



Natural environments and subjective wellbeing: Different types of exposure are associated with different aspects of wellbeing



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ABSTRACT

Despite growing interest in the relationships between natural environments and subjective wellbeing (SWB), previous studies have various methodological and theoretical limitations. Focusing on urban/peri-urban residents (n=7272) from a nationally representative survey of the English population, we explored the relationships between three types of exposure: i) 'neighbourhood exposure', ii) 'visit frequency', and iii) 'specific visit'; and four components of SWB: i) evaluative, ii) eudaimonic, iii) positive experiential and iv) negative experiential. Controlling for area and individual level socio-demographics and other aspects of SWB, visit frequency was associated with eudaimonic wellbeing and a specific visit with positive experiential wellbeing. People who visited nature regularly felt their lives were more worthwhile, and those who visited nature yesterday were happier. The magnitude of the association between weekly nature visits and eudaimonic wellbeing was similar to that between eudaimonic wellbeing and life circumstances such as marital status. Findings are relevant for policies to protect and promote public access to natural environments.

"Our working landscapes, cultural sites, parks, coasts, wild lands, rivers, and streams are gifts that we have inherited from previous generations. They are the places that offer us refuge from daily demands, renew our spirits, and enhance our fondest memories... Today, however, we are losing touch with too many of these places." Barack Obama (2010)

1. Introduction

In his second year of office, former US President Obama issued the Presidential Memorandum on America's Great Outdoors (Obama, 2010). The aim was to remind American's of the benefits to health and wellbeing of natural outdoor spaces, and to warn people about the consequences of greater urbanisation and detachment from the kinds of spaces in which we evolved physically and culturally (United Nations, 2005). His concerns have been echoed around the world (e.g. UK Department for Environment, Food and Rural Affairs, 2011). Importantly, this interest coincided with a rapid increase in relevant scientific research, much of it demonstrating a positive relationship between natural environments and health and wellbeing in general (for

reviews see: Bratman et al. (2012), Capaldi et al. (2014), Gascon et al. (2015), Hartig et al. (2014), Keniger et al. (2013), McMahan and Estes (2015), Sandifer et al. (2015)). Although encouraging, previous work on the relationships between natural environments and psychological aspects of wellbeing, in particular, has several methodological and theoretical limitations.

Methodologically, when exploring wellbeing outcomes, studies usually operationalise exposure to natural environments as either: a) 'neighbourhood exposure', i.e. the amount of green spaces such as parks/woodlands (de Vries et al., 2003; Gascon et al., 2015) and blue spaces such as rivers/coast (de Vries et al., 2016; White et al., 2013a) in the area around one's home; or b) a single 'specific exposure' of limited duration (e.g. a park walk, Berman et al., 2008; McMahan and Estes, 2015; Nisbett and Zelensky, 2011). An assumption of the neighbourhood exposure approach is that, as well as possibly having a window view of nature (Nutsford et al., 2016), people who live near natural environments will visit them more often for recreational purposes (e.g. Schipperijn et al., 2010). An assumption of the specific exposure approach tends to be that the positive effects of a single exposure speak to potential cumulative benefits from multiple exposures (e.g. Hartig et al., 2003, p.122). In other words, both approaches imply that a third type of exposure (beyond simply neighbourhood proximity or

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one-off visits), may be important for wellbeing, i.e. the frequency of exposure through voluntary visits (Shanahan et al., 2015). We know of no previous research that has looked at the relationships between wellbeing outcomes and: i) neighbourhood exposure; ii) visit frequency; and iii) a specific visit; in the same analysis.

Theoretically, previous studies that have investigated the relationship between natural environments and wellbeing have tended to neglect certain aspects of subjective wellbeing (SWB, i.e. how individuals think and feel about their lives, Diener et al., 1999). Specifically, building on long-standing philosophical debates, there is growing research and policy consensus (Kahneman et al., 1999; O'Donnell et al., 2014) that there are four components of SWB. These include: a) *Evaluative wellbeing*, how well individuals think their life is going overall; b) *Eudaimonic wellbeing*, how meaningful/worthwhile individuals think their behaviours/activities are; and c) *Positive* and d) *Negative hedonic or experiential wellbeing*, the emotions of pleasure (e.g. happiness) and pain (e.g. anxiety) individuals regularly experience. While the 'evaluative' component (e.g. life satisfaction) tends to be used in studies exploring the relationship with neighbourhood exposure, and the 'experiential' components in specific visit studies, very little research has considered the 'eudaimonic' component. Of the few studies that have explored this dimension of SWB, the focus has been on specific aspects of eudaimonic wellbeing, such as feelings of vitality (Ryan et al., 2010) and pro-social behaviours (Weinstein et al., 2009), following single exposures. We know of no previous quantitative research that has looked at the relationship between natural environments and eudaimonic wellbeing in general, or how neighbourhood exposure and visit frequency may be associated with how meaningful/worthwhile individuals feel their lives to be.

Qualitative research in health geography does, however, provide some clues linking nature exposure and eudaimonic wellbeing from narratives elicited during in-depth interviews (e.g. Bell et al., 2015; Völker, and Kistemann, 2013). For instance, in one interview during a coastal visit, a participant in Bell et al.'s (2015) study says: "*I think after living in London so many years, you're so enclosed. So to have that space and realise that there's a bigger thing out there than you, and nature is quite an amazing thing, when you look at the sky and the sea and the birds, just to kind of (pause) take it in, and sometimes it's like, well maybe my problems aren't as bad as I perceive them to be... it kind of puts things into perspective*" (p.62). Typical of these interviews, this quote emphasises thought processes beyond experiential emotional states including broader considerations such as being mindful of the present, self-transcendence, and being able to put things in perspective, all facets of eudaimonic wellbeing more broadly (Ryan and Deci, 2001).

In short, the current research aimed to address several methodological and theoretical limitations in earlier work by simultaneously exploring multiple types of exposure, including regular voluntary nature contact, and multiple components of SWB, including eudaimonic wellbeing. It did this by using data from a large nationally representative survey, conducted via in-home interviews in England. Following the focus on urbanisation as a potential factor in detachment from nature, our analyses also focused on urban and peri-urban residents (White et al., 2013b). Specifically we investigated the relationships between three types of natural environment exposure and four components of subjective wellbeing. Exposure was operationalised in terms of: a) 'neighbourhood nature' (% local area categorised as green/blue space); b) 'visit frequency' (frequency of recreational visits over the previous 12 months); and c) 'specific visits' (whether individuals visited nature 'yesterday'). SWB was operationalised using single item measures of the four components described above, as recommended by the Organisation for Economic Cooperation and Development (OECD, 2013): a) life satisfaction (evaluative), b) meaningful/worthwhile activities (eudaimonic), and c/d) happiness and anxiety yesterday (positive/negative experiential).

Based on earlier research we constructed three hypotheses. Of note, these involved controlling for the other aspects of SWB. Because the

four measures are generally correlated, controlling for their covariance allows clearer conclusions to be drawn about which aspects of SWB are uniquely associated with which exposure types. First, we hypothesised that the evaluative component of SWB (life satisfaction) would be related to neighbourhood exposure, because it measures an individual's consideration of their overall circumstances (e.g. income and neighbourhood), rather than specific behaviours. Second, we hypothesised that the eudaimonic component of SWB (meaningful/worthwhile activities) would be positively related to visit frequency. If any given visit to nature is 'worthwhile', more frequent visits should be associated with greater overall feelings that one is living a meaningful/worthwhile life. Third, we hypothesised that the experiential components of SWB (happiness and anxiety yesterday) would be most strongly related to whether or not an individual made a specific visit to nature yesterday. Whether or not one lives near nature or visits regularly, unless one actually visited yesterday there was no reason to think that one's mood yesterday would be positively affected. As the data were from a large, representative UK survey, we were able to explore these relationships while controlling for potential confounders including: neighbourhood factors (e.g. local crime statistics), individual socio-demographics (e.g. health) and time-related factors (e.g. weekend vs. weekday, season).

2. Method

2.1. Participants

Participants were drawn from the two waves of the Monitoring Engagement with the Natural Environment (MENE) survey that contained the SWB questions (Waves 4 and 6). The survey is part of the UK government's national statistics and sampling aims to ensure that respondents are representative of the adult English population (Natural England, 2011a). Each individual is assigned an urbanity code based on the Lower-layer Super Output Areas (LSOAs) in which they live. There are 32,482 LSOAs in England (2001 census) each containing approximately 1500 people and having a mean area of 4 km². LSOAs are categorised as being either Urban (> 10,000 inhabitants; 83.9% of the MENE sample), Peri-urban ('Town & Fringe', < 10,000; 8.2% of the MENE sample), or Rural ('Village, Hamlet, Isolated Dwelling'; 5.8% of the MENE sample). The LSOAs of 2.1% of the sample were missing. Following previous research into green/blue space in England (e.g. White et al., 2013b) we restricted our analyses to urban/peri-urban dwellers (92.1%) to avoid confounding levels of green space with the urban-rural distinction; the mean % of greenspace in urban, peri-urban, and rural areas is 32.5%, 67.1% and 91.2% respectively. Including rural dwellers did not alter any of the effects reported below. In sum, the final sample was n=7272, and can be considered representative of England's Urban/Peri-Urban population.

2.2. Procedure

The MENE is commissioned by Natural England, a part of the UK's Department for the Environment Food and Rural Affairs (DEFRA). It is part of a face-to-face in-home omnibus survey conducted across the whole of England and throughout the year to reduce potential geographical and seasonal biases (Natural England, 2011a). Although approximately 800 individuals are interviewed every week, the SWB questions were only asked in Waves 4 and 6 and the eudaimonic and experiential questions were not collected equally across the year resulting in reduced data for Spring and Summer months. Trained interviewers follow a computer assisted interview script and recording protocol (Natural England, 2011b).

2.3. Subjective wellbeing

The four SWB questions were developed by the UK's Office of National Statistics (ONS, 2011): 1) 'Overall how satisfied are you with

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