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Review Essay

Green space, health and wellbeing: making space for individual agency



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ABSTRACT

This essay examines the assumptions of green space use underpinning much existing green space and health research. It considers opportunities to move the field forward through exploring two often overlooked aspects of individual agency: the influence of shifting life circumstances on personal wellbeing priorities and place practices, and the role of personal orientations to nature in shaping how green space wellbeing opportunities are perceived and experienced. It suggests such efforts could provide more nuanced insights into the complex, personal factors that define and drive individual choices regarding the use of green spaces for wellbeing over time, thereby strengthening our understanding of the salutogenic potential (and limits) of green spaces.

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1. Introduction

A significant body of research has accumulated over the last 30 years that, whilst not conclusive, suggests a positive influence of green space exposure on human health and wellbeing. This includes the identification of associations between green space in the living environment, better self reported health (De Vries et al., 2003; Maas et al., 2006; Van Den Berg et al., 2010) and reduced morbidity, stress, obesity, and cardiovascular and respiratory disease (Nielsen and Hansen, 2007; Maas et al., 2009a; Richardson and Mitchell, 2010).

Efforts to explain the processes through which these associations might arise tend to suggest a role for: (a) improved environmental quality, such as reduced air pollution (Hartig et al., 2014); (b) physical

activity (Bowler et al., 2010; Thompson-Coon et al., 2011); (c) social interaction (Maas et al., 2009b); (d) direct restoration from stress or fatigue through psycho-neuro-endocrine pathways (Ulrich, 1983; Kaplan, 1995); and (e) emotional and/or spiritual experiences, though these are lesser researched (Warber et al., 2013). Overall, the balance of evidence currently favours the restorative pathway (Silveirinha De Oliveira et al., 2013), is mixed on physical activity, and limited with regards to social interaction (Hartig et al., 2014).

Whilst the evidence base provides valuable insights into the salutogenic potential of green spaces, existing research tends to be underpinned by the assumption that where people have nearby green spaces, they will use them (Hitchings, 2013). This risks equating green space presence (typically within the residential environment) with inevitable wellbeing experience (Conradson, 2005). Although this assumption is increasingly acknowledged as a limitation in much of that research, it does constrain the generation of more nuanced insights into when and why different people do or do not use green spaces and how; it is likely that complex personal factors define and

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drive our choices regarding the use of different green spaces for wellbeing over time and, therefore, the potential to benefit from 'use'. Where people do engage with their local green spaces, the nature of their interactions may promote certain dimensions of wellbeing at the expense of others (Collins and Kearns, 2007).

This article examines such assumptions of use alongside opportunities to move the field forward through exploring two often overlooked aspects of individual agency: the influence of shifting life circumstances on personal wellbeing priorities and place practices, and the role of personal orientations to nature in shaping how green space wellbeing affordances are perceived and experienced. It concludes by elaborating on four future research opportunities which could strengthen our understanding of the salutogenic potential (and limits) of green space by facilitating greater consideration of individual agency.

Within the article, agency is understood as "the capacity of individuals to make purposeful choices and transform these into desired actions and outcomes within the social, cultural, economic and political contexts specific to their daily lives" (Bell, 2012: 283). A broad interpretation of green space is adopted, including private and public green and blue spaces, primarily in and around urban areas, ranging from landscaped spaces (such as parks, gardens, allotments) to those considered relatively 'natural' (such as woodlands, rivers and beaches) (DTLR, 2002). Whilst the somewhat homogenous 'green space' term is used within this article for purposes of brevity, we recognise and support recent calls for greater specificity in our understanding of the diverse health and wellbeing potentials of different green and blue space settings and interactions (Velarde et al., 2007; Van Den Berg et al., 2014).

2. The limitations of existing assumptions underpinning green space-health studies

Much existing research, a significant proportion of which is carried out at a population-level, makes the assumption that a greater presence of, or proximity to, green space within the living environment will lead to enhanced green space use (Hitchings, 2013) and contribute to improved health outcomes. However the findings of these studies are mixed and often contradictory. For example, a vast and growing body of evidence has examined associations between green space proximity and self-reported physical activity at a population level. Some studies find positive associations (e.g. Panter and Jones, 2008; Coombes et al., 2010), others find no association (e.g. Hillsdon et al., 2006; Koohsari et al., 2013). Similar study designs have identified mixed associations between green spaces and/or streetscape greenery in the living environment and self-reported measures of social interaction. Positive associations have, for example, been identified using measures such as 'self-reported feelings of loneliness' (Maas et al., 2009b) and social cohesion scales (De Vries et al., 2013). However, no significant associations were identified using measures of the 'number of supportive interactions' or 'amount of contact with neighbours and friends in the neighbourhood' (Maas et al., 2009b).

The reasons for the uncertainty in these relationships may be due to a number of factors, including:

- Lack of consideration of proximity to competing resources (Mitchell, 2013), including more distant green spaces perhaps affording preferred activity opportunities or non-green space environments;
- Use of cross-sectional study designs with limited capacity to determine causality (Lachowycz and Jones, 2011);
- Application of varied green space proximity measures, including the number of parks or park acreage within a geographic unit, objective distances to the nearest green space using

Euclidian and/or street network analyses (Higgs et al., 2012), and more subjective measures examining perceived distance (Macintyre et al., 2008);

- Lack of information concerning local green space characteristics, which may be an important determinant of use (De Jong et al., 2012; Paquet et al., 2013).

A further factor concerns actual 'use' of these nearby green spaces, and how it varies according to population, circumstance, and individual or community capacity. As noted by Keniger et al. (2013), 'use' infers three types of interaction: (a) indirect, involving detached and largely visual green space engagement, such as appreciating a view from a window or photos, paintings and film footage; (b) incidental, in which a person is physically present within the green space but as a by-product of another activity, such as cycling through a park whilst commuting to work; and (c) intentional, where the primary aim is to directly experience the green space, be it for gardening, hiking, a picnic, wildlife watching etcetera. Although not discussed by Keniger et al. (2013), it is conceivable that an interaction may be both incidental and intentional; a person may, for example, consciously choose to cycle in the park rather than the road to gain a 'green fix' en route to work, but the primary aim of cycling is still to reach the office.

Opportunities for population-level epidemiological studies to explore the person or place-specific factors driving observed use patterns are currently limited by the lack of large-scale data sets capturing objective or subjective information about: (a) the quality of these spaces; (b) the diversity of experiences afforded by different green spaces; and (c) individual orientations that may influence use inclinations. Valuable population level studies have started to consider actual use of local green spaces for physical activity (Mitchell, 2013; Ord et al., 2013) and/or social interaction (Korpela et al., 2014) and, to some extent, the personal factors driving this use. For example, Lin et al. (2014) recently surveyed a stratified sample of 1479 residents in Brisbane, Australia, to examine the importance of both access and personal orientation factors in explaining park use. Amongst the 62% of respondents who reported visiting a park in the week prior to completing the survey, nature orientation (measured using the Nature Relatedness Scale) was a stronger determinant of use than nearby park coverage (though both were significant). Park users with stronger nature orientations also travelled further to green spaces and stayed longer once there than park visitors with weaker nature orientations.

The influences of setting type and person-specific factors on use have been examined independently to some extent, using both quantitative and smaller-scale qualitative study designs. For example, a growing body of evidence has sought to understand people's preferences for different green space characteristics, including physical (vegetation density, design, maintenance and presence of facilities) and social qualities (perceived safety and norms of use) (e.g. Ode et al., 2008; McCormack et al., 2010; Seaman et al., 2010). A small number of studies have considered the influence of past place experience in shaping woodland interactions (Milligan and Bingley, 2007; Ward Thompson et al., 2005, 2008). Efforts have also been made to explore barriers to green space use amongst different population sub-groups, broadly distinguished by ethnicity, race, income, age and disability (Ward Thompson et al., 2003; Sasidharan et al., 2005; Morris et al., 2011).

However, we still know relatively little about the more subtle and perhaps shifting values and identity orientations that affect individual interest and agency in interacting with such spaces, and whether individuals associate these interactions with feelings of wellbeing or otherwise. Such insights are important when considering how and why people may or may not be benefiting from the green spaces available within their local environments. As noted by

Pinder et al. (2009: 354), “there are several ways of being human, and the outdoors does not necessarily have the same salience in all”.

3. How could a focus on agency address the limitations of existing assumptions?

A renewed focus on individual agency (including capacity and inclination to engage with green spaces) could contribute to a more nuanced understanding of the ways in which people do or do not use different green spaces, and the extent to which people associate their green space interactions with wellbeing. Two potentially important aspects of individual agency in this regard are discussed in this section: the role of shifts in life circumstances over time and the development of personal orientations to nature.

3.1. The influence of shifting life circumstances over time

The processes by which different green spaces become more or less valued for wellbeing as our life circumstances change have gained limited attention in existing green space and health research. Favourable configurations of individual life circumstances and associated values for spending time in nature are important (Seaman et al., 2010), but it remains unclear how specific life course transitions may alter individual awareness and agency in seeking out green space as a wellbeing resource (Scopelliti and Giuliani, 2004). How, for example, might relocation from relatively green to more built up areas influence personal awareness of perhaps previously taken-for-granted green space benefits? How and why do people become conscious of the wellbeing affordances of such spaces, if at all, and can specific green space ‘turning points’ be identified?

A recent population-level epidemiological study identified variations in observed associations between local green space availability and mental health outcomes across the life course in England, and suggested that consideration of life stage could enhance our understanding of these relationships (Astell-Burt et al., 2014). Different patterns were observed with age and by gender. Whilst the benefit of greater local green space for men was apparent primarily in early to mid-adulthood, the benefit for women occurred later in life, in their mid-40s and older. Moreover, amongst these women, a moderate (rather than a high) degree of green space exposure was associated with the most favourable mental health outcomes. Reflecting on the findings, the authors highlight a weakness in our current understanding of which green spaces matter at different stages in life, why and for whom.

Linked to this, an earlier population-level epidemiological study identified gender differences in observed associations between ward-level urban green space coverage and cardiovascular and respiratory disease mortality in the UK, whereby protective associations were identified only for men (Richardson and Mitchell, 2010). Though not explored within the study, the authors speculate that women's leisure time exercise behaviour may be more severely attenuated following the birth of children, particularly if women are the primary childcare-giver. This idea is supported to some extent by the findings of a longitudinal study by Janke et al. (2010), which identified an increase in women's perceived freedom in leisure upon entering the ‘empty nest’ phase (when children have left the home). Taken together, the findings from these three studies suggest value in exploring gender-related differences in individual agency when considering shifts in green space use through the life course.

Older age is associated with periods of significant change, particularly relating to retirement, personal and spousal health, caring duties and bereavement (Parry et al., 2004). Use of certain green spaces has been found to alleviate some of the negative influences of these transitions on personal wellbeing. For example, studies have highlighted that older participants of group-

based nature conservation and/or gardening activities appreciate the opportunities gained for: structure and routine (Gross and Lane, 2007); meaningful social interaction and the development of stronger community ties (Sullivan et al., 2004); a sense of achievement, pride and ownership (Townsend, 2006); and the forging of new social identities (Milligan et al., 2005). Older adults' decisions concerning participation in communal gardening activities, or the use of green spaces more generally, may be influenced by factors such as the presence of amenities, including toilets, seating areas and cafes (Alves et al., 2008; Aspinall et al., 2010).

However, advancing age can limit older adults' capacity to cope with the garden, or to continue participating in social or community activities as they used to; these are changes in individual agency which may lead to distress, frustration or even depression (Gross and Lane, 2007). Research suggests agentic ‘preparation’ or ‘coping’ practices may help deal with these shifts. Examples include the gradual replacement of more labour intensive aspects of the garden (such as vegetables and shrubs) with tubs, hanging baskets, lawned or paved areas, as well as engaging in communal gardening schemes where individuals maintain each other's gardens in the event of illness, injury or short holiday periods (Milligan et al., 2004). These are examples of ‘adaptive’ agency, or ‘adaptive optimising strategies’ (Wiles et al., 2009: 665), whereby individuals shift their choices and actions to maximise the opportunities available to use their preferred green spaces, minimising the influence of new constraints emerging within their everyday realities.

Beyond these few studies, we know little about the influence of different life transitions on relational agency in terms of green space use. The notion of relational agency reflects Gergen's (2009: 135) recognition that choices are generally made within the context of relationships, present or past; “as we engage in relationships, both significant and superficial, we are continuously absorbing potentials for action”. As such, it would be pertinent for future research to consider how shifts in our social relationships (e.g. with partners, children, close friends etc.) might enhance or compromise personal priorities or capacity to seek out different green space experiences for wellbeing over time.

3.2. What about self identification with nature?

The perceived importance of green space to the individual for wellbeing has been linked to feelings of connection to, or self-identification with, nature (Mayer et al., 2009; Eriksson et al., 2012). For example, participants in Brehm's (2007) narrative study with rural communities in Heavenly Valley, United States, indicated that it takes a certain ‘type’ of person to thrive in such a remote rural area: a person willing to trade off the associated economic challenges (including low salaries and lack of shopping amenities) for the quality of life and peace afforded by the clean air, water, open spaces and clear skies of the mountains. In this regard, people develop meaning and build emotional ties to specific places, seeking communities whose values, norms and preferred lifestyles match their own (Williams and Patterson, 2008).

There is some evidence that childhood participation in nature-based activities may represent the start of a ‘nature-acculturation’ process, with different types of nature interactions potentially shaping those sought out as adults (Asah et al., 2012). For example, in-depth qualitative studies with adult green space users suggest the importance of relational aspects of childhood nature-acculturation; time spent playing with siblings, parents and friends in such areas as children often featured strongly within their positive memories (Burgess et al., 1988; Cosgriff et al., 2009; Spartz and Shaw, 2011). Similarly, small-scale forest-based studies in the UK have highlighted how individuals with limited childhood experience of such spaces are less likely to enjoy them as adults, expressing feelings of anxiety and uncertainty upon visiting rather

than restoration or enjoyment (Milligan and Bingley, 2007; Ward Thompson et al., 2005, 2008).

Asah's notion of 'nature-acculturation' highlights an important example where agency and socio-cultural influences may be interacting to shape the salience of green space to the individual. For example, prevalent cultural narratives concerning the benefits (well-being or otherwise) of green spaces may shape public expectations of these spaces and attune individuals to certain aspects of experience over others (Tuan, 1977). Interestingly in this regard, Rose (2012) describes how an awareness of cultural metaphors or narratives linked to certain phenomena and/or settings can conjure associated emotional responses, thereby shaping the moods and emotions described by individuals in relation to different place encounters. To illustrate this, she highlights how a sunrise may be experienced as 'promising', thunder and lightning as 'punishing' or clear skies as a 'new start' (and so forth).

Since the 1800s in the UK, green spaces have been politically and culturally constructed and reproduced as spaces that are 'good for us' (Brown and Bell, 2007). Exalted benefits of these spaces over time have included the dissipation of 'miasma' (Hickman, 2013), the 'healthful exercise of the population' (Carpenter, 2013), and opportunities for spiritual and physical 'renewal and retreat' from city life (Matless, 1998). Such positive constructions are not restricted to the UK. For example, the cultural practice of 'Shinrin-yoku' or 'taking in the forest atmosphere' has become increasingly popular in Japan after its promotion as a source of stress relief by the Japanese government in 1982 (Tsunetsugu et al., 2010). Forest-based well-being practices are also apparent across the Scandinavian countries, as discussed by Skår (2010) after conducting in-depth interviews with forest users in Norway. When discussing why female users refused to let fear hinder them from walking freely in the forest, Skår highlighted the importance of their upbringing and the role of prevailing cultural norms around nature interactions in Norway; "feelings of fear in nature do not fit well with the traditional Norwegian image" (Skår, 2010: 110). These socio-cultural influences appeared to contribute to 'intuitive expertise' in forest spaces; that is, "the accumulation and incorporation of experiences within the thinking and skills of individuals" (2010: 115).

Why people choose to engage with these different cultural narratives is largely unknown, and few studies have explored how exposure to diverse (and perhaps contrasting) cultural narratives may shape the wellbeing experiences sought out by individuals within their local green spaces. Studies have suggested that conflicting social and cultural norms around green space use, and perceptions of what constitutes 'appropriate' behaviour in such spaces, can act as a deterrent to use (Kessel et al., 2009). This is perhaps most pronounced in the US-based literature highlighting certain green spaces as 'White' places. In part this links to a history of racially segregated park systems, but also to a perception amongst minority Latino groups that aspects of their green space 'recreational style' – including 'boisterous picnicking' – would not be welcomed in US wildland spaces dominated by norms of 'Whiteness' (e.g. quiet hiking and contemplation) (Byrne, 2012: 608). As such, these individuals have come to feel 'out of place' in these spaces (Cresswell, 1996). This feeling has also been identified amongst black and minority ethnic groups in the context of the UK countryside (Aygeyman, 1990). These findings suggest the need to understand the processes driving different pathways of nature acculturation, and the implications of these for the types of green space experiences sought out by different individuals for wellbeing.

There are growing concerns that children's nature-based experiences (and therefore opportunities to access a nature acculturation pathway) are increasingly curbed by: (a) parental anxieties about children visiting forests and other public green spaces alone; and (b) the influence of second hand stories, films and sensationalised

media reporting of crime occurring in such areas (Burgess et al., 1988; Milligan and Bingley, 2007; Skår, 2010). With this in mind, it is important to understand how connections to nature may develop later in life and how they are acted upon. Although useful, existing measures such as the Connectedness to Nature Scale (Mayer and Frantz, 2004) and the Nature Relatedness Scale (Nisbet et al., 2009) are rarely used within green space and health studies to explore why, when and how people have come to connect to different types of green spaces, and how this influences their salience as resources for wellbeing. One exception, Korpela et al. (2008, 2010)'s survey work examining the restorative potential of people's 'favourite' places, identifies a significant association between individual nature-orientedness and self-reported restoration within green, as opposed to built, favourite places. However, it does not explore the origins or development of these nature orientations. Do feelings of nature connection precede wellbeing experiences or do feelings of wellbeing in such spaces help forge these connections?

4. Conclusions: steps to better integrate agency into future green space and health studies

This review essay has discussed assumptions of green space use that currently underpin much of the green space and health evidence base and identified future research directions aimed at understanding why different green space interactions do or do not become meaningful for wellbeing over time and for whom. In doing so, it suggests value in moving beyond a focus on green space presence and/or proximity to consider more subtle aspects of individual agency that may influence use patterns and experienced wellbeing benefits. More specifically, it highlights the need to consider the role of shifting life circumstances and personal identities (linked to nature or otherwise), past place experience, social relationships (perhaps with significant others or children) and what we term 'adaptive agency' in shaping the perceived importance of different green spaces as places for wellbeing over time.

Four recommendations can be made to enhance consideration of individual agency in future studies. First, improved understanding of the drivers of individual wellbeing place interactions may be gained through the inclusion of questions regarding nature connectedness, life circumstances and environmental pasts within qualitative and experimental green space and health studies (allowing more detailed study sample characterisation) and within repeated, large-scale survey designs (e.g. Natural England's annual Monitor of Engagement with the Natural Environment survey). Several relevant questions have already been developed that could be deployed, such as the Connectedness to Nature Scale (Mayer and Frantz, 2004) and the Nature Relatedness Scale (Nisbet et al., 2009). Longitudinal surveys would be particularly valuable in tracking the influence of different life transitions and place encounters on the perceived importance of diverse green space interactions for wellbeing over time.

Second, more funding could be directed towards the investigation of community green space intervention outcomes in real time, perhaps adopting mixed method approaches within natural experiments (Petticrew et al., 2005). These could be used to explore how (if at all) residents come to interact with a new or improved green space for different aspects of health and wellbeing, according to their personal priorities and life circumstances, and how this influences their wider orientations to nature. Through examining a range of health and wellbeing outcomes, using quantitative measures and in-depth qualitative approaches, insights could be gained into the multiple and synergistic processes that may be underway (Silveirinha De Oliveira et al., 2013). However, existing natural experiments have highlighted the challenges of identifying appropriate control communities and of engaging local interest in the

research process (Ward Thompson et al., 2013). Moreover, funding flexibility would be required to allow for uncertainty in the time frames over which benefits might be expected to occur. It is conceivable, for example, that benefits may take longer to emerge amongst communities previously exposed to neglected, unsafe green spaces or those without a culture of green space use.

Third, interesting insights could be gained by placing greater emphasis on relational agency when considering how people use different green spaces for wellbeing. As discussed above, wellbeing priorities and place decisions may be shared with significant others, including partners, children, parents or close friends. Future studies could therefore examine the relational drivers behind observed wellbeing place practices and the inter-subjective meanings attributed to different green space experiences over time. In-depth interviews with couples and/or families may be of value here in order to gain a more comprehensive understanding of that shared meaning and experience, and of how these meanings develop through the generations.

Finally, a focus on people's everyday lives and priorities, rather than the physical organisation of their parks is required to understand how and why different green spaces are able to infiltrate personal routines (Hitchings, 2013), and whether people conceptualise their green space activities in terms of health and/or wellbeing. The use of methods such as PhotoVoice (Plane and Klodowsky, 2013), mobile interviewing (Carpiano, 2009), or geonarratives (Kwan and Ding, 2008) may encourage these everyday perspectives. These could be combined with in-depth retrospective accounts of past place interactions, perhaps incorporating themed life histories (Uzzell et al., 2010) or timelining (Sheridan et al., 2011). Taken together, these approaches would highlight the processes by which green spaces become meaningful at different life stages, for different people and for their own reasons. Cross-cultural studies could be particularly interesting in this regard, perhaps sampling individuals who have moved between cultures with different 'nature and health' narratives.

Mixed method and truly interdisciplinary studies (Phoenix et al., 2013) with people at different life stages exhibiting varying levels and types of green space engagement will be of value here to enhance our understanding of the role of shifting identities, relationships, resources and responsibilities in shaping the importance of green spaces for wellbeing over time.

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References

- Alves, S., Aspinall, P., Ward Thompson, C., Sugiyama, T., 2008. Preferences of older people for environmental attributes of local parks: the use of conjoint analysis. *Facilities* 26, 433–453.
- Asah, S., Bengtson, D., Westphal, L., 2012. The influence of childhood: operational pathways to adulthood participation in nature-based activities. *Environ. Behav.* 44, 545–569.
- Aspinall, P., Ward Thompson, C., Alves, S., Sugiyama, T., Brice, R., Vickers, A., 2010. Preference and relative importance for environmental attributes of neighbourhood open space in older people. *Environ. Plann. B* 37, 1022–1039.
- Astell-Burt, T., Mitchell, R., Hartig, T., 2014. The association between green space and mental health varies across the life course. A longitudinal study. *J. Epidemiol. Commun. H.* 10.1136/jech-2013-203767.
- Aygeyan, J., 1990. Black people in a white landscape: social and environmental justice. *Built Environ* 16, 232–236.
- Bell, S., 2012. Young people and sexual agency in rural Uganda. *Cult. Health Sex.: Int. J. Res. Interv. Car* 14, 283–296.
- Bowler, D., Buyung-Ali, L., Knight, T., Pullin, A., 2010. A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health* 10, 456–466.
- Brehm, J., 2007. Community attachment: the complexity and consequence of the natural environment facet. *Hum. Ecol* 35, 477–488.
- Brown, T., Bell, M., 2007. Off the couch and on the move: global public health and the medicalisation of nature. *Soc. Sci. Med* 64, 1343–1354.
- Burgess, J., Harrison, C., Limb, M., 1988. People, parks and the urban green: a study of popular meanings and values for open spaces in the City. *Urban Stud* 25, 455–473.
- Byrne, J., 2012. When green is white: the cultural politics of race, nature and social exclusion in a Los Angeles urban national park. *Geoforum* 43, 595–611.
- Carpenter, M., 2013. From 'healthful exercise' to 'nature on prescription': the politics of urban green spaces and walking for health. *Landscape Urban Plan* 118, 120–127.
- Carpiano, R., 2009. Come take a walk with me: the 'Go-Along' interview as a novel method for studying the implications of place for health and wellbeing. *Health Place* 15, 263–272.
- Collins, D., Kearns, R., 2007. Ambiguous landscapes: sun, risk and recreation on New Zealand beaches. In: Williams, A. (Ed.), *Therapeutic Landscapes*. Ashgate Publishing Ltd, Surrey, pp. 15–32.
- Conradson, D., 2005. Landscape, care and the relational self: therapeutic encounters in rural England. *Health Place* 11, 337–348.
- Coombes, E., Jones, A., Hillsdon, M., 2010. The relationship of physical activity and overweight to objectively measured green space accessibility and use. *Soc. Sci. Med.* 70, 816–822.
- Cosgriff, M., Little, D., Wilson, E., 2009. The nature of nature: how New Zealand women in middle to later life experience nature-based leisure. *Leisure Sci* 32, 15–32.
- Cresswell, T., 1996. *In Place, Out of Place – Geography, Ideology and Transgression*. University of Minnesota Press, London.
- De Jong, K., Albin, M., Grahn, P., Björk, J., 2012. Perceived green qualities were associated with neighbourhood satisfaction, physical activity, and general health: results from a cross-sectional study in suburban and rural Scania, southern Sweden. *Health Place* 18, 1374–1380.
- De Vries, S., Verheij, R., Groenewagen, P., Spreeuwenberg, P., 2003. Natural environments – healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environ. Plann. A* 35, 1717–1731.
- De Vries, S., Van Dillen, S., Groenewagen, P., Spreeuwenberg, P., 2013. Streetscape greenery and health: stress, social cohesion and physical activity as mediators. *Soc. Sci. Med* 94, 26–33.
- DTLR, 2002. *Green Spaces, Better Places*. Final Report of The Urban Green Spaces Taskforce. Department for Transport, Local Government Regions, London.
- Eriksson, L., Nordlund, A., Olsson, O., Westin, K., 2012. Beliefs about urban fringe forests among urban residents in Sweden. *Urban Forestry Urban Greening* 11, 321–328.
- Gergen, K., 2009. *Relational Being: Beyond Self and Community*. Oxford University Press, New York.
- Gross, H., Lane, N., 2007. Landscapes of the lifespan: exploring accounts of own gardens and gardening. *J. Environ. Psychol* 27, 225–241.
- Hartig, T., Mitchell, R., De Vries, S., Frumkin, H., 2014. Nature and health. *Annu. Rev. Publ. Health* 35, 207–228.
- Hickman, C., 2013. 'To brighten the aspect of our streets and increase the health and enjoyment of our city': the national health society and urban green space in late-nineteenth century London. *Landscape Urban Plan* 118, 112–119.
- Higgs, G., Fry, R., Langford, M., 2012. Investigating the implications of using alternative GIS-based techniques to measure accessibility to greenspace. *Environ. Plann. B* 39, 326–343.
- Hillsdon, M., Panter, J., Foster, C., Jones, A., 2006. The relationship between access and quality of urban green space with population physical activity. *Public Health* 120, 1127–1132.
- Hitchings, R., 2013. Studying the preoccupations that prevent people from going into green space. *Landscape Urban Plan* 118, 98–102.
- Janke, M., Carpenter, G., Payne, L., Stockard, J., 2010. The role of life experiences on perceptions of leisure during adulthood: a longitudinal analysis. *Leisure Sci* 33, 52–69.
- Kaplan, S., 1995. The restorative benefits of nature: toward an integrative framework. *J. Environ. Psychol* 15, 169–182.
- Keniger, L., Gaston, K., Irvine, K., Fuller, R., 2013. What are the benefits of interacting with nature? *Int. J. Environ. Res. Public Health* 10, 913–935.
- Kessel, A., Green, J., Pinder, R., Wilkinson, P., Grundy, C., Lachowycz, K., 2009. Multidisciplinary research in public health: a case study of research on access to green space. *Public Health* 123, 32–38.
- Koohsari, M., Kaczynski, A., Giles-Corti, B., Karakiewicz, J., 2013. Effects of access to public open spaces on walking: is proximity enough? *Landscape Urban Plan* 117, 92–99.

- Korpela, K., Ylén, M., Tyrväinen, L., Silvennoinen, H., 2008. Determinants of restorative experiences in everyday favourite places. *Health Place* 14, 636–652.
- Korpela, K., Ylén, M., Tyrväinen, L., Silvennoinen, H., 2010. Favorite green, waterside and urban environments, restorative experiences and perceived health in Finland. *Health Promot. Int* 25, 200–209.
- Korpela, K., Borodulin, K., Neuvonen, M., Paronen, O., Tyrväinen, L., 2014. Analyzing the mediators between nature-based outdoor recreation and emotional well-being. *J. Environ. Psychol.* 37, 1–7.
- Kwan, M., Ding, G., 2008. Geo-narrative: extending geographic information systems for narrative analysis in qualitative and mixed-method research. *Prof. Geogr* 60, 443–465.
- Lachowycz, K., Jones, A., 2011. Greenspace and obesity: a systematic review of the evidence. *Obes. Rev* 12, e183–e189.
- Lin, B., Fuller, R., Bush, R., Gaston, K., Shanahan, D., 2014. Opportunity or Orientation? Who uses urban parks and why. *PLoS ONE* 9, e87422. <http://dx.doi.org/10.1371/journal.pone.0087422>.
- Maas, J., Verheij, R., Groenewegen, P., De Vries, S., Spreeuwenberg, P., 2006. Green space, urbanity, and health: how strong is the relation? *J. Epidemiol. Commun. H* 60, 587–592.
- Maas, J., Verheij, R., De Vries, S., Spreeuwenberg, P., Schellevis, F., Groenewegen, P., 2009a. Morbidity is related to a green living environment. *J. Epidemiol. Commun. H* 63, 967–973.
- Maas, J., Van Dillen, S., Verheij, R., Groenewegen, P., 2009b. Social contacts as a possible mechanism behind the relation between green space and health. *Health Place* 15, 586–595.
- Macintyre, S., Macdonald, L., Ellaway, A., 2008. Lack of agreement between measured and self-reported distance from public green parks in Glasgow, Scotland. *Int. J. Behav. Nutr. Phys. Activ* 5, 26–34.
- Matless, D., 1998. *Landscape and Englishness*. Reaktion Books Ltd, London.
- Mayer, F., Frantz, C., 2004. The connectedness to nature scale: a measure of individuals' feeling in community with nature. *J. Environ. Psychol* 24, 503–515.
- Mayer, F., Frantz, C., Bruehlman-Senecal, E., Dolliver, K., 2009. Why is nature beneficial? The role of connectedness to nature. *Environ. Behav* 41, 607–643.
- McCormack, G., Rock, M., Toohey, A., Hignell, D., 2010. Characteristics of urban parks associated with park use and physical activity: a review of qualitative research. *Health Place* 16, 712–726.
- Milligan, C., Gattrell, A., Bingley, A., 2004. 'Cultivating health': therapeutic landscapes and older people in northern England. *Soc. Sci. Med* 58, 1781–1793.
- Milligan, C., Bingley, A., Gattrell, A., 2005. 'Healing and Feeling': the place of emotions in later life. In: Davidson, J., Bondi, L., Smith, M. (Eds.), *Emotional Geographies*. Ashgate Publishing Ltd, Surrey, pp. 49–62.
- Milligan, C., Bingley, B., 2007. Restorative places or scary spaces? The impact of woodland on the mental wellbeing of young adults. *Health Place* 13, 799–811.
- Mitchell, R., 2013. Is physical activity in natural environments better for mental health than physical activity in other environments? *Soc. Sci. Med* 91, 130–134.
- Morris, J., O'Brien, E., Ambrose-Oji, B., Lawrence, A., Carter, C., Peace, A., 2011. Access for all? Barriers to accessing woodlands and forests in Britain. *Local Environ* 16, 375–396.
- Nielsen, T., Hansen, K., 2007. Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health Place* 13, 839–850.
- Nisbet, E., Zelenski, J., Murphy, S., 2009. The nature relatedness scale: linking individuals' connection with nature to environmental concern and behaviour. *Environ. Behav* 41, 715–740.
- Ode, A., Tveit, M., Fry, G., 2008. Capturing landscape visual character using indicators: touching base with landscape aesthetic theory. *Landscape Res* 33, 89–117.
- Ord, K., Mitchell, R., Pearce, J., 2013. Is level of neighbourhood green space associated with physical activity in green space? *Int. J. Behav. Nutr. Phys. Act* 10, 127–135.
- Panther, J., Jones, A., 2008. Associations between physical activity, perceptions of the neighbourhood environment and access to facilities in an English city. *Soc. Sci. Med* 67, 1917–1923.
- Paquet, C., Orschulok, T., Coffee, N., Howard, N., Hugo, G., Taylor, A., Adams, R., Daniel, M., 2013. Are accessibility and characteristics of public open spaces associated with better cardiometabolic health? *Landscape Urban Plann* 118, 70–78.
- Parry, J., Vegeris, S., Hudson, M., Barnes, H., Taylor, R., 2004. *Independent Living in Later Life*. A report of research carried out by the Policy Studies Institute on behalf of the Department for Work and Pensions, London.
- Petticrew, M., Cummins, S., Ferrell, C., Findlay, A., Higgins, C., Hoy, C., Kearns, A., Sparks, L., 2005. Natural experiments: an underused tool for public health. *Public Health* 119, 751–757.
- Phoenix, C., Osborne, N., Redshaw, C., Moran, R., Stahl-Timmins, W., Depledge, M., Fleming, L., Wheeler, B., 2013. Paradigmatic approaches to studying environment and human health: (Forgotten) implications for interdisciplinary research. *Environ. Sci. Policy* 25, 218–228.
- Pinder, R., Kessel, A., Green, J., Grundy, C., 2009. Exploring perceptions of health and the environment: a qualitative study of Thames Chase Community Forest. *Health Place* 15, 349–356.
- Plane, J., Klodawsky, F., 2013. Neighbourhood amenities and health: examining the significance of a local park. *Soc. Sci. Med* 99, 1–8.
- Richardson, E., Mitchell, R., 2010. Gender differences in relationships between urban greenspace and health in the United Kingdom. *Soc. Sci. Med* 71, 568–575.
- Rose, E., 2012. Encountering place: a psychoanalytic approach for understanding how therapeutic landscapes benefit health and wellbeing. *Health Place* 18, 1381–1387.
- Sasidharan, V., Willits, F., Godbey, G., 2005. Cultural differences in urban recreation patterns: An examination of park usage and activity participation across six population subgroups. *Managing Leisure* 10, 19–38.
- Scopelliti, M., Giuliani, M., 2004. Choosing restorative environments across the lifespan: a matter of place experience. *J. Environ. Psychol* 24, 423–437.
- Seaman, P., Jones, R., Ellaway, A., 2010. It's not just about the park, it's about integration too: why people choose to use or not use urban green spaces. *Int. J. Behav. Nutr. Phys. Act* 7, 78–87.
- Sheridan, J., Chamberlain, K., Dupuis, A., 2011. Timelining: visualizing experience. *Qual. Res* 11, 552–569.
- Silverinha De Oliveira, E., Aspinall, P., Briggs, A., Cummins, S., Leyland, A., Mitchell, R., Roe, J., Ward Thompson, C., 2013. How effective is the Forestry Commission Scotland's woodland improvement programme – 'Woods In and Around Towns' (WIAT) – at improving psychological well-being in deprived urban communities? A quasi-experimental study. *BMJ Open* 3, e003648. <http://dx.doi.org/10.1136/bmjopen-2013-003648>.
- Skår, M., 2010. Forest dear and forest fear: dwellers' relationships to their neighbourhood forest. *Landscape Urban Plann* 98, 110–116.
- Spartz, J., Shaw, B., 2011. Place meanings surrounding an urban natural area: a qualitative inquiry. *J. Environ. Psychol* 31, 344–352.
- Sullivan, W., Kuo, F., Depooter, S., 2004. The Fruit of Urban Nature: Vital neighbourhood spaces. *Environ. Behav* 36, 687–700.
- Thompson-Coon, J., Boddy, K., Stein, K., Whear, R., Barton, J., Depledge, M., 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. *Environ. Sci. Technol* 45, 1761–1772.
- Townsend, M., 2006. Feel blue? Touch green! Participation in forest/woodland management as a treatment for depression. *Urban Forestry Urban Greening* 5, 111–120.
- Tsunetsugu, Y., Park, B., Miyazaki, Y., 2010. Trends in research related to "Shinrin-yoku" (taking in the forest atmosphere or forest bathing) in Japan. *Environ. Health Prevent. Med* 15, 27–37.
- Tuan, Y.-F., 1977. *Space and Place: The Perspective of Experience*. University of Minnesota Press, Minneapolis.
- Ulrich, R., 1983. Aesthetic and affective response to natural environment. In: Altman, I., Wohlwill, J. (Eds.), *Human Behaviour and Environment: Advances in Theory and Research*. Plenum, New York, pp. 85–125.
- Uzzell, D., Gatersleben, B., White, E., 2010. Using the Life Histories Approach to Understand the Development of Outdoor Preferences and Practices: Report for the Outdoors and Health Network, ESRC Grant no. RES-355-25-0040.
- Van Den Berg, A., Maas, J., Verheij, R., Groenewegen, P., 2010. Green space as a buffer between stressful life events and health. *Soc. Sci. Med* 70, 1203–1210.
- Van Den Berg, A., Jorgensen, A., Wilson, E., 2014. Evaluating restoration in urban green spaces: does setting type make a difference? *Landscape Urban Plann* 127, 173–181.
- Velarde, M.D., Fry, G., Tveit, M., 2007. Health effects of viewing landscapes – Landscape types in environmental psychology. *Urban Forestry Urban Greening* 6, 199–212.
- Warber, S., Irvine, K., Devine-Wright, P., Gaston, K., 2013. Modelling well-being and the relationship between individuals and their environments. In: Coles, R., Millman, Z. (Eds.), *Landscape, Well-Being and Environment*. Routledge, Abingdon, pp. 20–37.
- Ward Thompson, C., Bell, S., Satsangi, M., Netto, G., Morris, N., Travlou, P., Chapman, M., Raemaekers, J., Griffiths, A., 2003. *Diversity Review: Options for Implementation*. A Report by OPENSpace in Association with SEMRU and CRSIS.
- Ward Thompson, C., Aspinall, P., Bell, S., Findlay, C., 2005. "It gets you away from everyday life": local woodlands and community use – what makes a difference? *Landscape Res* 30, 109–146.
- Ward Thompson, C., Aspinall, P., Montarzino, A., 2008. The childhood factor: adult visits to green places and the significance of childhood experience. *Environ. Behav* 40, 111–143.
- Ward Thompson, C., Roe, J., Aspinall, P., 2013. Woodland improvements in deprived urban communities: what impact do they have on people's activities and quality of life? *Landscape Urban Plann* 118, 79–89.
- Wiles, J., Allen, R., Palmer, A., Hayman, K., Keeling, S., Kerse, N., 2009. Older people and their social spaces: a study of well-being and attachment to place in Aotearoa New Zealand. *Soc. Sci. Med* 68, 664–671.
- Williams, D., Patterson, M., 2008. Place, leisure and wellbeing. In: Eyles, J., Williams, A. (Eds.), *Sense of Place, Health and Quality of Life*. Ashgate Publishing Ltd, Hampshire.