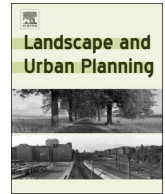




Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan



Perspective Essay

Enriching green exercise research

Jarkko Bamberg^{a,*}, Russell Hitchings^b, Alan Latham^b

^a Faculty of Management, University of Tampere, Finland

^b Department of Geography, University College London, UK

ARTICLE INFO

Keywords:

Green exercise
Research design
Qualitative methods
Public health

ABSTRACT

There is a growing body of research that, under the banner of ‘green exercise’, considers the additional physical and psychological benefits that may be accrued by those who exercise in ‘natural’ environments. This essay considers the implications of how this research has been conducted to date and argues that it may be usefully enriched by a fuller examination of how exercise and environment come together in less controlled conditions. After outlining some ideas and approaches commonly found in this field, we contend that there are two problems here: firstly, the focus on ‘green’ – in so far as this defines the experience in certain visual terms – and, secondly, the focus on ‘exercise’ – in so far as this downplays diversity in physical experiences. In response, we argue that studies centred on how various environments are inhabited by various groups of exerciser could provide fresh ideas about how best to promote the benefits of green exercise. We make this argument because the implied vision of positive landscape design currently associated with this field is typified by flat surfaces that allow exercisers to visually consume vegetation without other stimulation. With reference to qualitative work on recreational running, we contend that this is not always the way to go.

1. A growing body of work

We know that regular exercise is good for people and we know that being near greenery can often bring them benefits. So should we combine the two? This is the core proposition explored by research on what has been dubbed ‘green exercise’, the aim of which has generally been to enumerate the effects of this activity and to use the results to advocate for its encouragement. This body of work has been growing. We already have been provided with a number of overviews (Bowler, Buyung-Ali, Knight, & Pullin, 2010; Gladwell, Brown, Wood, Sandercock, & Barton, 2013; Thompson Coon et al., 2011) and the evidence base supporting the argument for green exercise, when taken as a whole, seems increasingly robust.

These studies have identified various benefits. Green exercise has been shown to lower blood pressure (Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2010; Pretty, Peacock, Sellens, & Griffin, 2005), to improve mood and self-esteem, and to help restore attention (Akers et al., 2012; Pretty et al., 2007; Rogerson & Barton, 2015). Greener environments have also been suggested to encourage greater levels of participation by overcoming issues of both boredom and perceived effort since the meditative effect of being in green environments serves to distract the exerciser from the apparent monotony and the awareness of physiological discomforts (Gladwell et al., 2013). Either way, the result would seem to be even greater benefit, if people find themselves

exercising for longer in green environments.

The implications of this research for planners and landscape designers initially seem obvious. They should either safeguard the green environments in which exercisers are already found or put more people in a position to avail themselves of these benefits by providing more green places for exercise. In this essay, we contend that there is more to it than that. We argue that getting to grips with how to act on the findings provided by this valuable work requires turning to research approaches that have hitherto been uncommon in this field. More specifically, we argue that studies focused on the real world experience could provide valuable ideas about how green exercise is most effectively encouraged. We begin by taking stock of existing green exercise research to draw out the implications of how it has most commonly been conducted to date. As a provocation for further debate and a way of developing our position, it is contended that there are two problems here: firstly, the focus on ‘green’ and, secondly, the idea of studying ‘exercise’. Then we turn to some alternative ways of tackling the topic.

2. Underpinning theory and predominant approaches

The anxiety motivating much green exercise research is that changing urban lifestyles are leading to reduced contact with ‘nature’ in ways that are making people less physically active and more mentally stressed. Psycho-evolutionary theories of stress reduction (e.g. Ulrich,

* Corresponding author at: Pinni A5035, 33014, University of Tampere, Finland.

E-mail addresses: jarkko.bamberg@uta.fi (J. Bamberg), r.hitchings@ucl.ac.uk (R. Hitchings), alan.latham@ucl.ac.uk (A. Latham).

1983, 1986) particularly work with the idea of a growing mismatch between living conditions and the environments to which humans are physically and psychologically suited (Grinde & Patil, 2009). In a parallel argument, ‘attention restoration theory’, also suggests the experience of natural environments promotes mental recuperation (Kaplan, 1995; Kaplan & Kaplan, 1989). This is, in part, because looking at vegetation takes us away from our immediate concerns, but also because natural objects such as trees, leaves and vegetation have a unique capacity for mental refreshment. A more recent addition to the suite of theories attempting to define this process is the ecological dynamics approach, which – developing Gibson’s (1979) analysis of visual perception – suggests that green environments provide particularly complex, challenging and intense ‘affordances’, which together prompt a set of beneficial emotions and feelings (Brymer & Davids, 2013; Brymer, Lecturer, Sharma-brymer, & Davids, 2015).

In view of the central focus on mental processes, it is unsurprising that green exercise researchers have often been drawn to psychological research protocols. Within this, for Barton, Wood, Pretty, and Rogerson (2016), most studies adopt one of three strategies: (i) comparing the outcomes of outdoor exercise in built environments and more ‘natural’ settings; (ii) comparing the outcomes of indoor and outdoor exercise; and (iii) using laboratory settings to examine the effects of changes to the visual environment (Barton, Wood, Pretty & Rogerson, 2016, p. 27–28). As an example of the first approach, Berman, Jonides, and Kaplan (2008) asked participants to walk in either an area of secluded parkland or on a busy road lined with offices before conducting tests “to explore how interactions with nature and urban areas would affect cognitive performance” (p.1208). Similarly, Brown, Barton, Pretty, and Gladwell (2014) asked office workers to walk a particular route during their lunch breaks twice per week. This was either in an urban setting, which “consisted of pavement routes through housing estates and industrial areas”, or in an area “centered around trees, maintained grass, and public footpaths” (p.391). There is also work on the Japanese idea of ‘forest bathing’ that compares viewing a forest (or the experience of walking in one) with viewing or walking in an urban area (see Lee et al., 2011; Park et al., 2010).

The second approach compares indoor and outdoor exercise. Focht (2009), for example, studied the effect of brief walks on affective responses, enjoyment and adherence to exercise. He asked participants to walk for 10 min on a laboratory treadmill and 10 min in an outdoor setting at a self-selected intensity. He found that the outdoor experience led to improvements in the affective responses and enjoyment of his participants. Ryan et al. (2010) similarly compared the ‘vitalizing effects’ of walking in an outdoor environment instead of indoors. In their study, an experimenter silently guided participants on a short 15-min walk – either indoors or outdoors. The indoor walkers “were led through a series of underground hallways and tunnels that were devoid of living things, although there were various objects, posters, and changing colors” (p.162). Meanwhile, their outdoor counterparts “walked on a largely tree-lined footpath along a river” (p.162). Their results suggested that walking outdoors results in greater ‘vitality’ than walking indoors. Another example is the study by Kerr et al. (2006) comparing the emotional effects of running in laboratory and ‘natural’ environments. They had two groups of runners, competitive and recreational, run 5 km on a laboratory treadmill and on a tree-lined footpath alongside roads. The outdoor path ran alongside lakes, through woods and playing fields, and there was only light traffic on the roads (p. 349).

The third approach is particularly focused on what participants see. In one of the first studies of green exercise, participants jogged on a treadmill for 20 min facing projections of a range of outdoor scenes (Pretty et al., 2005). To examine physiological effects, the heart rate of participants was monitored continuously and their blood pressure was measured pre- and post-exercise. Psychological effects were measured by filling out questionnaires on mood and self-esteem before and after the exercise event. Another study examined “the extent to which color,

as a primitive visual feature, contributes to the green exercise effect” (Akers et al., 2012, p. 8661). Here it was hypothesized that seeing a vegetated environment would result in a positive mood and reduced perceived effort. To test this out, participants cycled on exercise bikes while facing “video footage of a rural cycling course” that was selected for “the high percentage of green foliage in the screen” (Akers et al., 2012, p.8662). The participants watched the video three times: in an unedited mode, with a red filter applied, and with an achromatic filter. The aim was to evaluate the potential effect of the ‘green’ colour of vegetation.

Common to all three approaches, and consistent with the positivistic ambitions of this broader research style, is the deliberate manipulation of predefined features of the experience whilst others are held constant or ‘controlled’. This is a widespread approach. But the idea that can flow from this strategy in terms of the specific interests of this journal is that planners should probably aim to reproduce conditions that were originally only part of an attempt to implement an appropriately ‘scientific’ test. In other words, the vision of positive design that these studies are most commonly drawn to is one in which a series of well-maintained flat or undulating pathways take runners and walkers past attractive, and seemingly unchanging, vistas of trees, plants and grassland. We argue that, whilst this may sometimes be the right objective, other ways of studying exercise in natural environments could lead to some different ideas.

3. The trouble with ‘green’

In their reviews of green exercise research, both Bowler et al. (2010) and Thompson Coon et al. (2011) discuss how what is considered a ‘natural’ environment differs from study to study. They also highlight how the characteristics of chosen environments are not often described in great detail. In some studies, for example, the ‘natural’ environment is simply described as an outdoor ‘green’ environment (Bowler et al., 2010). Notwithstanding this lack of detail, what is evident in this body of research is how ‘nature’ generally features as a set of environmental features that are there to be looked at. Furthermore, ‘green spaces’ are also largely investigated as a relatively unchanging and unvaried backdrop for potential exercise. In some studies, the natural environment is quite literally a picture (e.g. Akers et al., 2012; Pretty et al., 2005). In the ‘forest bathing’ studies mentioned above, participants are mostly asked to view the trees of the forest or to look at ‘nature’ whilst they are walking. Sight dominates the discussion. Other senses are mentioned in passing or ignored. In this way, ‘nature’ experience becomes a visual encounter with ‘green’. Some strategy was, of course, necessary to transform ‘nature’, famously dubbed one of the most complicated words in the English language (Williams, 1973), into a manageable research object. But this strategy can also lead to a particular vision of the most desirable environments for green exercise.

In an extreme example of this, exercising research subjects looking at the color green (rather than living vegetation) is taken as a proxy for testing out the effects of exercise in nature (Akers et al., 2012). Though this is a practical strategy, the implication is that public health promoters might want to encourage exercise in rooms or places painted green if that is all that is required to deliver the benefits that these studies reveal. Similarly, other studies of the response to vegetated scenes can, for example, support an argument for virtual environments that immerse people in seemingly vegetated spaces (Depledge, Stone, & Bird, 2011). If, for example, ageing societies find actual green environments difficult to negotiate physically, putting people on treadmills facing videos of landscapes could be seen as entirely sensible. Either way, such scenarios point to the potential irony of how studies that were originally designed with a view to encouraging outdoor activity could feasibly have the opposite effect if used to justify the replication of indoor experiences that were originally merely part of a strategy for finding a suitably ‘scientific’ means of testing the effects of exposure. For now though, and pulling back from such visions of where

things could go in terms of societal response, the general impression given by these studies is that well-maintained parks or forests on a clear summer's day with a few other people around is probably the ideal environment for green exercise. Barton et al. (2016), for example, suggest that “competently managed, high-quality, accessible green spaces are essential for long-term sustainability and healthy communities” (p. xv).

We argue there are other aspects to the outdoor ‘nature’ experience that are also worthy of attention. Because the research design was originally intended to control for such variables, it has become, for example, common for green exercise research either to downplay how outdoor environments are ever changing or to create conditions in which they will likely make less of an impact. Berman et al. (2008) mention in passing that their results were not affected by weather conditions and “the season in which subjects were tested had no impact” (p.1209). Yet they do not reveal how the weather conditions varied. Kerr et al. (2006) tell us that their “experimental sessions were organized on days when weather and ground conditions were similar (sunny, no wind, dry ground)” (p.350). A set of pleasant, unremarkable conditions has seemingly often been sought out by these studies because the intention is not to evaluate weather effects. So for example, Lee et al. (2011) say that “the study was performed on days with fine weather in August” (p. 95) and Ryan et al. (2010) detail how their “data collection took place during the months of September and October between 11am and 4 pm when weather conditions permitted” (p. 162). Similarly, Focht (2009) details how his “outdoor walks were completed only on days when the weather was conducive to outdoor activities”. Indeed, “seven outdoor sessions had to be rescheduled due to poor weather” (p. 614). These statements show that there is not only a preference for ‘nice weather’ in these studies, but also how some weather conditions are deemed inappropriate for exercising outdoors.

Yet many people clearly do exercise outdoors in very varied conditions regarding temperature, light, and various other aspects of the environment. And green leaves often slowly turn brown, before sometimes being covered in white when snow creates a very different winter landscape. Quite possibly this is a central part of the attraction for many exercisers. This begs the question of how exactly different weather conditions and seasonal environmental differences play into the exercise experience. Other studies elsewhere, for example, reveal a clear seasonal variation in physical activity levels (Shephard & Aoyagi, 2009), with greater levels of participation in the summer months. Were we to analyze this variation in terms of how the field of green exercise research has developed so far we might be inclined to argue that the greater photosynthesis of summer may be pulling exercisers who are naturally drawn to the psychological benefits of ‘green’ out from their buildings. But we don't yet know a great deal about such processes.

So our first contention is that the visual focus on ‘green’, and the decision to study it with reference to certain ideas about appropriately ‘scientific’ testing may be standing in the way of a fuller appreciation of how environments that are often only sometimes and partly green are actually encountered. That the discussion has come to be defined by color is best illustrated by how those who have since turned their attention to the potential benefits of exercise near or within water have badged their work as about the effects of ‘blue’ space (White et al., 2016). Doing so makes sense as an attempt to put ‘blue’ alongside ‘green’ as a comparably important topic. But such a move also takes us to our second point about varied exercise forms since, though green exercise practices might not always be about looking, blue exercise benefits are often especially about a more physical kind of environmental immersion (Foley, 2015).

4. The trouble with ‘exercise’

We now turn to the physical activities that have generally been studied in green exercise research. Literature reviews (Bowler et al., 2010; Thompson Coon et al., 2011) indicate that walking is often the

preferred form though a number of studies have also asked people to either cycle on stationary bikes or to run. Other exercise types are much less common. The duration of the exercise event is also usually short, commonly ranging from 10 to 60 min. For example, in Berman et al.'s (2008) study, walks were specified as from 50 to 55 min in green or urban settings. Focht (2009) similarly asked participants to walk for 10 min on either a treadmill indoors or in an outdoor setting. Some studies justify the short time by reasoning that, if even short spells of green exercise produce benefits, these positive effects are probably more certain. Some studies also replicate public health guidelines about exercise duration to see if those who follow them in green spaces might be in line for a double dividend (Brown, Barton, Pretty, & Gladwell, 2012; Brown et al., 2014). However, it is also true that the reason for selecting particular exercise durations often goes unstated.

As with duration, the routes for those studies that involve walking or running in outdoor settings are usually predefined. The given route is usually some kind of loop, such as in the study by Teas, Hurley, Ghumare, and Ogoossan (2007), in which participants walked for an hour around a preset route of 600 m at a self-selected pace. Sometimes there is an ‘out-and-back’ route, in which participants walk or run to some predefined point along a given route and then return the same way (e.g. Bodin & Hartig, 2003; Butryn & Furst, 2003). In few studies, most notably those with a ‘forest bathing’ focus, the route is less defined. However, even in these studies, researchers generally select the location and control the time spent wandering within (Park et al., 2010). Others are even more prescriptive. For example, Bodin and Hartig (2003) mailed participants a map two weeks before their trial with instructions that they should familiarize themselves with the selected route in advance. Berman et al. (2008) asked participants to wear GPS watches so that their compliance could be checked. Kerr et al. (2006) placed research assistants at ‘advantageous positions’ along the running route. This was thought necessary as a safety measure, but it also allowed them to spot deviations from the route (Kerr et al., 2006, p.350).

Studies do not always tell us why specific modes of exercise were selected. This is particularly so with walking, which is often taken as the obvious stand-in for ‘exercise’ more generally. Exercise bikes are sometimes justified because they make it easier to ‘rigorously control’ (Rogerson, Gladwell, Gallagher, & Barton, 2016, p.1) the experience. Different reasons are given for a focus on running. For Bodin and Hartig (2003), this is because it is more intense than walking. For Kerr et al. (2006), research should “match exercisers with their usual mode of exercise when testing, rather than, for example, testing runners on bicycle ergometers” (p. 346). A final reason is that there is already evidence that running has positive effects on mood (Butryn & Furst, 2003).

All physical activities, including those understood as ‘exercise’, require a body that senses the environment and engages with it by moving in or through it. Yet, and building on the above discussion of ‘green’, this moving and sensing body is further hidden in green exercise research because of a tendency to downplay the specifics of the physical activity at hand. However, to sit on an exercise bike in a park is something very different to cycling or running through that park (see Rogerson et al., 2016). People also interact with ‘nature’ in many ways even within the same practice. Take the recent fashion of barefoot running. Those who praise barefoot running claim it is a superior form of environmental engagement (to shod running) because more information is exchanged between surfaces and feet (Lieberman, 2012; McDougall, 2009; Robbins & Hanna, 1987). In this way, barefoot running provides a useful reminder that when people exercise their engagement with the physical environment is multisensory and that this stimulation can be more highly prized than fixed and unchanging conditions.

So a second problem, as we see it, relates to how ‘exercise’ can be positioned in green exercise research as an easily recognizable and internally uniform activity. This has either been because ideas about scientific testing have led researchers to ask participants to do the same

thing or because variation has been downplayed in the quest for more broadly applicable results. But by studying exercise in this way, the diversity of ways in which people actually do their physical activities, with greenery or otherwise, is swept under the carpet.

5. Inhabiting environments and the running experience

So far we have argued two things. One, that work on green exercise, in trying to control for context, has turned the natural environment into a largely visual object in a way that misses how varied environments are experienced. Two, that in hopefully positioning certain exercise forms as representative of ‘exercise more generally’, the specifics of how particular forms are experienced by people are downplayed. Both manoeuvres make sense from one perspective. But the demands of certain beliefs about appropriate experimental design have also led to a situation in which relatively little is known about how various exercise forms might come into contact with a range of ‘green’ or ‘natural’ environments. And whilst there have been studies that evaluate a diversity of ‘green exercise’ practices (see, for example, how [Barton and Pretty \(2010\)](#), draw on projects centred on activities that range from farming to fishing), these studies do not generally delve fully into the detail of the experience. The ambition is rather to reach for more general effects through quantitative analysis. There are, however, other bodies of work that do not bow to these same demands. In this respect, we turn now to cultural studies of physical exercise. Though not often connected to the ‘green exercise’ agenda (for recent exceptions, see [Glackin and Beale \(2018\)](#), on how male recreational cyclists think about the benefits of natural cycling environments and [Allen-Collinson \(2018\)](#), on how weather influences the experience of those targeted by a Welsh outdoor exercise scheme), we find a range of recent in-depth qualitative studies with something valuable to add to this discussion.

Take [Brown’s \(2017\)](#) study of how walkers and cyclists in the Scottish Highlands value ‘ground-feel’. Through talking and exercising with both groups, she highlights the centrality of tactile environmental engagement to both practices. In part, this is about the varied elevations of the terrain they traverse. However, the experience is also profoundly shaped by the texture of trails. This is particularly the case for mountain bikers, who, when called upon to examine the pleasures generated through cycling highland trails, prove quite eloquent on the varied pleasures of various surfaces. In this way, she echoes the argument of [Ward Thompson \(2013\)](#) who contends that, if we want to understand “the landscape qualities that spark movement for movement’s sake” ([Brown, 2017, p.312](#)) we should pay more attention to how bodies and environments affect one another. Something similar can be seen in [Eden and Barratt’s \(2010\)](#) comparison of indoor and outdoor climbers. They show how the differences between the two cannot straightforwardly be linked to a superficial understanding of context (that one is inside and the other in ‘nature’). Rather their interviews reveal the subtle, but nonetheless deeply felt, variations in corporeal engagement with certain climbing surfaces. The difference that environmental affordances such as these make to exercise practices is also clearly apparent in [Phoenix and Orr’s \(2014\)](#) work on older exercisers. Talking with them about the full complement of exercise forms, they discover a diversity of modes through which ‘nature’ plays into the potential pleasures of exercise – from cold water on a swimmer’s body, the resistance offered by a steep hill climb, to the “touch of wind” (p. 96) on an older walker’s hair. And, as [Cook and Edensor \(2017\)](#) remind us in their rural cycling study, these modes also change after dark when alternative relationship between bodies and surroundings take shape.

What these studies show is that different exercisers relate to the environments with which they come into contact in very different ways. And, more than that, the physical features of these environments shape the exercise experience in ways that cannot be deduced in advance of careful study. So, if the aim is to understand how relationships between certain exercise practices and nominally natural environments develop, it is worth paying attention to how exactly particular elements of the

environment come to feature in the lived experience. Developing this point, and as a means of underlining how relevant studies have the potential to enrich green exercise research, we now turn to the growing body of qualitative work on recreational running. In many of the green exercise studies, running features as a proxy for a relatively bloodless idea of ‘exercise’. Yet, if we examine running, and its environments, with reference to in-depth studies of experience we can paint a rather different picture.

[Lorimer \(2012\)](#), for example, describes the recreational runner as “a highly accomplished sensualist” (p. 83), an exercising body in search of tactile engagement. [Nettleton \(2013, 2015\)](#), in an ethnography of fell running (a particular kind of hill running) in North England, tells a similar story. Her runners describe an absorption in the wild environment of the fells that has echoes of the romantic sublime. In part this absorption is visual, involving wonder at the natural landscape that surrounds them. But it also, and more crucially to our argument here, involves an intense corporeal engagement with that landscape. These runners convey a deep sense of absorption in the activity of fell running that is a product of their on-going, long term, physical involvement with a very particular set of material conditions. And this is not a ‘green’ landscape, or a ‘natural’ landscape per se. It is a landscape with very specific elements: rocks, heather, streams, mud, scree slides and so on. Exercising where they do, [Nettleton’s](#) fell runners have developed a deep attachment and knowledge of the environments they run through, and this is an attachment not easily transferable to another environment.

Of course, most recreational runners do not have the opportunity to run in these environments, as some of the anxieties sustaining green exercise research make clear. In more urban contexts, studies like those of [Krenichyn \(2004, 2006\)](#) and [Barnfield \(2016\)](#) nonetheless demonstrate that many runners (along with other exercisers) still find the ‘natural’ environments of large urban parks to be calming and restorative. Tellingly, however, they also point to a range of other engagements that are important in encouraging people there. Some studies suggest that parks may be valued running environments because of the loose sense of camaraderie with the other runners found there ([Hitchings & Latham, 2017a](#)). However, that is not to suggest that all urban runners feel an affinity with other space users since [Cook, Shaw, and Simpson \(2016\)](#), for example, highlight the kinaesthetic pleasures that some find in weaving through pedestrians who rather feature as obstacles (cf. [Allen-Collinson & Hockey, 2015; Hockey & Allen-Collinson, 2006](#)). We might feasibly think of urban running, whether in parks or on streets, as something quite different from that which happens in more ‘natural’ spaces.

In any case, this research approach encourages us to redefine the problem as being less about providing the right vegetated environment for beneficial green running, and more about how exercising bodies and physical environments lock into an on-going positive relationship with one another. In the interviews of [Howe and Morris \(2009\)](#), for example, running in woods are valued because of the “rolling dirt track.... that is soft underfoot, being occasionally covered with bark chips in places and wooden planks in others” (p. 319). The point for these runners is that this is an alternative to the hard pavements of more urban areas. These environmental ‘affordances’ are very different, but perhaps no less important, to those examined in green exercise research. [Howe and Morris](#) also suggest that some runners do so outside because they need to practice in conditions comparable to planned future cross-country races. So these runners are not doing so because of green exercise benefits when, as others have pointed out ([Butryn & Masucci, 2009](#)) ‘natural’ environments, with all their distracting variation, are sometimes less appealing than their indoor equivalents for those whose priority is optimizing athletic performance. It may therefore be that we should leave these highly committed exercisers alone in promoting green exercise because the last thing they would want is psychological relaxation when the focus is squarely on achieving peak performance.

Some of our own work has sought to compare indoor and outdoor

running. But this is in a different way to the green exercise studies discussed above (Hitchings & Latham, 2016). For indoor recreational runners in London, we have explored the seductions of the variation-less surface and environment associated with the gym treadmill. Through interviews, we found the dull uniformity of the experience helping to hold valued exercise routines in place. The ability to delegate to the treadmill, and the knowledge that the machine will guide them smoothly to the end of the workout, trumped any benefits from being outdoors, even though those found on these machines, when asked to reflect on the matter, thought ‘indoor’ running was far from the ideal. They had been recruited into indoor routines that encouraged them to ‘forget’ about the possibility of environmental benefits outside (see also Hitchings, 2013). We have also been studying how recreational runners are drawn into an urban forest in Finland. Some did so because they wanted to experience varied surfaces since the materials that often tend to accompany ‘green environments’ (rocks, soil, roots and so on) invited their bodies to respond in ways that positively animate their runs. For them, engaging with these irregularities kept their bodies and minds occupied, which, in turn, helped them to transcend the daily grind. Yet others described how more uniform surfaces can also facilitate an escape from preoccupations by supporting a mental state in which they have no need to concentrate on anything.

Building on this experiential focus, Hockey (2013) describes an interesting mix of meditation and monitoring amongst more experienced runners who move in and out of states of ease and exertion over the course of a training run. Little is explicitly said here about specific features of the environment, but it is quite possible that the restorative effects of greenspace may be playing into this. There are therefore some hints here about how, during the run, runner and living trees and vegetation might come together to achieve the ideal mix of performance and psychological benefit.

Then there is the matter of how running’s apparent simplicity hides a story of diversity in where and how it has been done over time. The spread of ‘jogging’ in Sweden, for example, undercut national ideals about the ‘trail’ by being proudly non-natural, as running was imaginatively relocated to urban environments as a result of being repositioned as about the efficient achievement of health, rather than romantic ideas about the forest (Qviström, 2017). In this way, there is also value in linking green exercise to a broader historical sense of the changing environments to which running has been attached (Latham, 2015).

Our point here is no more complicated than to show how these studies shed light on whether, how and when ‘green exercise’ will likely happen for different runners, along with the extent to which the suggested benefits of running through and alongside greenery will be welcomed by them. Our aim is to move the discussion from experimental data on the value of green exercise, to a fuller sense of whether and how it might be encouraged amongst certain groups, along with the possible role of landscape design in all of this. And whilst such studies no doubt complicate the picture in terms of practical implications, they also start to reveal a more variegated sense of how certain exercisers and certain environments might feasibly coalesce. We therefore see potential in more qualitative work on exercise and (sometimes green) environment (for more on this argument, see Hitchings and Latham (2017b)).

6. Conclusion

The intention in green exercise research has been to control for context effects in the quest for more robust results regarding the effects of exercising near vegetation. One limitation of this, according to Barton, Bragg, Wood, and Pretty (2016), is that “it does not provide the full-sensory experience of green exercise participation” (p.30). They also suggest that further research is needed “to conclude whether laboratory-based findings are fully applicable to the real world” (p.30). We agree with this and we offer the following three pointers about how

this research might proceed. First, it is necessary to take a step back from prevailing research approaches and not stress the importance of the greenness or blueness – or any other visually predefined feature – of the exercise environment too greatly beforehand. That is, research should be open to the varied qualities of the environment and the varied ways in which people physically engage with them. Second, ‘nature’ should be recognized as dynamic since weather, seasons, and the material conditions for exercise are varied and ever changing outdoors. It is worth studying these dynamics instead of assuming what is, for example, to be judged ‘fine’ or ‘poor’ weather because they will likely be key to understanding how ‘green exercise’ practices attract and retain enthusiasts. Third, people evidently exercise in very many ways, and that variation really matters to whether they are likely to do this in or alongside greenery. And understanding this diversity requires close scrutiny of how specific exercisers relate to their environments.

We offer these pointers here because, in terms of landscape design, our concern is that the current implied vision of the environments that facilitate ‘green exercise’ is coloured by how the topic has been studied so far. Green exercise studies often leave us with a picture of flat lawns, paths and opportunities for an undifferentiated set of exercisers to gaze at greenery in unremarkably warm and pleasant weather. Planners and designers interested in practical application should remember that this picture is an artefact of the research approach and not necessarily what they should always strive to recreate themselves. For a more detailed sense of what they should actually do, we think that the stage is now set for a fuller examination of the factors that encourage or discourage different groups to avail themselves of green exercise benefits in their everyday lives. And whilst there will be many possible ways of doing so, we think that some of the ideas and approaches presented above could play a useful part in this.

Acknowledgements

This research was supported by Academy of Finland project *Affective Landscapes of Running* (grant number 295386).

References

- Akers, A., Barton, J., Cossey, R., Gainsford, P., Griffin, M., & Micklewright, D. (2012). Visual color perception in green exercise: Positive effects on mood and perceived exertion. *Environmental Science and Technology*, 46(16), 8661–8666. <http://dx.doi.org/10.1021/es301685g>.
- Allen-Collinson, J. (2018). ‘Weather work’: Embodiment and weather learning in a national outdoor exercise programme. *Qualitative Research in Sport, Exercise and Health*, 10(1), 63–74. <http://dx.doi.org/10.1080/2159676X.2017.1360382>.
- Allen-Collinson, J., & Hockey, J. (2015). From a certain point of view: Sensory phenomenological envisioning of running space and place. *Journal of Contemporary Ethnography*, 44(1), 63–83. <http://dx.doi.org/10.1177/0891241613505866>.
- Barnfield, A. (2016). Public health, physical exercise and non-representational theory – A mixed method study of recreational running in Sofia, Bulgaria. *Critical Public Health*, 26(3), 281–293. <http://dx.doi.org/10.1080/09581596.2015.1029434>.
- Barton, J., Wood, C., Pretty, J., & Rogerson (2016). *Green exercise: Linking nature, health and well-being*. London and New York: Routledge.
- Barton, J., & Pretty, J. (2010). What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environmental Science & Technology*, 44(10), 3947–3955. <http://dx.doi.org/10.1021/es903183r>.
- Barton, J., Wood, C., Pretty, J., & Rogerson, M. (2016). Green exercise for health. A dose of nature. In J. Barton, R. Bragg, C. Wood, & J. Pretty (Eds.). *Green exercise: Linking nature, health and well-being* (pp. 26–36). London and New York: Routledge.
- Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science*, 19(12), 1207–1212.
- Bodin, M., & Hartig, T. (2003). Does the outdoor environment matter for psychological restoration gained through running? *Psychology of Sport and Exercise*. [http://dx.doi.org/10.1016/S1469-0292\(01\)00038-3](http://dx.doi.org/10.1016/S1469-0292(01)00038-3).
- Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., & Pullin, A. S. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*, 10(456), <http://dx.doi.org/10.1186/1471-2458-10-456>.
- Brown, K. M. (2017). The haptic pleasures of ground-feel: The role of textured terrain in motivating regular exercise. *Health and Place*, 46, 307–314. <http://dx.doi.org/10.1016/j.healthplace.2016.08.012>.
- Brown, D. K., Barton, J. L., Pretty, J., & Gladwell, V. F. (2012). Walks4work: Rationale and study design to investigate walking at lunchtime in the workplace setting. *BMC Public Health*, 12, 550. <http://dx.doi.org/10.1186/1471-2458-12-550>.
- Brown, D. K., Barton, J. L., Pretty, J., & Gladwell, V. F. (2014). Walks4Work: Assessing the

- role of the natural environment in a workplace physical activity intervention. *Scandinavian Journal of Work, Environment & Health*, 40(4), 390–399. <http://dx.doi.org/10.5271/sjweh.3421>.
- Brymer, E., & Davids, K. (2013). Ecological dynamics as a theoretical framework for development of sustainable behaviours towards the environment. *Environmental Education Research*, 19(1), 45–63. <http://dx.doi.org/10.1080/13504622.2012.677416>.
- Brymer, E., Lecturer, P., Sharma-brymer, V., & Davids, K. (2015). The relationship between physical activity in green space and human health and wellbeing: An ecological dynamics perspective. *Journal of Physical Education Research*, 2(2), 7–22.
- Butryn, T. M., & Furst, D. M. (2003). The effects of park and urban settings on the moods and cognitive strategies of female runners. *Journal of Sport Behavior*, 26(4), 335–355.
- Butryn, T. M., & Masucci, M. A. (2009). Traversing the matrix: Cyborg athletes, technology, and the environment. *Journal of Sport and Social Issues*, 19(3), 423–450. <http://dx.doi.org/10.1177/0193723509340000>.
- Cook, M., & Edensor, T. (2017). Cycling through dark space: Apprehending landscape otherwise. *Mobilities*, 12(1), 1–19. <http://dx.doi.org/10.1080/17450101.2014.956417>.
- Cook, S., Shaw, J., & Simpson, P. (2016). Jography: Exploring meanings, experiences and spatialities of recreational road-running. *Mobilities*, 11(5), 744–769. <http://dx.doi.org/10.1080/17450101.2015.1034455>.
- Depledge, M., Stone, R., & Bird, W. (2011). Can natural and virtual environments be used to promote improved human health and wellbeing? *Environmental Science and Technology*, 45(11), 4660–4665.
- Eden, S., & Barratt, P. (2010). Outdoors versus indoors? Angling ponds, climbing walls and changing expectations of environmental leisure. *Area*, 42(4), 487–493. <http://dx.doi.org/10.1111/j.1475-4762.2010.00943.x>.
- Focht, B. C. (2009). Brief walks in outdoor and laboratory environments. *Research Quarterly for Exercise and Sport*, 80(3), 611–620. <http://dx.doi.org/10.1080/02701367.2009.10599600>.
- Foley, R. (2015). Swimming in Ireland: Immersions in therapeutic blue space. *Health and Place*, 35, 218–225. <http://dx.doi.org/10.1016/j.healthplace.2014.09.015>.
- Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston: Houghton Mifflin.
- Glackin, O., & Beale, J. T. (2018). "The world is best experienced at 18 mph": The psychological wellbeing effects of cycling in the countryside: An Interpretative Phenomenological Analysis. *Qualitative Research in Sport, Exercise and Health*, 10(1), 32–46.
- Gladwell, V. F., Brown, D. K., Wood, C., Sandercock, G. R., & Barton, J. L. (2013). The great outdoors: How a green exercise environment can benefit all. *Extreme Physiology & Medicine*, 2(3). <http://dx.doi.org/10.1186/2046-7648-2-3>.
- Grinde, B., & Patil, G. G. (2009). Biophilia: Does visual contact with nature impact on health and well-being? *International Journal of Environmental Research and Public Health*, 6(9), 2332–2343. <http://dx.doi.org/10.3390/ijerph6092332>.
- Hitchings, R. (2013). Studying the reoccupations that prevent people from going into green space. *Landscape and Urban Planning*, 118, 98–102. <http://dx.doi.org/10.1016/j.landurbplan.2012.09.006>.
- Hitchings, R., & Latham, A. (2016). Indoor versus outdoor running: understanding how recreational exercise comes to inhabit environments through practitioner talk. *Transactions of the Institute of British Geographers*, 41(4), 503–514. <http://dx.doi.org/10.1111/tran.12138>.
- Hitchings, R., & Latham, A. (2017a). How 'social' is recreational running? Findings from a qualitative study in London and implications for public health promotion. *Health & Place*, 46, 337–343. <http://dx.doi.org/10.1016/j.healthplace.2016.10.003>.
- Hitchings, R., & Latham, A. (2017b). Exercise and environment: New qualitative work to link popular practice and public health. *Health & Place*, 46, 300–306. <http://dx.doi.org/10.1016/j.healthplace.2017.04.009>.
- Hockey, J. (2013). Knowing the 'Going': The sensory evaluation of distance running. *Qualitative Research in Sport, Exercise and Health*, 5(1), 127–141. <http://dx.doi.org/10.1080/2159676X.2012.693531>.
- Hockey, J., & Allen-Collinson, J. (2006). Seeing the way: Visual sociology and the distance runner's perspective. *Journal of the International Visual Sociology Association*, 21(1), 37–41. <http://dx.doi.org/10.1080/14725860600613253>.
- Howe, P. D., & Morris, C. (2009). An exploration of the co-production of performance running bodies and natures within "Running Taskscapes". *Journal of Sport & Social Issues*, 33(3), 308–330. <http://dx.doi.org/10.1177/0193723509340007>.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169–182. [http://dx.doi.org/10.1016/0272-4944\(95\)90001-2](http://dx.doi.org/10.1016/0272-4944(95)90001-2).
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York: Cambridge University Press.
- Kerr, J. H., Fujiyama, H., Sugano, A., Okamura, T., Chang, M., & Onouha, F. (2006). Psychological responses to exercising in laboratory and natural environments. *Psychology of Sport and Exercise*, 7(4), 345–359. <http://dx.doi.org/10.1016/j.psychsport.2005.09.002>.
- Krenichyn, K. (2004). Women and physical activity in an urban park: Enrichment and support through an ethic of care. *Journal of Environmental Psychology*, 24(1), 117–130. [http://dx.doi.org/10.1016/S0272-4944\(03\)00053-7](http://dx.doi.org/10.1016/S0272-4944(03)00053-7).
- Krenichyn, K. (2006). "The only place to go and be in the city": Women talk about exercise, being outdoors, and the meanings of a large urban park. *Health and Place*, 12(4), 631–643. <http://dx.doi.org/10.1016/j.healthplace.2005.08.015>.
- Latham, A. (2015). The history of a habit: Jogging as a palliative to sedentariness in 1960s America. *Cultural Geographies*, 22(1), 103–126. <http://dx.doi.org/10.1177/1474474013491927>.
- Lee, J., Park, B. J., Tsunetsugu, Y., Ohira, T., Kagawa, T., & Miyazaki, Y. (2011). Effect of forest bathing on physiological and psychological responses in young Japanese male subjects. *Public Health*, 125(2). <http://dx.doi.org/10.1016/j.puhe.2010.09.005>.
- Lieberman, D. E. (2012). What we can learn about running from barefoot running: An evolutionary medical perspective. *Exercise & Sport Sciences Reviews*, 40(2), 63–72. <http://dx.doi.org/10.1097/JES.0b013e31824ab210>.
- Lorimer, H. (2012). Surfaces and slopes. *Performance Research*, 17(2), 83–86. <http://dx.doi.org/10.1080/13528165.2012.671080>.
- McDougall, C. (2009). *Born to run*. New York: Alfred A Knopf.
- Nettleton, S. (2013). Cementing relations within a sporting field: Fell running in the English lake district and the acquisition of existential capital. *Cultural Sociology*, 7(2), 196–210. <http://dx.doi.org/10.1177/1749975512473749>.
- Nettleton, S. (2015). Fell runners and walking walls: Towards a sociology of living landscapes and aesthetic atmospheres as an alternative to a Lakeland picturesque. *British Journal of Sociology*, 66(4), 759–778. <http://dx.doi.org/10.1111/1468-4446.12146>.
- Park, B. J., Tsunetsugu, Y., Kasetani, T., Kagawa, T., & Miyazaki, Y. (2010). The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): Evidence from field experiments in 24 forests across Japan. *Environmental Health and Preventive Medicine*, 15(1), 18–26. <http://dx.doi.org/10.1007/s12199-009-0086-9>.
- Phoenix, C., & Orr, N. (2014). Pleasure: A forgotten dimension of physical activity in older age. *Social Science and Medicine*, 115, 94–102. <http://dx.doi.org/10.1016/j.socscimed.2014.06.013>.
- Pretty, J., Peacock, J., Hine, R., Sellens, M., South, N., & Griffin, M. (2007). Green exercise in the UK countryside: Effects on health and psychological well-being, and implications for policy and planning. *Journal of Environmental Planning and Management*, 50(2), 211–231. <http://dx.doi.org/10.1080/09640560601156466>.
- Pretty, J., Peacock, J., Sellens, M., & Griffin, M. (2005). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*, 15(5), 319–337. <http://dx.doi.org/10.1080/09603120500155963>.
- Qviström, M. (2017). Competing geographies of recreational running: The case of the "jogging wave" in Sweden in the late 1970s. *Health & Place*, 46, 351–357. <http://dx.doi.org/10.1016/j.healthplace.2016.12.002>.
- Robbins, S. E., & Hanna, A. M. (1987). Running-related injury prevention through barefoot adaptations. *Medicine and Science in Sports and Exercise*, 19(2), 148–156.
- Rogerson, M., & Barton, J. (2015). Effects of the visual exercise environments on cognitive directed attention, energy expenditure and perceived exertion. *International Journal of Environmental Research and Public Health*, 12(7), 7321–7336. <http://dx.doi.org/10.3390/ijerph120707321>.
- Rogerson, M., Gladwell, V. F., Gallagher, D. J., & Barton, J. L. (2016). Influences of green outdoors versus indoors environmental settings on psychological and social outcomes of controlled exercise. *International Journal of Environmental Research and Public Health*, 13(4), 363. <http://dx.doi.org/10.3390/ijerph13040363>.
- Ryan, R. M., Weinstein, N., Bernstein, J., Brown, K. W., Mistretta, L., & Gagné, M. (2010). Vitalizing effects of being outdoors and in nature. *Journal of Environmental Psychology*, 30(2), 159–168. <http://dx.doi.org/10.1016/j.jenvp.2009.10.009>.
- Shephard, R. J., & Aoyagi, Y. (2009). Seasonal variations in physical activity and implications for human health. *European Journal of Applied Physiology*, 107(3), 251–271. <http://dx.doi.org/10.1007/s00421-009-1127-1>.
- Teas, J., Hurley, T., Ghumare, S., & Ogooussan, K. (2007). Walking outside improves mood for healthy postmenopausal women. *Clinical Medicine: Oncology*, 1, 35–43.
- Thompson Coon, J., Boddy, K., Stein, K., Whear, R., Barton, J., & Depledge, M. H. (2011). Does participating in physical activity in outdoor natural environments have a greater effect on physical and mental wellbeing than physical activity indoors? A systematic review. *Environmental Science and Technology*, 45(5), 1761–1772. <http://dx.doi.org/10.1021/es102947t>.
- Ulrich, R. S. (1986). Human responses to vegetation and landscapes. *Landscape and Urban Planning*, 13, 29–44. [http://dx.doi.org/10.1016/0169-2046\(86\)90005-8](http://dx.doi.org/10.1016/0169-2046(86)90005-8).
- Ulrich, R. S. (1983). Aesthetic and affective response to natural environment. In J. Altman, & I. Wohlwill (Vol. Eds.), *Behavior and natural environment*: vol. 6. *Human behavior and environment* (pp. 85–125). New York: Plenum.
- Ward Thompson, C. W. (2012). Activity, exercise and the planning and design of outdoor spaces. *Journal of Environmental Psychology*, 34, 79–96. <http://dx.doi.org/10.1016/j.jenvp.2013.01.003>.
- White, M. P., Bell, S., Elliott, L. R., Jenkin, R., Wheeler, B. W., & Depledge, M. H. (2016). The Health benefits of blue exercise in the UK. In J. Barton, R. Bragg, C. Wood, & J. Pretty (Eds.), *Green exercise: Linking nature, health and well-being* (pp. 69–77). London and New York: Routledge.
- Williams, R. (1973). *The country and the city*. New York: Oxford University Press.