

Actively Noticing Nature (Not Just Time in Nature) Helps Promote Nature Connectedness

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Abstract

The climate and biodiversity crises reveal a failing human-nature relationship. The psychological construct of nature connectedness provides a means for understanding and improving that relationship. Furthermore, recent research suggests that higher levels of nature connectedness benefit both people and the environment, promoting pro-nature conservation actions, pro-environmental behaviours, and greater personal wellbeing. Nature connectedness is therefore emerging as a key target to improve human and nature's wellbeing. Using data from a large national survey in the UK, the present research investigates how nature contact and noticing nature activities predict nature connectedness. Multiple regression analyses revealed that noticing nature, through activities that involve active sensory engagement with wildlife, explained levels of nature connectedness over and above simply spending time in nature. Moreover, the activities engaged in when in nature had differential effects on nature connectedness. Watching, listening to and photographing wildlife were significant predictors of nature connectedness, whereas studying nature, looking at scenery through windows, observing celestial phenomena and collecting shells and rocks were not. The results have implications for how best to improve nature connectedness, both in terms of how to design and improve greenspaces, and in terms of how to better engage the public with nature for a healthy and sustainable future.

Introduction

Climate warming and biodiversity loss show the human-nature relationship is failing. The psychological construct of nature connectedness has provided a focal point for understanding that relationship, and for showing the ecological gains to be had for restoring it. Recent research has shown that a close relationship with nature helps explain pro-nature conservation actions that support biodiversity (Richardson et al., 2020) as well as pro-environmental behaviours associated with addressing climate change, with causal links being established (Mackay & Schmitt, 2019). The benefits of higher levels of nature connectedness extend to human wellbeing, with systematic reviews and meta-analyses showing a clear link to between nature connection and mental wellbeing (Capaldi et al., 2015; Pritchard et al., 2020), and interventions suggesting a causal link between nature connectedness and improvements in mental health (McEwan et al., 2019). Reflecting this growing body of evidence, recently, nature connectedness has been proposed as a basic psychological need and key metric within wellbeing assessments (Lambert et al., 2020). A Given the emerging importance of nature connection for human and nature's wellbeing, there is benefit in understanding more about how specific forms of activity explain individual differences in nature connectedness. The following analysis sets out to study how various activities associated with both contact with nature and active engagement with nature explain differing levels of nature connectedness.

A great deal of valuable research has shown a relationship between nature contact, and improvements in wellbeing (Bratman et al., 2019; Bratman et al., 2021; Cox et al., 2017; Frumkin et al., 2017; McMahan & Estes, 2015; Meredith et al., 2020; Shanahan et al., 2016; White et al., 2019; White et al., 2021). Given this body of research, recommendations and policies for supporting wellbeing through nature and increasing connection with nature, often focus on the nature contact factors measured in the research, namely nature access and visits. However, recent large-scale studies have shown that differences in wellbeing outcomes are better explained by nature connectedness than by

nature contact alone (Martin et al., 2020; Richardson et al., 2021; Richardson & Hamlin, 2021;).

Further, empirical research has shown that nature connectedness and mental wellbeing can be improved through interventions that prompt people to actively notice and appreciate nature (McEwan et al., 2019; Passmore & Holder, 2017; Richardson & Sheffield, 2017). As such, the evidence suggests that while spending time in nature is important for a sense of wellbeing, what matters more is what people do with that time and the strength of their relationship with nature.

Given this research, nature connectedness is emerging as a key target to improve human (Lambert et al., 2020) and nature's wellbeing (Richardson et al., 2020). Lumber et al. (2017) identified the five 'pathways to nature connectedness' through activities that involve sensory engagement, emotion, meaning, beauty and compassion. However, the study did not consider the role of more passive nature contact. This is important because research and policy around the concept of 'connection with nature' often conflates nature contact and the psychological construct of nature connectedness, despite the recent work showing clear distinctions between these measures. Therefore, to derive the maximum benefits from nature engagement programmes there is a need to distinguish between simply spending time in nature, and actively engaging in activities that are associated with nature connectedness - a closer relationship with nature.

The present research supplements that of Lumber et al. (2017) by directly comparing the role of passive nature contact with more active noticing nature activities in explaining levels of nature connectedness. 'Noticing nature' involves paying attention to the rest of the natural world, and brings together senses and mind. To notice nature is to go beyond passive, largely unconscious, receipt of the sensory information one is exposed to in nature, and incorporate elements of attention, awareness and intention. We can go on a nature walk, without paying attention to the nature on that walk; we can see a bird without watching that bird. Noticing nature involves activation of the pathways to nature connectedness, and centrally, the pathway of sensory engagement, involving paying attention to the sensory information available. This active engagement with the senses turns hearing into listening, for example. Noticing is thus the first step towards activation of the other pathways – appreciating beauty, making meaning, feeling emotions or compassion. It is the basis of the 'noticing the good things in

nature' activity that has been shown to increase levels of nature connectedness (McEwan et al., 2019) and the increase in noticing nature that explains wellbeing and pro-nature behaviours better than recent visits to nature (Richardson & Hamlin, 2021).

In sum, building on the work on noticing nature and motivated by the difference between general contact with nature (e.g., to visit, walk, spend time in nature) and the more active sensory engagement (e.g., to look, watch, listen, smell and notice) involved in noticing and appreciating nature, the present research considers how these two broad factors explain levels of nature connectedness. Clearly noticing nature usually requires proximity to and contact with nature, so in addition to looking at the role of each factor, the analysis will consider the extent they work together. Finally, to help inform practical guidance on access and visits to nature, the analysis will consider the types of noticing activities in more detail, thus informing the types of active sensory engagement that should be promoted when encouraging access to nature.

Method

YouGov/National Trust Survey Overview

In 2019, The National Trust commissioned YouGov to conduct a survey of UK adults' relationship with nature. The survey sought to provide a comprehensive understanding of attitudes towards nature, experiences of nature and methods of engaging with nature, as well as the relationships between these variables and human wellbeing.

YouGov is an international public opinion and research data group based in London, United Kingdom that conducts objective demographically-representative surveys. YouGov is a member of the British Polling Council, a corporate member of ESOMAR, and is registered with the Information Commissioner; as such, YouGov abides by all of these agency's respective rules regarding ethical consent of all survey respondents. As per these rules, all respondents provide informed consent to participate in the survey

Participants

The total sample consisted of 2094 participants. In the YouGov dataset, 13.4% were aged 16-24, 24.8% were aged 25-39, 24.1% were aged 40-54, and 37.7% were aged 55 or over. 51.6% of participants identified as female, 48.4% identified as male.

Measures of Dependent Variables

Connection to nature was measured using the single item Inclusion of Nature in Self scale (INS; Schultz, 2002). The INS is an adaptation of the measure for interpersonal closeness (Aron et al., 1992) and measures the extent to which people close to nature. Participants are shown seven sets of two circles, one circle labelled *Self* and the other *Nature*, with varying degrees of overlapping. They are asked to choose the one that best represents their relationship with nature, with scores from 1 (circles beside each other) to 7 (completely overlapping). As a single-item measure reliability cannot be calculated, but the INS has been found to have good validity and has been widely used, featuring in hundreds of peer-reviewed publications (Martin & Czellar, 2016).

Measures of Predictor Variables

The YouGov survey assessed various constructs and behaviours associated with contact and noticing nature. Contact with nature was measured using six items: 'Visit a local park or other nearby greenspace', 'Choose to walk through local parks or green spaces on my way to other places', 'Swam or paddled in a river or the sea', 'Climbed or walked up a large hill or mountain', and 'Spent time in nature to make myself feel happier'. Respondents rated each of the items on a four-point scale from 1 = *Often* to 4 = *Never*. The sixth item measuring time in nature asked participants to indicate the number of days on which more than one hour was spent in nature (1 = *Every day*, 2 = *4 to 6 days*, 3 = *2 to 3 days*, 4 = *1 day*, 5 = *None*).

Noticing nature activities included thirteen specific activities that involved sensory engagement, which varied in terms of the degree of attention and intention they involved: 'Look at natural scenery from indoors or whilst on journeys', 'Watch wildlife', 'Take photos or videos of wildlife, plants or animals', 'Listened to birdsong', 'Smelt wild flowers', 'Taken a photo or drawn/ painted a picture of a

natural view, plant, flower or animal etc.’, ‘Collected shells or pebbles on the beach’, ‘Studied nature with a microscope or binoculars’, ‘Enjoyed watching a wild animal playing’, ‘Taken time to notice butterflies and/ or bees’, ‘Stopped to look at the moon and/ or stars’, ‘Watched the sun rise’, and ‘Watched clouds’. Respondents rated each of the items on a four-point scale from 1 = *Often* to 4 = *Never*.

All of the preceding predictor variables were subsequently reverse scored for ease of interpretation.

Several demographic variables were also measured. Age was measured to the year. For the purposes of the current analyses, gender identification was recorded using two categories: ‘male’ and ‘female’. Ethnicity was also coded as a binary variable for the purposes of the current paper: participants were recorded as being white or of a minority ethnicity.

Results

We first of all created broad measures of contact with nature and noticing nature using factor scores derived from factor analyses of items measuring these two constructs. We then use the two resultant sets of factor scores as predictors in correlation and multiple regression analyses that examine the extent to which contact with nature and noticing nature predict nature connectedness. A second multiple regression examines the extent to which each of the thirteen noticing nature activities that make-up the broad noticing nature measure predict nature connectedness.

To measure the constructs of contact with nature and noticing nature, two unweighted least squares factor analyses were performed. One factor analysis was performed on the six items that measured contact with nature. Bartlett's test of sphericity was significant ($\chi^2(15) = 3484.99, p < .001$) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .83, suggesting that the data were dimensional in nature and thus suitable for factor analysis (values of 0.5 or above are generally held to indicate suitability for factor analysis; Hair, Anderson, Tatham, & Black, 1995; Tabachnick & Fidell, 2001). We used two statistical methods to decide on the appropriate number of factors to extract. A

scree plot was sharply elbowed, with the initial eigenvalue dwarfing all proceeding factors. Kaiser's (1960) rule also suggested one factor should be extracted, because only one of the eigenvalues was greater than one (the six eigenvalues of the reduced correlation matrix were 3.14, .85, .64, .57, .46 and .35 respectively). Considering these together, we decided that a one factor solution best represented the data. The factor accounted for 52.31% of the variance in the items. All six items loaded on the factor and had factor loadings ranging from .49 to .74.

A second factor analysis was performed on the thirteen items that measured noticing nature activities. Bartlett's test of sphericity was significant ($\chi^2(78) = 10221.11, p < .001$) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .94, suggesting that the data were suitable for factor analysis. Kaiser's (1960) rule suggested that no more than two factors should be extracted (the first six eigenvalues of the reduced correlation matrix were 6.03, 1.02, .88, .81, .63 and .59 respectively). The scree plot was strongly elbowed and suggested a one factor solution. We decided that a one factor solution best represented the data. The factor accounted for 46.4% of the variance in the items. All thirteen items loaded on the factor and had factor loadings ranging from .55 to .76.

To investigate the relationships between the predictor items of interest and the dependent variable (connection to nature), a series of bivariate correlations were performed. As illustrated in Table 1, there were significant correlations between all pairs of variables.

[TABLE 1]

To examine the extent to which contact with nature and noticing nature predicted nature connectedness, a multiple regression was performed using the enter method. In addition to the two variables of interest, age, gender and ethnicity were also entered as predictors. The assumption of multicollinearity was met (VIF = 1.01 – 2.32; Tolerance = .43 - .99). As shown in Table 2, the model was significant ($F(5,1674) = 173.3, p < .001, R^2 = .34$), with contact with nature ($t = 8.91, p < .001$), noticing nature ($t = 11.75, p < .001$) and age ($t = 2.81, p < .01$) significant predictors of nature connectedness.

[TABLE 2]

To further determine the variance accounted for by contact with nature and noticing nature, a commonality analysis was performed. Commonality analysis is a method of partitioning variance according to predictor variables such that one can ascertain both the individual and combined contribution of each variables to the variance accounted for by the regression equation (R^2) (Rodwell, 1996). Contact with nature accounted for 10.16% of the variance accounted for, while noticing nature accounted for 15.61%. In combination, contact with nature and noticing nature accounted for an additional 63.13%.

To further investigate the relationship between noticing nature and nature connectedness, a second multiple regression was performed. This multiple regression was identical to the first, with one exception. Instead of the broad measure of noticing nature, the thirteen specific noticing nature activities that made-up the measure were entered as separate predictors in the model so as to examine their relationships with nature connectedness. The assumption of multicollinearity was met (VIF = 1 – 2.29; Tolerance = .44 - .97). As shown in Table 3, the model was significant ($F(17,1662) = 53.7, p < .001, R^2 = .35$). As well as age ($t = 2.62, p < .01$), watching wildlife ($t = -4.28, p < .001$), taking photos or videos of wildlife, plants or animals ($t = -2.64, p < .01$), listening to bird song ($t = -2.83, p < .01$), and taking time to notice butterflies or bees ($t = 2.36, p < .05$) were significant predictors of nature connectedness.

[TABLE 3]

Discussion

The analysis considers how the two broad factors of contact with, and noticing of, nature explain levels of nature connectedness. The results suggest that ways of engaging with the natural world differ in terms of the extent to which they explain a close relationship with nature, and by extension the results point to potentially efficacious means of boosting nature connectedness. Mirroring previous empirical research (McEwan et al., 2019; Passmore et al., 2017; Richardson & Sheffield, 2017), noticing nature explained higher levels of nature connectedness than was explained by contact with nature. For wellbeing (Richardson et al., 2021), pro-nature behaviours (Richardson et al., 2020) and

nature connectedness, there is clearly a need for active sensory engagement with nature while in green spaces rather than simply being passively exposed to it.

The commonality analysis showed that, when considered in isolation, the 'noticing nature' activities accounted for around 50% more of the variance in nature connectedness than time in nature.

However, as expected, the two factors worked together: the noticing of nature clearly works with time and visits to nature. Much policy work focusses on access to nature and increasing visits, without taking into account what people do during their time in nature. There is a clear need to consider what the access and visits are for, and what types of activity might be offered or encouraged during that access. Such consideration should inform the design of green spaces and the programmes that take place in them.

Looking at the types of sensory engagement activities more closely, those high in nature connectedness were characterised by watching and taking photographs of wildlife, listening to bird song and noticing butterflies and bees. Together with previous empirical work, this pattern of results highlights that noticing and actively engaging with the sounds and sights of wildlife is an effective means of boosting the human-nature relationship. This reflects the sensory contact pathway to nature connectedness identified by Lumber et al (2017) whose work provides a design framework for how sensory engagement with nature can be framed and extended to improve nature connectedness. For example, through reference to the emotions evoked, the beauty observed and meaning that brings to one's life. The design framework has been extended based on qualitative analysis of the positive experiences noted when people are prompted to actively engage with nature (Harvey et al, 2020; McEwan et al, 2020). The successful application of noticing nature interventions (e.g., McEwan et al., 2019; Passmore et al., 2017) supports the idea that connecting with nature requires active and focused attention. There is a crucial distinction between being exposed to nature and *noticing* nature, this is the difference between seeing and watching, and between hearing and listening. Active sensory engagement with nature, involving attention to and awareness of what is being seen or heard, is the basis for 'noticing' nature and necessary for turning sensory input into the kind of activity that can promote closer relations with nature. Importantly, these kinds of activities are not inherently

complicated, time-consuming or effortful and do not involve money or equipment (with the exception of photography). What is required is simply a turn of attention, taking time to tune in, notice and engage with nature.

From the regression analysis, photography but not painting emerged as a significant predictor of nature connectedness. The association between photography and nature connectedness is perhaps not surprising. Photography not only exposes people to nature whilst capturing the image, but also when reviewing and editing the resultant files, with close attention being paid to the features portrayed in the image. The weaker association between painting and nature connectedness on the other hand might reflect that, despite being a slower process, people often paint at home, without direct sensory contact with the subject. Finally, it should be noted that although only photographing wildlife was a significant predictor in the regression, both were significant correlates of nature connectedness, with photography only marginally higher.

The results also suggest that several other candidate routes to nature connectedness may be less effective. It appears that attending to celestial features such as the sun, moon and clouds does not explain higher levels of nature connectedness. Although part of the natural world, these abiotic features are not biological in nature and so are perhaps viewed as being qualitatively different from other aspects of nature, such as birds, insects and other wildlife. Analysis of the aspects of nature people notice as being ‘good’ and which lead to increased nature connectedness (Richardson & Sheffield, 2017) has shown that biotic aspects have greater representation than abiotic themes (McEwan et al., 2020).

Viewing scenery from indoors also emerged as a relatively ineffective means of promoting nature connectedness. Although viewing scenes of nature has been found to have benefits (e.g. Kaplan, 2001), compared with outdoor activities it provides lower levels of exposure and sensory engagement with wildlife. In particular, exposure to the auditory and olfactory aspects of nature is almost entirely absent when viewing scenery from indoors. Furthermore, this activity was described as ‘looking’, which implies a more passive sensory engagement, conceptually distinct from ‘watching’ or ‘noticing’. It would be interesting to explore further whether alternative descriptions capture

qualitatively different ways of engaging with nature, comparing the nature connectedness of those who 'look' at nature outside a window with those who 'watch' nature outside a window.

The results have implications for how best to improve nature connectedness, and suggest several relatively easy ways to improve public greenspaces in terms of their capacity for improving the human-nature relationship. For example, increasing exposure to birdsong can be achieved by creating suitable habitat for breeding songbirds. Such conservation management prescriptions include creating diverse vegetation structure in woodlands, with a particular focus on providing a significant shrub layer. Similarly, noticing bees and butterflies could be facilitated by managing grassland for these insect groups, for example by reduced mowing of amenity grassland areas. Complementing these habitat management prescriptions, urban design and event programming will have a significant role to play in drawing attention to these features and so increasing levels of noticing and engagement.

Several limitations of the study should be highlighted. The study design is correlational in nature, so the direction of causality cannot be confidently inferred. It is possible that the pattern of statistical relationships reported arose because nature connectedness causes people to engage in some activities more than others. For example, nature connectedness might have more influence over how often one listens to bird song than how often one looks at natural scenery from windows or smells wildflowers. However, empirical research (McEwan et al., 2019; Richardson & Sheffield, 2017) lends support to the interpretation that noticing nature has a causal effect on nature connectedness. Nonetheless, further research to establish causality through different intervention designs would be desirable.

Another limitation pertains to the number of items used in the study. Thirteen nature-related behaviours were used. These covered a broad spectrum of activities and so each type of activity was not covered by many items. Consequently, the items do not allow for fine-grained triangulation of exactly which aspects of the behaviours promoted nature connectedness. For example, it is unclear whether it was being indoors which rendered viewing scenery relatively ineffective, or whether the issue lies with the broad activity of viewing natural scenery itself. Similarly, it has yet to be established whether collecting shells is an apparently weak pathway to nature connectedness because there is something special about the act of collecting (perhaps activating ecologicistic-scientific values

in Kellert's (2012) typology), or because biotic remains of animals do not elicit a strong sense of connection to nature. More fine-grained investigation is needed to understand which elements of the activities bring people closer to nature.

It is worth acknowledging the limitations of sensory engagement with nature alone in addressing the seriousness of the problems faced by nature – including humanity. The climate emergency and environmental crises require radical and urgent action on a global scale, involving extensive political, cultural and behavioural change. However, part of that change has to be a recognition of the interdependence of human and nature wellbeing, and the importance of humans having strong relationships with the rest of nature, as captured by the construct of nature connectedness. Speaking on BBC 4's *Costing the Earth* program (Heap, 2019) after the publication of The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services global assessment report on biodiversity and ecosystems (IPBES, 2019), Sir Bob Watson, lead scientist of the work, noted the core issue was about humans and that we need to ask how do we become more in tune with nature? How do we relate to nature? Active engagement with nature, with increased awareness of and attention to biotic elements of the natural world, is necessary at a personal level, but the political and cultural environment to facilitate and such a relationship with nature is crucial for instigating the kind of psychological and cultural shifts needed to address the emergencies we face.

In sum, policies to improve access and encouraging people to spend time *in* nature is a good thing, but for the maximum benefits there is a clear need to encourage people to spend time *with* nature.

Changing how people feel about and value nature is key for their behaviour towards it and for mental wellbeing and nature connectedness provides an evidence based focal point within vague and fragmented calls for reconnection with nature (Ives et al, 2018). Governments, designers and planners, policy makers, health and social care services, educators and so on can support active engagement with nature in policy and practice (Richardson et al., 2020). This can be done through promoting biodiversity for increased opportunity for full sensory experiences in nature and allocating resources towards initiatives that encourage the noticing of nature (Bratman et al., 2019; Richardson et al., 2019; Richardson et al., 2020). The results above show that the interventions can be as simple

prompts in campaigns informed by the pathways to nature connectedness (e.g. 30 Days Wild; Richardson et al., 2016) or for transformational change interventions at system leverage points (see Richardson et al., 2020 for a discussion). If there can be a culture where a passing butterfly is noticed and enjoyed, there will be a greater chance to avert the chaos of nature's destruction.

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