investigate the impact of interactions with the environment on pedestrians' wellbeing. Building on geographical literature on affordances and literature on happiness and wellbeing and environmental psychology, we consider walking as passing through a series of places, in which intended or non-intended interaction with the material and social environment evokes physical and/or emotional responses. The influence of environmental factors on wellbeing is empirically investigated for a sample of students of Utrecht University, using a novel, mobile data collection method, based on smartphone questionnaires.

The remainder of the paper is organised as follows. The second section provides an overview of relevant literatures on wellbeing, walking and the impact of place characteristics. The third section describes the data collection method and sampling strategy. The fourth section describes the outcomes of the survey, including both quantitative and qualitative findings. The fifth section, finally, draws conclusions regarding the main findings of the study, reflects on the limitations of the study and the data collection method and explores avenues for further research.

## Theoretical background

In this section we discuss theories and empirical findings that are relevant to define the wellbeing effects that accrue from pedestrians' interaction with the walking environment. In particular, we discuss the concepts of hedonic and eudaimonic wellbeing, affordances, restoration and optimal arousal.

First, wellbeing studies suggest that walking may enhance both the eudaimonic and the hedonic dimension of wellbeing. The eudaimonic dimension of wellbeing (Ryff and Singer 2008) is fostered by maximising one's virtue and realising one's potential, and is related to autonomy, environmental mastery and social interactions. Walking has been found to contribute to the eudaimonic dimension of wellbeing by, for instance, giving elderly and children more sense of autonomy and mastery (Ziegler and Schwanen 2011; Whitzman and Tranter 2012) and contributing to social relationships for elderly (Ziegler and Schwanen 2011) neighbourhood dwellers (Sugiyama *et al.* 2008) and park visitors (Tinsley *et al.* 2002).

However, walking may also increase hedonic wellbeing, which is defined as experiencing pleasant feelings and positive affect (Diener *et al.* 1999). Olsson *et al.* (2013) demonstrate that pedestrians and cyclists have higher positive affect than car drivers and public transport users. Research by Ekkekakis *et al.* (2008) suggests that the physical activity involved in walking may be a reason for this. Qualitative studies of walking (Middleton 2009) emphasise how the rhythmicity and sensory sensation of sounds, smells and aesthetics may make walking a more or less enjoyable activity in itself.

Affordances theory (Gibson 1979) provides a basis for understanding how the walking environment may influence how pleasant walking is, and how it adds to wellbeing. Affordances can be defined as the opportunities offered by an environment to take actions, aimed at fulfilling one's needs. Affordances need to be actualised by individuals, by perceiving and actively shaping them (Kyttä 2004; Clark and Uzzell 2002). Affordances can be physical, such as kerbs in a park allowing skate-boarders to perform tricks (Clark and Uzzell 2002), or seats allowing elder pedestrians to rest (Risser *et al.* 2010). However, affordances may also be of a social and symbolic kind, such as the presence of the right people to confirm tastes and support actions (Clark and Uzzell 2002; Ettema and Schwanen 2012). In this respect, the fact whether one chooses to walk voluntarily or is forced to walk due to a lack of other transportation options may also strongly influence how the walking environment confirms one's social status in a positive or negative sense (Bostock 2001).

The literature provides various examples suggesting that decisions about whether and where to walk are made with regard to fulfilling certain needs and realising places' affordances. In line with the previous

discussion, the presence of others may be an affordance that allows social interaction and thereby makes walking more pleasant and valuable (Ziegler and Schwanen 2011; Kyttä 2004). The reverse, but equally relevant, affordance is the absence of those disturbing the required interaction, such as adults or bullies (in case of children), or other people who may be threatening (Pain 1997) or insulting (Gimlin 2010). Also for elderly, affordances may influence to what extent benefits of walking, such as self-esteem and independence, can be realised. Place characteristics such as availability of places to rest, good quality surface, safe crossings etc may facilitate walking by elderly (Risser *et al.* 2010). In a similar vein, specific affordances are discussed in the context of people with cognitive limitations, blind people (Parkin and Smithies 2012) and overweight individuals (Andrews *et al.* 2012). From the above it follows that wellbeing effects derived from an environment may depend on personal characteristics such as age, gender and physical condition.

A different approach to explaining the influence of the (walking) environment on wellbeing is taken by restoration theory (Kaplan 1995). This theory holds that the environment may counteract fatigue and depletion of mental resources by offering involuntary attention or fascination. In particular natural places have been found to provide potential for the restoration of mental resources. The restorative effect of natural environments has been demonstrated also in the context of walking. The literature suggests that individuals actively choose routes (Middleton 2009) or locations (Tinsley *et al.* 2002) because of the presence of green space, but also that green spaces and walking routes make them more vitalized and relaxed (Martens *et al.* 2011).

Another theoretical explanation of the impact of places on walking is suggested by Van Hagen (2011) and Isaacs (2001) referring to arousal theory. According to arousal theory, stimuli (sound, light and temperature) have an optimal level of arousal. Individuals prefer some degree of uncertainty in their environment, in order for it to provide sufficient challenge. However, overload of uncertainty and complexity frustrates individuals' need to make sense of their environment and leads to stress. Isaacs (2000), for instance, finds that pedestrians prefer narrow streets (comfortable proportions), bending streets (surprising the walker) and small-scale architecture, and dislike monotonous and wide streets.

## Study description

### *Aim and scope*

A case study was carried out to investigate how physical and social place characteristics influence the

experience of walking trips by students of Utrecht University. It is realised that students are not representative of the wider population, and that the specific age bracket and education level included in this study will be affected by the environment in a different way than other groups. Yet, we feel that the study significantly adds to the literature by starting to explore the effect of interactions with the environment in a detailed way. The study focused on a subset of the place characteristics outlined above, deemed most relevant for university students. First, certain places may be threatening to some students at certain times (e.g. female students at night in certain areas), making safety and fear relevant issues. Also, we feel that issues such as arousal and restoration, interaction with others in public space, and feelings of in- and out-of-placeness and safety are potentially significant factors that influence students' walking trips.

### Study method

The main objective of the study was to observe students' affective state while walking, as well as to record the place-related factors that influence their affective state. To this end, we opted for mobile data collection, facilitated by the increasing use of smartphones. Since smartphones are carried along almost 24/7, they provide a promising tool for collecting online data and collecting information about the walking experience *in situ*. Especially since feelings and emotions are fleeting (Robinson and Clore 2002), recalling them is likely to lead to biased results, and they are best recorded on the spot. For this reason, we feel that *ex post* semi-structured interviews, while allowing one to acquire rich interpretive data of issues that pedestrians experience as determining their walking experience, are less appropriate when investigating *in situ* experiences. Smartphones offer the attractive feature that, through dedicated questionnaire software, they allow one to record quantitative data (pre-coded answer categories and rating scales) as well as textual answers to open questions, and visual records like photographs. The use of quantitative measurement scales allows us to connect to the main stream of affect measurement as taking place in wellbeing studies, while the use of open questions and photographs allows us to interpret the impact of the environment in terms of more substantive theories. To improve interpretation of the *in situ* data, focus groups were held 3–4 weeks afterwards, in which the participants' experiences with the data collection tool were investigated, but also the walking experiences were discussed from a substantive point of view. This discussion took place in response to examples of walking experiences described in text and by photographs.

A questionnaire was developed for Android smartphones, using the ODK software package. To measure affective state, we used a two-dimensional

scale, consisting of two items (passive–active, sad–glad) on a –3 to 3 scale, based on the Swedish Core Affect Scale (Västfjäll and Gärling 2007). To measure students' evaluation of the place where they walked we included two items (monotone–varied, dull–exciting), based on the idea that optimal arousal and restoration influence affective state. In addition, students had the opportunity to (but were not obliged to) enter text and add a photograph to explain why they found a place either boring or exciting. Based on the idea that feeling at ease and safe would add to affective wellbeing, two items were added (unfriendly–friendly, unsafe–safe) to tap students' perception of these dimensions. Again, students were free to add textual explanation and a photograph to explain their evaluation of safety. In addition, travel purpose, travel company and familiarity with the walking location were recorded. It is realised that allowing respondents to enter textual data in the context of only their excitement and safety rating is a limitation, in the sense that other elements of experiencing walking trips receive no attention. However, the approach has the advantage of acquiring more focused qualitative information on issues thought to be relevant.

Since this study was originally designed to explore the options of the smartphone as a data collection tool, the above questionnaire was also administered in a paper and pencil version that has essentially the same items, but for obvious reasons did not include the option to add a photograph.

### Fieldwork procedure

The study was carried out in two waves during the summer of 2011. During June/July, 14 students of the Faculty of Geosciences participated in the smartphone data collection. Students were recruited by posters at billboards and a mailing among about 1200 students of the Faculty of Geosciences at Utrecht University. However, at the time of the study the number of students owning an Android smartphone was still very low, severely limiting the number of participants. Participants were instructed to fill out the questionnaire on their smartphone during each walking trip they made, after walking for 5 minutes. The questions about place characteristics would apply to the location they were in at that time. Participants were instructed to fill out the questionnaire for every walk over 3 weeks. All 14 participants recorded information about multiple walking trips.

A second wave of data collection took place in September/October 2011. Through recruitment in classes of geography students, 30 students agreed to participate in a paper and pencil version of the survey. Of those, 15 were instructed to fill in the questionnaire during each walk after 5 minutes of walking. Fifteen were instructed to fill out the questionnaire at the end of the day retrospectively for each walk. Participants received booklets in which

**Table 1** Sample descriptives

	<i>n</i>
Residential location	
Utrecht (city)	19
Utrecht (rest of province)	5
Other	6
Gender	
Male	12
Female	9
Nationality	
The Netherlands	27
Foreign	4

they could record up to 12 walking trips. However, only 12 students allocated to the recall condition and five students allocated to the 'during walk' condition eventually completed the recording of walking trips and handed in the booklets.

In total, 31 students participated in the study, filling out the questionnaire for 332 walking trips. The average number of trips reported is 10.7, ranging between 2 and 29 trips. Personal characteristics of the students are displayed in Table 1.

During the subsequent data collection processes participants were assembled in separate focus group sessions for the purpose of reflecting on their experiences with different data collection modes and to reflect on initial outcomes. Two mixed-gender focus groups of five and six people were organised for each data collection platform. This group size proved to create comfort among strangers with a shared research experience and encourage discussion. Sample pictures and ratings for liveliness and fear were used to show contrasting answers and spark a discussion about the respondents' rating process. The collective and flexible nature of focus group discussions made it a suitable tool for exploring a wide range of experiences and opinions, even when contradictory.

### Analysis

Our data are both quantitative and qualitative, giving the opportunity for a mixed methods approach. In particular, quantitative data were analysed using multivariate statistics. Reported levels of happiness and activation were used as dependent variables in a regression analysis, in which assessments of the walking environment in terms of variation, excitement, friendliness and safety as well as person and trip characteristics were used as independent variables. To account for the fact that the data include multiple trips made by a single individual, we applied a multilevel regression model, in which variation within and between individuals is treated separately.

Qualitative data are available from the textual descriptions, photographs and focus groups that were held. It is noted that due to the data collection procedure, textual data about the walking experience are already categorised into dimensions of excitement and safety. That is to say, rather than asking respondents to describe how they felt during walking and why, we asked them if and why they found the environment exciting or safe. Given this focus, we applied thematic analysis to the textual explanations of each dimension, aiming to find underlying dimensions of excitement and safety. We used the quantitative data on happiness to increase our understanding of differences in people's experiences of excitement and safety. For instance, different qualitative assessments of high-excitement places may correspond to more or less pleasant emotions experienced in these places.

## Results

### Multivariate analyses

Descriptives of happiness and activation (Table 2) suggest that respondents were on average in a positive and active mood during their walks. To assess the relative impact that environmental factors have on happiness and activation, a regression analysis was carried out in which happiness (the score on the 'sad-glad' scale) and activation are regressed on place characteristics, trip and personal characteristics. In the analysis we regard each trip made by an individual as an observation.

The multilevel model explaining happiness (Table 2) suggests that when controlling for personal and trip characteristics, excitement and variation of the walking environment also lead to higher affect. An interpretation in line with optimal arousal theory would be that more lively environments provide sufficient challenge to experience mastery and autonomy, thereby fostering eudaimonic wellbeing. However, safety and friendliness do not influence affect during walking. In addition, walking alone is found to lead to lower affect than walking in company. Walks made for social purposes (e.g. to visit a friend) lead to higher wellbeing during the walking trip compared with other walks.

A multilevel model of activation regressed against place evaluations, personal and trip characteristics (model 2) suggests that activation is positively affected by a more varied and a safer environment. A more varied environment may directly lead to more stimulation and feeling more activated, in support of optimal arousal theory. A safe environment apparently gives one more freedom to move around and feel more activated. Thus, whereas variation and excitement may add to wellbeing by providing challenge, as discussed before, the effect of safety suggests that being in control of the environment on a fundamental

**Table 2** Descriptives and regression models of happiness and activation

	Unhappy–happy		Passive–active	
	Estimate	p-value	Estimate	p-value
Mean	1.55		1.13	
Standard deviation	1.13		1.38	
Percentage positive	84.6		71.1	
	Model 1		Model 2	
	Estimate	p-value	Estimate	p-value
Intercept	<b>1.306</b>	<b>0.022</b>	<b>2.402</b>	<b>0.001</b>
Place evaluations				
Varied	<b>0.102</b>	<b>0.017</b>	<b>0.173</b>	<b>0.001</b>
Exiting	<b>0.100</b>	<b>0.025</b>	0.978	0.087
Friendly	0.042	0.458	–0.098	0.177
Safe	0.004	0.937	<b>0.144</b>	<b>0.049</b>
Survey mode (reference: Smartphone)				
Paper, recall	<i>–0.410</i>	<i>0.057</i>	–0.168	0.444
Paper, online	0.113	0.632	0.017	0.945
Company (reference: two or more persons)				
Alone	<b>–0.494</b>	<b>0.020</b>	–0.316	0.243
One other person	–0.044	0.856	–0.258	0.404
Saturday (ref: weekday)	–0.000	0.999	0.399	0.103
Sunday (ref: weekday)	–0.100	0.650	0.398	0.150
Evening (ref: daytime)	0.112	0.463	0.254	0.193
Trip purpose				
Shopping, personal	–0.045	0.798	0.034	0.881
Social visits	0.298	<i>0.058</i>	<b>0.530</b>	<b>0.008</b>
First visit	<i>0.628</i>	<i>0.072</i>	0.020	0.965
Variance component	0.067	0.171	0.004	0.901
–2 Log likelihood	862.814		1005.015	

Bold: significant at 95% confidence level

Italic: significant at 90% confidence level

level of personal safety is another prerequisite for deriving wellbeing effects. Not only may feelings of autonomy and mastery be undermined in unsafe settings, it also provides a barrier to engage in meaningful or pleasant interactions during walking. As for the happiness model, it is found that trips made for social purposes lead to a higher activation level.

#### Qualitative analyses of texts and photographs

To further investigate what defines excitement and safety in a concrete setting, the textual comments entered by respondents were analysed, in relation to their assessment of excitement and safety and wellbeing outcomes. In addition, outcomes of the focus groups were used to interpret the relationships.

To analyse the relationship between excitement and wellbeing, it is noted that, although combinations of high happiness scores with high excitement levels are more common, high happiness also occurs with low excitement scores. Although excitement is likely not the only factor including happiness during walking, it makes sense to analyse the text fragments entered for both combinations of happiness and place excitement. For the combination of high happiness and excitement scores, we found texts by and large

supporting theories about the effect of stimuli and social interaction. Some texts directly point at positive stimulation and cosiness, such as:

City centre: there are lots of shops, restaurants and people (Figure 1a).

Lively, many people, they are laughing.

A small café with a lot of people.

The associated photographs (Figure 1) confirm the role of people, shops and restaurants, suggesting that both the presence of others and facilities to meet others and/or engage in activities are positive stimuli that enhance people's mood. This is confirmed by results from the two focus groups, which also examine in more detail the relative importance of people and physical elements in the environment. In general, people and the associated activities are deemed by far the most important factors:

Researcher: So if you divide it into two camps, liveliness and safety, starting with liveliness, on top of your head, what are the most decisive factors?

Participant 1, female : People.



**Figure 1** Places with varying happiness and excitement scores (a, b) Exciting and happy, (c) dull and unhappy, (d) exiting and unhappy, (e) dull and happy

Participant 2 and 3, male: Traffic, people . . .

Participant 2, male: Things going on moving.

Participant 1, female: Activity.

Researcher: Did anybody think about noise?

Participant 3, male: It comes with it, but I don't find it exciting.

Researcher: So what would be an exciting place?

Participant 3, male: A market for example, or shopping street, or bus station or . . .

Participant 2, male: Just any place that has a lot of people.

However, some indicate that the physical surroundings in themselves have an impact on excitement:

Participant 4, female : I don't think that if it is lively it always depends on the people, but also the physical surroundings . . . like if there is a lot of buildings, or you are in a park it is different than when you are in a city.

Researcher: Aha, so it is not only the people?

Participant 4, female: No, for me it is more about the physical surroundings.

The positive effects are mirrored in the texts entered by those reporting low happiness and low excitement scores:

Nothing to do besides studying.

Houses similar to each other in appearance. Uniform neighbourhood (Figure 1c).

These phrases illustrate the lack of stimulation that for them coincides with lower affect. The photographs going with these assessments (Figure 1) suggest that the absence of both people and traffic, but also the rather monotone appearance of buildings may play a role. A noteworthy outcome of the focus groups is that the experience of excitement may be rather dependent on time of the day or the season:

Participant 5, female: Sometimes I feel like there is a lot of people here talking to each other, it is lively, but in the morning when it is a bit more quiet then you think 'oh, this is very boring' . . . so I think it depends on the time that you come over here.

Researcher: and it depends on the time in which you are in the city?

Participants 6 and 7, female : Yeah, yeah.

Participant 7, female: Like now there is a lot of exams on the Uithof so it is quiet. If you do this in September it will be way more crowded, and the results will be different.

However, optimal arousal theory suggests that people may also become overburdened with stimuli, or in reverse, appreciate a degree of quietness. In support of this, texts entered by respondents who report low happiness levels and high excitement, mention issues such as:

Lots of people around Utrecht Central station, trying to catch their train (Figure 1d).

Passing traffic.

Repetition and unsafe.

The associated photographs suggest that in contrast to the presence of people engaging in leisure, the presence of too many other people engaging in transportation may be experienced as stressful or dangerous. It is also noted that a high excitement place like the railway station may be experienced as pleasant or unpleasant by different individuals, apparently based on their preferences or mental state. While in itself this notion of heterogeneity is of importance, more research is needed to identify the causes of such heterogeneity.

In contrast, respondents with high happiness and low excitement scores entered texts like:

Quiet surroundings, green (Figure 1e).

Trees and canal.

Church.

Apparently, and illustrated by the photographs, a lack of stimuli may be experienced as positive if the environment contains natural elements, such as trees and water, or is associated with places of contemplation and retreat, such as a church.

Taken together, these remarks and photographs suggest positive effects of tranquilising and green environments, in support of restoration theory. Thus, the text and photograph analysis of excitement and affect scores suggests a non-linear and heterogeneous effect of excitement. While for many more excitement coincides with higher affect, in some cases too much stimulation may have negative affective effects and more quite environments are preferred. Likewise, heterogeneity exists with respect to whether other people are the most decisive factor in experiencing excitement.

## Conclusion and discussion

In this paper we applied a novel data collection technique (in situ smartphone surveys with quantitative and qualitative items) to investigate pedestrians'

experience of their walking trips and the impact on their wellbeing during the walk. In support of optimal arousal theory and the importance of social interaction for wellbeing, we find that happiness is highest in places with many activities going on (cafés, restaurants, shops, traffic) and many people being around. Hence, stimulation turns out to be a specific need that can be fulfilled by walking in urban areas. However, in support of restoration theory, we find that places with lower activation levels may also foster positive feelings, especially if they contain natural elements (such as trees and water) or buildings with a more contemplative character.

From a theoretical point of view, we argue that it makes sense to combine theories from multiple disciplines (wellbeing research, geography, environmental psychology, epidemiology, neighbourhood studies) to understand the impact of places on wellbeing for a particular activity such as walking. Building on psychological theories, hypotheses can be developed about how places can influence the relationship between walking and wellbeing, relating to concepts such as autonomy, social relations, arousal and restoration. Geographical theories such as affordances theory are particularly helpful in understanding the impact of places in terms of concrete interactions between pedestrians and their physical and social environment.

We are aware that our illustrative study has some limitations. Given the target group (students) and the *a priori* focus on excitement and safety issues, additional factors may be at play in different contexts. In addition, the limited sample size sets limits to generalisation of the results. With respect to the target group of this study, it is likely that the factors found to add to excitement, safety and positive affect in this study do not do so to the same extent for other groups. For instance, students may be less sensitive to feeling unsafe and physical barriers in comparison to the elderly. In addition, their life stage may make them more sensitive to opportunities for social interaction compared with workers living in a household, who arrange their social life in a different way and in different places. Research among a more representative sample or aimed at other specific groups will be needed to reveal such differences.

With respect to the type of experiences included, issues such as identification and in-placeness and embodied multi-sensuous experiences are less likely to show up in our survey. With respect to embodied experiences, smartphone surveys could be used to elicit such experiences, by using more specific prompts or more open answer categories. Also, other methods, such as walk along methods, could be used to record such experiences. With respect to identification, attachment and in-placeness, smartphone surveys are likely less appropriate compared with walk along methods and *ex posteriori* interviews, since the interviewer is likely to elicit more about the

history of the respondent and his/her attachment to the place. Yet, capturing these aspects seems to be relevant, since memories of previous visits, one's feelings towards others in a place and the symbolic meaning of a place influences whether someone experiences positive or negative emotions.

However, smartphone surveys might contribute to the understanding of identification and attachment processes and their impact on wellbeing when combined with follow up interviews, in which the meaning of photographs and texts is discussed. In general, a limitation of our approach is that textual explanations will be short and not very detailed, due to the *in situ* character of the procedure. As a result, the interpretation may remain thin and require additional data collection through interviews.

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