Nature Connectedness: What do we know and what could we know?

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A narrative review and research agenda

The current climate and biodiversity crises will necessitate deep changes in behaviour in order to be resolved. The experience of nature connectedness has been the focus of much exploration as a tool that could help shift individual behaviours: indeed, nature connectedness is linked to both well-being and pro-conservation, environmentally friendly behaviours (Barragan-Jason et al., 2023). Nature connectedness can be encouraged through positive experiences of contact with nature, with education about the natural world and encouraging people to consider the importance of nature in their lives (Sheffield et al., 2022).

Nevertheless, nature connectedness remains a fluid and insufficiently understood phenomenon: it can refer to several constructs of attachment to specific places, subjective experiences, or psychological traits of individuals (Ives et al., 2017).

Little is known about the mechanisms underlying nature connectedness as a psychological trait, and it may have been studied in populations that are too homogeneous to allow for sufficient generalisation. Indeed, most studies on this phenomenon have focused on people in Western countries who approach nature as a place of leisure. The research done outside of this setting has yielded contrasting results, calling into question the idea of nature connectedness as a human universal. For example, the only study of nature connectedness in a nomad pastoral population shows that they report a lower connectedness with

nature than people from neighbouring villages (Marczak & Sorokowski, 2017), contrasting with reports that farmers show higher connectedness than other rural residents (Kohler et al., 2014).

This paper aims to summarise what is currently known about the underpinnings of nature connectedness as a psychological trait and outline the edges at which this concept may meet its limits. Indeed, a better understanding of what this connectedness can mean in a different context for people who have different relationships with nature is an important step towards understanding human-nature relationships in a non-Western-centric context and changing these relationships for the better.

KEYWORDS: nature connectedness, environmental psychology, experiences of nature, well-being, sustainable behaviour

RSD TOPIC: Society & Culture

Introduction

In the current climate and biodiversity crisis, the relationship between humans and nature has been the object of much attention (Dietsch et al., 2020; Gifford, 2011; van der Linden, 2015): human activities play a large part in these crises, but little has changed in terms of impact despite growing awareness of these issues (Atkinson & Jacquet, 2022; Carter, 2008). While policy change and collective action are vital in tackling these crises (Clarke et al., 2014; Friedlingstein et al., 2014), psychology must not be neglected in order to understand support or lack thereof for policies and individual pro-environment actions (Bostrom et al., 2019; Pongiglione & Cherlet, 2015).

Among the concepts that have emerged in the study of behavioural change for sustainability, nature connectedness has been the subject of particular interest (Barbaro & Pickett, 2016; Barragan-Jason et al., 2022; Barrera-Hernández et al., 2020; Martin et al., 2020): indeed, people who feel more connected to nature show both more well-being and more environmentally-friendly actions (Barragan-Jason et al., 2023),

when environmental activism is often accused of making people anxious or guilting people into action (Eom et al., 2021; Yacek, 2022).

Nature connectedness, understood as the awareness of the deep links between humans and the rest of life on Earth (Zylstra et al., 2014), has thus been put forward as a tool in the environmental crisis that can sidestep the issue of the intention-action gap, and motivate action for the environment from a place of care rather than a place of obligation.

Environmental psychology is increasingly concerned with the relationship between humans and the rest of the biosphere, as it is crucial in pro-environmental behaviours, and the notion of connectedness with nature has been instrumental in understanding this relationship. Cognitive scientists have also explored this relationship, mostly through the prism of natural settings being beneficial to mental health and cognitive capacities. In particular, contact with nature has been shown to have a restorative effect on attention, i.e., to lead to faster recovery of attentional capacities after an activity inducing mental fatigue. However, nature connectedness is a complex, multi-dimensional concept which can refer to different phenomena depending on fields of research, authors, and in popular culture. Disentangling the different aspects of nature connectedness may help us better understand it and its mechanisms beyond its links with behaviour and well-being.

The purpose of the present paper is to lay out the history of the concept of nature connectedness and the approaches through which it has been studied in order to highlight future avenues of research that could deepen our understanding of this phenomenon.

Nature connectedness and its history

The first work to measure a sense of nature connectedness dates back only to the early 2000s (Schultz et al., 2002, inspired by the affinity for nature from Kals et al., 1999), but this concept arises in a broader context of concern over the harm caused to nature by human activities starting in the 1970s despite human survival being directly dependent on the natural environment.

Beyond human survival, environmental philosophers have called since the 1970s for the recognition of responsibility of care towards nature and non-human forms of life (Brennan & Lo, 2021). Based on earlier work, such as that of Aldo Leopold calling to see the land as a community to be protected (Leopold, 1949), deep ecologists call for an identification of human ego with the biosphere (Naess, 1973) and for an abandonment of a modern society that stunts human's natural tendency to care for nature (Shepard, 1992) while socio-ecologists call for a greater egalitarianism between humans and other forms of life without dissolving humanity into nature (Bookchin, 2005).

These philosophers generally consider this issue of lack of consideration for nature as a new issue, whether it is caused by the invention of agriculture, Christianity, or mechanisation (Ponting, 1991). A growing physical separation stemming from increasing urbanisation and decreasing physical contact with nature has indeed been documented and is cause for concern (Miller, 2005; Robinson & Godbey, 1997; Soga & Gaston, 2016).

Pioneer environmental psychologists Kaplan and Kaplan established that people show a preference for natural landscapes over human-built ones (Kaplan, 1984; Kaplan & Kaplan, 1989), as well as the psychological benefits of spending time in contact with nature in terms of stress-reduction and general well-being (Kaplan, 1973, 1983). Their research paved the way for much interest in the psychological benefits of contact with nature, from stress reduction to attention restoration, as well as physical health (Howard Frumkin et al., 2017; Martin et al., 2020). Another foundational work is that of E.O. Wilson, whose life work of passionately studying ants led him to formulate the *biophilia hypothesis* (Wilson, 1984), which postulates the existence of an "innately emotional affiliation of human beings to other living organisms." This hypothesis has been the basis for work exploring the universality of enjoyment of nature contact and the potential evolutionary basis for this enjoyment (Barbiero, 2018; Kellert & Wilson, 1993). The field of ecopsychology emerged in the same period (Roszak et al., 1995) and focuses primarily on the role of human-nature relationships in human well-being as it can be applied to psychotherapy and individual well-being.

Taken together, these works brought two separate arguments for more connections between humans and their natural environment: both in order to foster care for this environment and to enhance human well-being.

The first measure of nature connectedness from Schultz et al. (2002) is based squarely on the first argument: they measure connectedness with nature, drawing a direct parallel with the social psychology literature measuring social connectedness in order to contrast it with scales measuring environmental values and behaviour.

Following their work, several psychometric scales have been developed to measure different aspects of connectedness with nature, such as the Connectedness to Nature Scale (Mayer & Frantz, 2004) and the Nature-Relatedness Scale (Nisbet et al., 2009; Nisbet & Zelenski, 2013), and work from the 2000s and later has now clearly established that nature connectedness is linked to sustainable behaviour such as recycling, reducing meat consumption, not taking planes, donating to environmental causes (Arendt & Matthes, 2016; Barbaro & Pickett, 2016; Ives et al., 2018; Martin et al., 2020).

Research investigating the second argument, linking nature connectedness and well-being, gained momentum in the 2010s (Capaldi et al., 2014) and established a clear positive link between nature connectedness and well-being. After the positive effects of nature exposure on well-being had been well-established (Berman et al., 2008; Kaplan & Kaplan, 1989; Wells, 2000), nature connectedness was found to be a mediator for this effect (Mayer et al., 2009).

While these two literatures remain somewhat distinct, they generally use the same definitions of nature connectedness, the same tools to measure it, and cite this double effect of nature connectedness as an additional reason to study the phenomenon (Barragan-Jason et al., 2023; Cleary et al., 2020; Liefländer et al., 2013; Martin et al., 2020). These two literatures also have a common goal of understanding the roots of nature connectedness and how it can be encouraged.

Definitions of nature connectedness

Over the years, several definitions of nature connectedness have been proposed. Schultz, in his first mention of nature connectedness, defines it as the cognitive aspect of self-inclusion in nature, together with caring for nature (affective aspect) and commitment to protect nature (behavioural aspect). He posits that “connectedness

refers to the extent to which an individual includes nature within his/her cognitive representation of self" (Schultz, 2002, p.67), in parallel to the idea that interpersonal closeness can be seen as the inclusion of the other in the representation of the self (Aron et al., 1992).

Mayer & Frantz (2004) created the first questionnaire aiming to provide a quantitative estimate of nature connectedness, which they define as "individuals' affective, experiential sense of oneness with the natural world" rather than a cognitive belief.

The exact limits encompassed within nature connectedness, therefore, vary between authors: Zylstra et al., in their interdisciplinary review of the concept (2014), bring together two of the dimensions of self-inclusion in nature as defined by Schultz et al. and offer a definition of nature connectedness as "a stable state of consciousness comprising symbiotic cognitive, affective, and experiential traits that reflect, through consistent attitudes and behaviours, a sustained awareness of the interrelatedness between one's self and the rest of nature".

In the field of education psychology, specific measures have been developed to measure nature connectedness in children (Cheng & Monroe, 2012), which distinguish several dimensions of nature connectedness along different lines: nature enjoyment, experiences of nature in one's immediate environment, empathy towards living creatures, sense of oneness with nature, and sense of responsibility and concern for nature. In this case, nature enjoyment and empathy could be likened to the affective aspect of Schultz et al.'s self-inclusion in nature, sense of oneness to their nature connectedness, and sense of responsibility and concern for their commitment to protecting nature.

Other authors define nature connectedness in a broader manner. Ives et al. (2017) review the concept of human-nature connection from a broader point of view than psychology, including works from more diverse fields, such as geography, sociology, anthropology, etc. Based on this wide literature, they distinguish three broad usages of the term nature connectedness: nature connectedness as mind (psychometric scales), as experience (qualitative analyses) and as place (place attachment). Drawing on Ives et al. (2017), Riechers et al. (2020) build on the work of Ives et al. to define five different types of connectedness with nature: material (biophysical flows), experiential, emotional

(spirituality, place attachment), cognitive (knowledge and awareness), and philosophical (conception of the place of humans in nature). Similarly, Lumber et al. (2018) distinguish five pathways to nature connection, which are contact, emotion, meaning, compassion, and beauty. These categories are similar to Riechers et al.'s, with the meaning being similar to their philosophical category but no cognitive category.

This plurality of definitions shows how multifaceted the concept and experience of nature connectedness can be and the variety of factors that go into the subjective experience of being connected with nature. It also highlights the variety of definitions of nature to which one can feel connected: nature as a spiritual force, a set of physical laws, a beautiful landscape seen on a hike, a plant on one's desk, etc.

It is also important to note that relationships with nature can be quite diverse and not always positive: Soga and Gaston (2020), for example, call for more research on negative interactions between humans and nature.

The roots of nature connectedness

This ties back to the roots of nature connectedness: people who spend time in very different natural landscapes or who have very different activities in nature may relate to it differently and assign different values to nature (Kellert, 1993).

Indeed, rural green places, for example, result in more nature connectedness than coastal blue places (Wyles et al., 2019), and activities where people focus on nature, like photography or watching wildlife, predict more nature connectedness than simply spending time in nature (Richardson et al., 2021; Zhang et al., 2014).

While nature connectedness is often presented as the remedy to a lack of contact between humans and nature, many experiences and personal characteristics are associated with it. Women report more nature connectedness, as do more open and empathetic people and people who are more liberal, more spiritual, and self-describe as environmentalists (Lengieza & Swim, 2021b). Education can have an impact on the nature connectedness of both children and college students (Barrable, 2019; Ernst & Theimer, 2011; Kossack & Bogner, 2012; Lankenau, 2016; Liefländer et al., 2013), as can daily contact with green infrastructure (Abdelaal, 2019; Dipeolu & Ibem, 2022).

More generally, experiences of contact with nature in childhood and adulthood are associated with nature-connectedness (Cleary et al., 2020; Sheffield et al., 2022), which may explain why rural youths report more nature-connectedness than urban youths (Klassen, 2010; Price et al., 2022), as do people who participate in farming or gardening (Kohler et al., 2014; Lumber et al., 2018; Pérez-López et al., 2020; Pérez-Ramírez et al., 2021).

Indirect experiences with nature, such as art and documentaries, can also encourage nature connectedness (Arendt & Matthes, 2016; Lumber et al., 2018). Even more indirect experiences, like meditation, reflection, and consuming psychedelic drugs, also have an impact (Lengieza & Swim, 2021b). These experiences can also arise from design features inbuilt spaces: biophilic design principles such as botanical motifs or the use of natural materials (Kellert, 2008, p.7-8) can contribute to nature connectedness (Alves et al. 2022; Richardson and Butler, 2022).

While many predictors of nature connectedness are now well-known, little is known about the psychological mechanisms that lead from these predictors to nature connectedness. It has been shown that contact with nature elicits positive emotions such as elevated mood, awe, compassion, gratitude, and diminished self-awareness (Lengieza & Swim, 2021a; Nisbet & Zelenski, 2011; Petersen et al., 2019). The positive effects of contact with nature on cognitive functioning and emotional regulation may also play a role (Barrera-Hernández et al., 2020; Giusti & Samuelsson, 2020; Wyles et al., 2019). Paying attention to nature while immersed in it also seems to play an important role in nature connectedness (Richardson et al., 2021).

The breadth of the definition of nature connectedness may actually hinder the search for mechanisms: its cognitive, affective, and experiential aspects may have different causes.

It is likely that someone who feels connected to nature in a purely cognitive way, stating that they know that their livelihood depends on nature but who does not feel any emotional attachment to it, is experiencing different processes from someone who feels deep empathy for the plants in their home. They may also assign different values to this connection, as shown by Kellert (1993).

When studying contact with nature, it will be helpful to follow Ives et al.'s recommendation to specify the place and the modality of contact with nature: familiarity with a place, especially in the long term, could lead to a different aspect of nature connectedness than admiration of many exotic landscapes, more dependent on place attachment. Similarly, the care of a garden, a plant, or an animal may hinge on different mechanisms than simple contact or actions taken for the benefit of nature in general.

Is nature connectedness universal?

While it could be beneficial to narrow down research on specific dimensions of nature connectedness, we should simultaneously widen its field of application.

Indeed, nature-connectedness research suffers a common bias in behavioural research: it focuses overwhelmingly on WEIRD (western, industrialised, rich, democratic) countries, especially when it comes to quantitative research (Ives et al., 2017; Marczak & Sorokowski, 2018; Sedawi et al., 2020). It is interesting to note that disparities have been found within WEIRD countries: different racial groups in the United States may have different relationships with nature that reflect, for example, the historical exclusion of Black people from natural spaces in this country (Taylor, 2018; Taylor, 2019).

This bias is particularly problematic since alienation from nature has been described as specific to Western culture, and indigenous people from around the globe are often heralded as examples of respectful relationship with nature. Knowing more about nature connectedness in non-WEIRD contexts could be helpful to widen our understanding of what nature connectedness can be.

Nevertheless, there is a small but significant scholarship on the relationship between culture and nature connectedness, specifically exploring the universality of this experience or nature connectedness in developing countries (Andrea et al., 2015; Dipeolu & Ibem, 2022; Marczak & Sorokowski, 2018; Tester-Jones et al., 2020).

While it is argued that nature connectedness could be a universal phenomenon based on an evolutionary advantage of affinity for nature (Kellert & Wilson, 1993), we also know that cultural norms shape the types of interactions that people have with nature

and how they perceive these interactions (Andrea et al., 2015), which means cultural variations may be interesting to study in order to better understand what part of nature connectedness is truly universal.

A study of nature connectedness in Bedouin children in Israel (Sedawi et al., 2020) shows the influence of cultural norms, including gender norms, on ways of engaging with nature, but also that pollution and harsh climate can be strong barriers to the enjoyment of contact with nature, and to the development of a positive sense of nature connectedness.

A few studies explore the impact of indigenous cultures on nature connectedness, with contrasting results: Niigaaniin & MacNeill (2022) show that North-American Anishinaabe indigenous cultural knowledge is associated with nature relatedness, while Marczak & Sorokowski (2018) show that Kenyan Meru semi-nomadic traditional lifestyle is associated with less affinity towards nature than in Meru people who live in a town, watch television and attend formal schooling.

The authors argue that having a livelihood less dependent on nature and being less exposed to natural dangers could allow for the development of more positive feelings towards non-human life. They argue that contact with nature in Western societies is correlated with nature connectedness because that contact is chosen and generally takes place in recreational settings.

Marczak and Sorokowski raise the interesting criticism that most of the research on nature connectedness concerns people whose only contact with nature is through leisure, which could have a major impact on their relationship with nature. Very few studies explore nature contact that is not chosen. Kohler et al. (2014) explore specifically French farmers' relationship with nature and show that farmers identify themselves more strongly with nature than other residents of their rural municipalities. These farmers, however, are also more opposed to the creation of protected natural areas and are more likely to consider that nature should be tidy and under human control.

These results highlight that contact with nature does not automatically lead to more nature connectedness and suggest that the positive effect of contact with nature on connectedness may be specific to contact during leisure activities.

Conclusion

Nature connectedness is a complex, multidimensional concept which has proven helpful over the past decades as a tool to motivate sustainable behaviour while heightening well-being. However, the psychological roots of nature connectedness are still poorly understood, and untangling the different dimensions of nature connectedness may help better understand its causes. In particular, place attachment could play an important role in nature connectedness.

Following the bias of many fields of research, environmental psychology has explored mostly the relationships with the nature of people living in Western countries in the context of leisure activities. These biases could hinder our understanding of nature connectedness and of the variety of modalities in which humans can feel connected to nature.

Narrowing the focus of future research on specific aspects of nature connectedness while studying more varied populations could, therefore, help us gain a better understanding of the scope of nature connectedness and its mechanisms.

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