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Transpersonal Ecodelia: Surveying Psychedelically Induced Biophilia

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Abstract: Objective: To explore the perceived influence of psychedelic experiences on participants' relationship with the natural world. Method: A total of 272 participants reporting previous use of psychedelics completed free-text response requests via an online survey. Thematic analysis was used to explore group participant responses. Results: Participants who described a pre-existing relationship with nature reported that psychedelics acted to re-establish and bolster their connection to nature. Those reporting no previously established connection to nature described psychedelics as helping them bond with the natural world. Underlying both of these were reports of transpersonal experiences, of which 'interconnectedness' was most frequently linked to shifts in attitudes and behaviours. Participants were also asked to reflect on previous psychedelic experiences that took place in nature and reported a range of benefits of the natural setting. Conclusions: These findings suggest that psychedelics have the capacity to elicit a connection with nature that is passionate and protective, even among those who were not previously nature oriented. More research is needed to explore the potential implications of psychedelic use outside laboratory-controlled settings in order to enhance these important effects.

Keywords: psychedelics; ecopsychology; transpersonal; nature connectedness; ecodelia

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1. Introduction

1.1. Ecological Identity

Our 'relationship with nature' has been described as a construct that can be measured, using a wide array of quantitative tools (for a review, see [1]). Prior studies indicate that these scores can change, yet little is known about the mechanisms underlying these changes. Using a qualitative approach, a deeper exploration of individuals' subjective experiences is possible, allowing a richness of detail and the distilling of key themes.

Fundamentally, ecopsychology links nature and spirituality, locating humankind within the ecosystem and incorporating a spiritual aspect into this connection [2,3]. By examining the psyche's deepest-rooted questions surrounding the perception of the self and nature [4], ecopsychology encourages a removal of the self from the current materialistic worldview to form a more empathetic link with the Earth [5]. *Deep ecology* takes a similar approach [6], describing humankind as "organisms as knots in the biospherical net" [7] (p. 95), to highlight a deep interconnection between the wholeness of the self and the Earth [8]. According to Naess [9], in order for the self to develop and grow, the boundaries of the egoic self must be overcome to break from our pre-existing social structures and move towards a more symbiotic relationship with the planet that we call home. Both approaches de-emphasize an anthropocentric view, opposing the idea of nature as a

resource and necessitating a more transpersonal explanation of humankind's relationship with nature. Such a shift in view may be vital in the wake of a broad erosion of human connection to nature [10] and a lack of interventions to reduce environmentally destructive human behaviour [11] in the midst of a mass extinction event orchestrated by our species [12–14].

1.2. Psychedelics and Nature Connectedness

Nature connectedness (sometimes referred to as nature relatedness in the literature) is a measure of one's self identification with nature, encompassing "one's appreciation for and understanding of our interconnectedness with all other living things on the earth" [15] (p. 718). It can be considered analogous to biophilia, which has been defined as "the connections that human beings subconsciously seek with the rest of life" [16] (p. 350). The recent resurgence in psychedelic research has resulted in a number of studies reporting increased connection to nature.

Lifetime psychedelic use has been found to predict higher levels of nature relatedness [17–19] and a prospective online study measuring a wide variety of psychological variables pre- and post-psychedelic use showed a significant increase in nature relatedness [18]. One retrospective study found that psychedelic mystical experiences were commonly associated with positive changes in relationships with nature [20] and self-reported pro-environmental behaviour [21]. A small clinical study also reported enduring increases in nature relatedness in a group of individuals with treatment-resistant depression [22]. Studerus et al. [23] pooled data from eight studies in which psilocybin was administered and found that over a third of participants reported pro-ecological shifts that were sustained in the long term. While nature connectedness was not specifically assessed in some of these latter studies, this positive shift in individuals' relationship with nature is likely related to or partially explained by an increase in nature connectedness. Combined, these findings suggest psychedelics can elicit significant, sustained shifts in ecological worldview and increases in nature connectedness that persist far beyond the acute experience.

Connectedness has been defined as a psychological state with three domains: connectedness to self, others, and world [24]. The last domain, 'connectedness to world', includes the natural world and transpersonal dimensions. Doyle [25] describes the 'ecodelic' insight as "the sudden and absolute conviction that the psychonaut is involved in a densely interconnected ecosystem" (p. 20). Doyle also goes on to highlight the importance of transpersonal dimensions and their role in making sense of the strangeness arising from these psychedelic experiences. When psychedelic experiences are beneficial for people, they tend to increase connectedness across all three domains [24,26], thus a shift in one's relationship with the natural world after a psychedelic mystical experience is not surprising.

Increased connectedness to nature post-psychedelic use does not appear to be reliant upon whether or not the psychedelic was taken in a natural or clinical setting. Kettner et al. [18] identified a role for the perceived influence of nature in the acute psychedelic state; however, an increased connection to, and enduring shifts in the relationship with, nature has also been evidenced in the non-natural environs of clinical trials [22,23]. Psychedelic administration in natural settings is proposed to lead to more substantial increases in nature connectedness [10], but researching this question remains problematic owing to the legal restrictions around undertaking research of psychedelic substances.

The mechanism by which this increased connection to nature occurs is undetermined; however, awe and ego-dissolution have been proposed as mediating factors [18,19]. A dissolution of boundaries elicited by psychedelics has been associated with feelings of oneness and unity with nature [27,28] and it has been proposed that experiences of ego-dissolution may act as a mechanism through which states of unity and interconnectedness may be accessed [10]. Experiences of ego-dissolution under a psychedelic have also been linked to reduced speciesism and positively associated with animal solidarity and desire to help animals [29]. Sustained shifts in nature connectedness may be partly underpinned by acute experiences of self-transcendent positive emotions during a

psychedelic experience leading to a downstream predisposition to experiencing such emotions in day-to-day life, even if the acute experience did not occur in a nature-based setting [30]. Qualitative findings indicate that boundary dissolution (i.e., lack of separation) and other transpersonal perspectives (i.e., becoming aspects of nature) play an important role in the development of an increased connection to the natural world [24].

Shifts in individuals' relationship with nature may arise from psychedelic use in natural settings; however, such shifts may not be limited to usage in such settings [22,23]. Natural settings can induce peak experiences without the use of psychedelics. Both nature-induced and psychedelic-occasioned peak experiences share common outcomes such as interconnectedness and increased wellbeing (for a review, see [10]). The natural environment is proposed to be the ideal setting for mystical-type experiences [31], and can be considered as a prototypical inducer of states of awe [32,33], which can generate profound changes in worldview and pro-environmental behaviour [34,35].

Psychedelic research suggests that mystical experiences shift the experiencer away from an ontological materialist understanding of the world by increasing spirituality in experiencers [36–40]. Research suggests that psychedelics may be causally influential in the shift from hard positivism to metaphysical positions such as panpsychism [41]. Psychedelic experiences, for some individuals, might facilitate an expansion of worldview to incorporate a more ecopsychological or animistic understanding.

1.3. Purpose of This Research

Although the current global legal restrictions have limited psychedelics' experimental investigation to clinical trials and naturalistic studies, the data from this research indicate increases in nature connectedness [22]. However, the quantitative tools used in such studies contain numerical ratings on a predetermined set of features. A relationship with nature is personal, subtle, and deep. Feeling oneself as part of a wider interconnected web of life can be a profound experience, often predicated upon contact with the natural world that is emotional, visceral, and multisensorial. Additionally, quantitative measures can only partially elucidate the underlying mechanisms by which nature connectedness develops and changes. Therefore, although previous research provides an outline regarding the possible impact of psychedelics on nature connectedness, there is a lack of qualitative data to provide richness of detail. This research seeks to flesh out the understanding of individuals' psychedelic use as it relates to changes in their relationship with the natural world. By accessing a large number of respondents, we seek to provide a general understanding and highlight areas for future development in the field of ecodelic research.

2. Methods

2.1. Participants

A total of 272 participants were opportunistically sourced from two online communities of psychedelic users. One set of respondents (n = 32) were attendees of Breaking Convention—a 3-day biennial conference on psychedelic research—and the second (n = 240) was sourced via a research participation request from a psychedelic user group on the social media platform Facebook (see Table 1 for additional participant data). To be eligible for participation, respondents must have reported use of at least one drug type listed. Participant responses were recorded on frequency of use scale where 1 = never, 2 = once, 3 = occasionally, 4 = often, 5 = regularly, 6 = extensively, and 7 = excessively (see Table 2 for mean values). Ethical approval for this study was granted by the Psychology and Counselling Research Ethics Panel of the University of Greenwich, London, England.

Table 1. Study participant ages and gender across groups.

Group	Convention (*n* = 32)	Social Media (*n* = 240)	Combined (*n* = 272)
Age in Years [Mean (SD)]	28.41 (10.78)	37.58 (12.66)—1 missing	36.49 (12.78)—1 missing
Gender (%)			
Male	59	53.0	54.0
Female	41	42.0	42.0
Gender Non-Conforming	-	3.0	2.0
Transgender Woman	-	0.4	0.4
Transgender Man	-	-	-
Prefer not to Answer	-	0.4	0.4

Table 2. Mean survey respondent drug use by type (*n* = 272).

Value	Drug Type									
	LSD	DMT	Magic Mushroom	Mescaline	Iboga/Ibogaine	MDMA	Ketamine	Salvia	Ayahuasca	Cannabis
n	264	263	265	264	264	265	265	263	263	272
Mean	3.34	2.10	3.54	1.55	1.06	3.34	2.39	1.47	1.70	4.51

n = number of participants responses, LSD = lysergic acid diethylamide, DMT = N, N-Dimethyltryptamine, MDMA = 3,4-methylenedioxymethamphetamine.

2.2. Methodology

Participants were served statements (see Appendix A) relating to prior drug use, ecological attitudes, the brief measure of nature relatedness (NR-6) [42], and inclusion of nature in self (INS) [43] scale. Participants were then asked to complete five open-text boxes exploring factors relating to the development of pro-ecological attitudes.

Owing to the large number of responses and the exploratory nature of the research, an experiential [44] inductive [45] approach was taken in coding data. Independent double coding was undertaken by the first (A.I.) and third (F.H.) author in order to reduce bias [46,47].

Data were coded in an iterative method of content analysis (Stiles, 1999), where each emerging code/theme is applied in a reassessment of the complete dataset. Data were analysed using the 11th edition of NVivo in a process of thematic analysis [45]. The main themes were discussed and agreed upon by authors A.I. and F.H. and subsequent lower-order themes were discussed at length. Latent superordinate themes were developed by analysis by the first author (A.I.) using an inductive approach to theme generation.

The process of theme generation began with translation of the data from survey tool to analysis tool once the qualitative and quantitative data (published in [48]) were parsed (i.e., Qualtrics > SPSS > NVivo). The quantitative data were analysed in a collaborative manuscript investigating associations between retrospective psychedelic experiences and nature relatedness [48]. The qualitative data were retained for analysis here. NVivo software provides a useful way to decompose large chunks of data (i.e., interview data) into *cases* (i.e., participant data) for subsequent identification of codes (themes) and necessitates early involvement with the data. This process of familiarisation continues as the process of theme generation begins by identifying potential themes, with some inevitably becoming redundant before groupings are explored.

The purpose of this research was to explore participant experiences rather than understand the meaning behind an ecodelic experience per se; in line with this, a semantic approach was employed to examine the content present in the data. Understanding the complex content reported to occur in the psychedelic state requires some degree of interpretation and the process of theme generation cannot be said to be wholly free from researcher imposition. The interpretation of meaning within the often metaphorical and

analogous language used to describe the psychedelic experience required careful attention to detail and consideration of context (e.g., previous responses and continuing narratives).

3. Results

Each of the superordinate themes (transpersonal: 3.1, revealer: 3.2, amplifier: 3.3, and psychedelic use in nature: 3.4) are detailed in Table 3.

Table 3. Themes.

Theme	Number of Participants Endorsing Theme (%)
3.1. Transpersonal	
3.1.1. Unitive Experience	84 (31)
3.1.2. Interspecies Communication	18 (15)
3.1.3. Transmogrification	9 (3)
3.1.4. Spiritual/Energy	15 (6)
3.1.5. Nature as Self	13 (6)
3.2. Revealer	62 (23)
3.2.1. Pattern/Structure	5 (2)
3.2.2. Awe	4 (1)
3.2.3. Nature Vision	18 (7)
3.2.4. Diet	15 (6)
3.3. Amplifier	87 (32)
3.3.1. Growing up in Nature	62 (23)
3.3.2. Lifestyle Change	24 (9)
3.4. Psychedelic Use in Nature	110 (40)
3.4.1. Nature as a Remedy	5 (2)

3.1. Transpersonal

By far the most prevalent theme was that of transpersonal experiences, that is, "experiences in which the sense of identity or self extends beyond (trans) the individual or person to encompass wider aspects of humankind, life, psyche or cosmos" [49] (p. 203). Transpersonal experiences often include spiritual aspects but do not necessitate a theistic interpretation.

3.1.1. Unitive Experience

Among the transpersonal experiences reported by our participants, the most frequent was that of the unitive experience reported in a multitude of ways, as experiences of "no divide or separation" (P 116), a "seamless consciousness" (P 233), and the "interconnectedness of all life" (P 63). One participant describes gaining an understanding of humankinds' position in the cosmic framing of nature:

A new prospective [sic] of human being as part of a bigger ecosistem [sic], at the same time so small in a macroscopic universe. (P 127)

Within the overarching theme of transpersonal, there were some contributory themes that were identified as transpersonal experiences with specific reference to participants' relationship with nature but disparate enough to represent distinct clusters of contributions to the superordinate theme.

3.1.2. Interspecies Communication

A number of participants indicated that their psychedelic experiences contained aspects of interspecies communication, providing access to humankinds' "natural capacities of awareness of reality… unblocking some of the usual limits of our perception, [it] allows me to see earth's aliveness" (P 10). Most commonly, these experiences related to communication with flora, e.g., being "comforted by a flower" (P 10) and being able to "communicate with trees" (P 49, P 153). These experiences also included aspects of the natural world—and indeed the world itself—not commonly considered alive:

I understand now that nature is fully concious [sic], that communication with plants and rocks is possible. (P 78)

To be able to talk to and with Earth in the psychedelic state. (P 134)

A small number of participants also described experiences of "speaking to plants" (P 269) that extended beyond the acute psychedelic experience, also reporting that the experiences informed new metaphysical beliefs:

"*I basically became spiritually animist*". (P 134)

3.1.3. Transmogrification

The reported instances of experiencing life as "other entities" (P 49), be that other species or features of the natural world, were specifically aligned with a role in increasing nature connectedness. These experiences commonly spanned multiple aspects of nature allowing individuals to "experience reality as a tree, a bear, an eagle, as the jungle, as a river…" (P 81). These reported experiences were also framed in the context of boundary dissolution and the unitive experience and included experiences of embodiment with multiple aspects of nature:

I became the forest. First the tree, the branches, the leaves, then I went underground and became the roots, the ground, the living beings in the ground. I was everything. (P 22)

I experienced a complete breakdown of the nature/self divide, and then had an incredibly visceral experience of metamorphosing into a wolf. (P 255)

I melt with the universe and I felt trees and animals melting with my body. (P 200)

I was spread over the surface of the earth on the surface of all water, connected by the water in which I was standing to the surface of all water in a gravitational unity. (P 56)

3.1.4. Spiritual/Energy

The transpersonal experience was also framed to encompass aspects of the spiritual, which were described in numerous religio-spiritual frameworks. Often, the spiritual connections were framed as having the property of an undefined energy e.g., "[connection] to plant network and to Earths [*sic*] energy" (P 231) or as personification of nature and substances themselves, e.g., "the spiritual element of earth" (P 65), "Gaia" (P 56) and "Madre Ayahuasca" (P 138). One participant linked an interconnectedness of all things to an undefined force:

The wind, trees, grass and even soil constantly radiate an energy that we are undeniably part of. (P 119)

3.1.5. Nature as Self

A number of participants expressed the view that, following insight gained through psychedelic experiences, "harming nature would be like hurting myself" (P 41). The interpretation of the ecological damage caused by humankind as self-harm was also linked to reports of increased interconnectivity occasioned through psychedelic use. This new perspective was commonly described as feelings and knowledge resulting from unitive experiences:

> *[The] use of psychedelics has demonstrated that there is actually no real separation between humanity and the natural world and that our interconnectivity makes it absurd to exploit and damage any part of our environment*. (P 152)

> *Tripping on LSD…feeling the earth's [sic] pain regarding what we are doing to the environment*. (P 19)

> *Feeling in various ways "one with nature" or "I am nature" on LSD trips and magic mushrooms made me want to preserve it even more because of the better understanding that when nature is hurt, I am hurt*. (P 46)

3.2. Revealer

One route by which psychedelics were responsible for an increased connectedness with nature was by revealing a new knowledge or understanding of nature. A profound change in participants' understanding of nature was often reported, for instance, that "small things are part of a larger mechanism" (P 106). Others reported experiences suggesting that all things share some dimension of fraternity, that "we are all one, we all come from the same Source [*sic*]" (P 73). Aspects of nature that might often be considered non-sentient were also described as animate, with psychedelics creating an "awareness of nature being alive" (P 100). These insights were also shared from seemingly non-terrestrial sources, highlighting the wide range of revelatory experiences:

> *Contact with alien life forms which are watching humanity and remind me that we are stewards for the earth [sic]*. (P 235)

Often, participant revelations included aspects of the world that had previously been masked from conscious experience. New perspectives on humankind's place in the ecology of the planetary organism were also evident, as highlighted by two differing takes on views of an urbanised London following psychedelic use:

> *I remember being on LSD and overlooking the London skyline. Plenty of fog and smoke, complete lack of "nature", it all looked very toxic, but also delicate. It felt as though nature could quite easily take back what isn't ours*. (P 42)

> *I remember coming into work on a Monday morning after doing mushrooms at the weekend, and looking out of the 20th story office window over London. I was amazed, because I saw a woodland in front of me, with buildings poking out between the trees, where beforehand, I had only noticed the buildings and the trees were the background. It was a complete foreground/background cognitive switch*. (P 255)

The most common reappraisal of an individual's understanding is found in the transpersonal aspects of some psychedelic experiences—specifically, unitive experiences and the epistemological shifts they engender:

> *This [using psychedelics] is where I can actually experience unity, and seeing that the wisdom and the beauty are in all that exist. When you are so awake, you simply see it. Feel it. And truth. Once experienced, it doesn't need proof. It simply knows itself*. (P 107)

> *They make one realise the interconnectedness of everything… the soul of the world and the sentience in all organisms*. (P 253)

3.2.1. Pattern/Structure

A small number of participants described the role of "heightened pattern recognition" (P 63), perceptions of "complex…structure" (P 251), and noticing "the pattern of the leaves" (P 121) in increasing their connection to nature. Others framed this heightened perceptual experience as informing a new cosmological understanding; "all the atoms in this plane are constantly vibrating. I saw that nature is a manifestation of this" (P 205).

Parallels between the patterning of the body of the Earth and the human body were also highlighted by participants noticing "repeating patterns in nature that are also present in myself" (P 110). Another participant expands on this idea:

> *As I came back into my being, the dawn began to break and [e]very rock, grain of sand, tree branch,* etc. *became reflective of the patterns that exist within the human body and its organs*. (P 233)

3.2.2. Awe

Exploration of nature's wonder during psychedelic experiences often gave rise to intense feelings of awe. Nature was described as "wonderful" (P 261) and "incredible in everything it does" (P 127). One participant described wonderment at visual aspects of nature, which informed their nature connection:

> *While using LSD, I experienced the beauty of butterflies in the forest, in broken beams of lights through the canopy, I was in awe. I felt as though nature is beautiful and delicate and needs to be protected and respected*. (P 137)

Revelations about nature's intrinsic wonder were poetically described: "incredible in everything it does, from germinating a seed in the soil to amazing rainbows in the sky" (P 127). Another participant described finding awe in the mundane beauty of nature's capability to sustain life:

> *It was as breathtaking as any wonder of the natural world, yet this was a productive farm, feeding a small community*. (P 261)

3.2.3. Nature Vision

A number of participants described visions that occurred during psychedelic experiences leading to an increased sense of connectedness to nature. Commonly, these visions conveyed an understanding about nature, as one participant reported that their psychedelic experiences facilitated an "awareness of the mycelial network beneath our feet, it helps to expand my own conscious awareness and feelings of connectedness to all living beings and nature" (P 70). Another participant described how this information can be both explicit and less than obvious:

> *It seems very clear to me that information is conveyed very directly from plants to humans, what type of information is sometimes extremely clear and other times obscure with meanings becoming apparent later or much later*. (P 265)

Commonly, visions were described as being delivered by, or pertaining to, aspects of nature, such as experiencing how "Earth grieves the losses she/they has experienced at the hands of humanity" (P 134). Entities encountered within psychedelic experiences also conveyed new knowledge about humankind's impact, with trees communicating "all the madness we have done here on Earth" (P 61), ancestors showing "the life force we've been burinin [*sic*]" (P 8), and extraterrestrials cultivating psilocybin mushrooms on Earth "to make some people more concerned about the environment" (P 226).

The reported content of visions was a mix of positive, connective experiences such as witnessing "a sweeping vista of the sunrise across Africa simultaneously with the dawn I was in in England" (P 69) and negative experiences such as "the entire forest being destructed [*sic*], burnt [*sic*] etc, and its people killed" (P 96), but both were implicated in promoting positive ecological attitudes. Some visions viscerally highlighted the sheer extent of ecological destruction as a tragedy of self-harm:

In effect, that we were killing ourselves, we had the right to kill ourselves if we choose to do so, and that she [Gaia] would continue. (P 56)

3.2.4. Diet

Often, a change in diet resulted following the psychedelic experience, although the specifics of the experience and its relationship to the behaviour were not always explicit. Some participants linked their changes to transpersonal experiences with aspects of nature:

I felt animals around me living through me and planta growing with me… … No animals products are in my diet since. (P 200)

Increased my sense of connectedness to nature (an ayahuasca ceremony leading me to become vegetarian). (P 132)

Changes towards meat-free diets were also described as unintentional. Aversions, such as not being able to "stomach chicken or meat any longer" (P 258), as well as moral reasons were implicated in change. Participants reported a desire to "limit suffering" (P 50), citing "compassionate and environmental reasons" (P 228) and a newfound "compassion for all living things" (P 79). Increased connectedness was also linked to these increased feelings of empathy for other beings, "a violent bad trip including visions of slaughter… made me feel like a cannibal" (P 44).

One participant succinctly explained how diet fitted in with their ecologically conscious behaviour changes they attributed to psychedelic use:

I have gone from a daily meat eater to a vegan, from having ambitions of any well-paid career to having a career that has a positive impact on society or the world. (P 266)

While dietary change was most commonly in the direction of reduced meat consumption, a small number of participants found justification for a shift in the opposite direction through their psychedelic experiences, providing a new understanding or perspective:

Psychedelics in general have given me a better sense of empathy for animals raised in unethical conditions, however they have also taught me that humanity is part of nature so eating meat itself isn't unethical or immoral. (P 247)

I began a healing process I was vegan before I drank ayahuasca and after my first session I saw how I punched [sic] myself and the grief and anger I carried was a reflection of the suffering in nature. Now I eat meat and I celebrate nature. (P 207)

These alternative justifications for dietary change highlight the subjectivity present in individuals' experiences.

3.3. Amplifier

Other participants expressed experiences that changed their relationship with nature, describing a reinforcing role of psychedelic experiences rather than experiencing a revelation. A large number of participants who reported psychedelics having an amplifying quality on their pre-existing relationship with nature referenced the importance of early life experiences involving the natural world. The potential for psychedelics to bolster this relationship applied across multiple types of environment (e.g., access to urban green spaces and rural upbringing). Those who described an "initial passion" (P 112) for nature commonly referred to these experiences as having a validating capability, to "reinforce" (P 228) and "strengthen" (P 220) a prior connection with nature. Other participants described their experiences with a wide range of adjectives:

Psychedelics really cemented my connection to the environment. (P 13)

Enhanced a personality that already felt much affinity with nature. (P 101)

DMT and psilocybin experiences have always intensified my relationship with nature. (P 23)

The redoubling of prior beliefs also permitted "remembering what's actually important" (P 170), reminding participants that "I am a part of nature and nature is within me" (P 81). Some participants who described strong prior relationships with nature explained the role of psychedelics in making connections more apparent:

> *I've always been empathetic but psychedelics made me see our connectedness clearly*. (P 259)

> *Magic mushrooms… allowed me to *feel* what I already knew. They increased my confidence in its truth*. (P 251)

Often, pre-existing relationships with nature were described as a "strong connection" (P 183) and psychedelic experiences for some of those individuals also provided support for their metaphysical hypotheses:

> *It wasn't like I met something new or foreign. It was more like a validation for the deeper reality of nature that I thought I had been in contact with*. (P 184)

3.3.1. Growing up in Nature

A large number of participants who reported psychedelics having an amplifying quality on their relationship with nature referenced experiences of growing up with access to nature. How this access was defined varied. A large proportion of those individuals found this initial connection to be the result of proximity to more wild nature:

> *Growing up on an isolated farm, playing in nature as a boy*. (P 56)

> *Living in quite a remote area, growing up around nature/the outdoors*. (P 126)

> *Childhood experience of rural environments encouraged and supported by family members*. (P 265)

However green spaces in urban environments were also considered important ways to access nature. One individual's experience of growing up describes how a "city with an amazing park sparked my love of being in nature" (P 98). Additionally, "building up a close relationship with the sea" (P 165) and other blue spaces was referenced as important in nature connectedness:

> *Being in beautiful places, particularly by water and in sunshine… all reinforce appreciation and care for ecology and natural systems*. (P 232)

For some, this relationship with the natural world was also facilitated through less long-term immersions such as travel and "vacations to national parks and jungles" (P102), "field trips" (P 68), and membership to experiential clubs such as the "girl guides" (135).

3.3.2. Lifestyle Changes

Individuals also described how psychedelic use led to increases in pre-existing pro-ecological behaviours such as "recycling, saving energy and water" (P 257) and becoming "more aware of my own impact (garbage production, past overconsumption)" (P 86).

Participants also commonly framed these strengthened feelings and actions in terms of increased sense of "duty" (P 152) and described feeling "compelled" (P 9) to act. One participant describes their change over a range of efforts to act pro-environmentally:

> *Connecting with nature on psychedelics has reinforced my feelings of a responsibility to make better actions with regards to me and the environment. I eat less meat, choose locally sourced ingredients where possible, reuse and recycle- basically become a more environmentally conscious consumer*. (P 222)

For some individuals, psychedelic experiences were seen as responsible for increasing their resolve and deepening dietary lifestyle choices already established. This was primarily framed in terms of changes to diet such as the drive to "eat less meat" (P 44). Some participants described the changes arising from their psychedelic experiences as a reaction to negative emotions they experienced:

> *Mushrooms made me confront my feeling of guilt over unnecessarily eating meat, amd [sic] gave me courage to finally stop*. (P 228)
>
> *I've been berated for not being fully vegan*. (P 13)

3.4. Psychedelic Use in Nature

A pre-existing relationship with nature informed the way in which psychedelics were used. One theme that was common was the use of psychedelics in nature. The nature-connecting effects of psychedelics were reported as being "heightened when done in nature" (P 149), forming the "most powerful direct and significant influence" (P 167) on nature connectedness when taken in that context. For some participants, using psychedelics in nature was fundamental to the development of their "relationship with nature" (P 253) and was also described as closely linked to their development of nature connectedness:

> *All the psychedelic experiences Ive [sic] had in nature have enhanced my feeling of connection to the natural world*. (P 261)
>
> *Once you step foot, barefoot in the rain with the earth and grass in between your toes on a full moon soaking the vibrations in while enjoying psychedelics is enough to start the ball rolling in the way to appreciate nature and the earth [sic]*. (P62)

This role of being immersed in nature in shaping the interconnectedness reported was also clear for some participants:

> *Take mushrooms and wander around a forest for hours. Only under the influence of mushrooms will you notice and understand just how precious and miraculous nature really is*. (P 58).
>
> *Every time I use psy [sic] in nature I feel connected to nature more and this closes the feeling of myself being separate from nature, instilling me with greater desire to act in an ecologically conscious way*. (P 167)

For some participants, psychedelic experiences in nature factored into the development of a kind of stewardship role: "this sense of connection and shared essence influences my concern and sense of responsibility to care for Earth" (P 235). Psychedelic use in nature created a novel environment to explore the natural world, "just being in nature while on psychedelics is somewhat of an explosion for all the senses" (P 221), and allowed time for others to deepen their connection, "being in nature and appreciating it in the close up" (P 109).

There were also expressions of nature as being the preferential setting in which to use psychedelics, with participants seeking "experiences in nature rather than indoors" (P 97) and in the "countryside vs. the city" (P 119), describing nature as the "safest and most interesting place in which to explore the psychedelc [*sic*] state" (P 56). Some participants also indicated that location was an influence on their decision to use psychedelics, "I only really like to do psychedelics in a natural environment. As a pedestrian living in a city, I don't really use them as much" (P 104). Another participant described actively seeking out "nature and solitude away from artificial noise" (P 92) to improve their experience.

Participants frequently reported associations between psilocybin mushrooms and nature connectedness. Psilocybin mushrooms were also commonly linked with reports of outdoor psychedelic use:

> *Mushrooms in nature seems [sic] eminently capable of revealing intimate connection of self and world*. (P 260)
>
> *Take psylocybin [sic] and look up at the stars! This whole place is a fucking miracle*. (P 67)

Participants also frequently reported using psychedelics in combination with outdoor activities such as "walking" (P 112), "hiking" (P 30), and "camping, as well as swimming in a lake while naked" (P 43), suggesting, for some individuals, it forms an intrinsic aspect of their relationship with nature.

Nature as a Remedy

Nature was also cited as having a curative effect during challenging psychological aspects of the acute psychedelic state, with participants expressing feelings of "needing to be in nature" (P 34), providing both a physiological and metaphorical "well needed gasp of air" (P 78). For one participant, proximity to nature was a major consideration as a tool for harm reduction:

> *During these times when I felt it was too much for me, I have always used the outdoors and nature to get me through them*. (P126)

Elements of nature were important in this regard, with challenging experiences being "sorted with either earth or water" (P 136). One participant expanded on this, describing nature as providing both physiological and psychological relief during a difficult part of a psychedelic experience:

> *I needed to be in a natural environment or else I would break out in sweat and barely be able to talk*. (P 78)

Some participants also described drawing on memories of prior psychedelic experiences in nature "in order to relieve anxiety" (P 193) and to manage well-being: "if I'm ever worrying or stressed, I fall back on this feeling" (P 220).

3.5. Reflexivity

Researchers have studied nature connectedness and psychedelic experiences in depth, making complete separation from the topic impossible and potentially influencing theme generation.

4. Discussion

A qualitative analysis of responses from a psychedelic user group on a series of questions exploring factors and experiences relating to their connection to the natural world revealed a set of common themes. The thematic analysis generated four superordinate themes, *transpersonal, revealer*, *amplifier*, and *psychedelic use in nature*, that related to an increased connection to the natural world.

Nature connectedness is a complex and multidimensional construct, and these superordinate themes suggest that psychedelics can influence nature connectedness in multiple ways, with shifts encompassing contact with nature, emotion, empathy, meaning, and perceptions of beauty, all of which have been highlighted as pathways to enhanced nature connectedness [50].

When used in natural settings, psychedelics may have a proclivity towards evoking meaningful nature experiences, defined as "powerful non-ordinary experiences with/in nature that are particularly profound, significant, affective and difficult to wholly describe." [51] (p. 4). They may be sparked by perceptions of symbolic phenomena in nature, such as patterns and visions, and commonly involve a heightened state of awareness, emotional intensity, a sense of connection, and shifts in normal perception [51–53]. Such experiences can in turn lead to deepened nature connectedness [51,54]. As previously mentioned, recent findings [48] suggest that the effects of psychedelics in promoting the nature connection may be most common in users of psilocybin mushrooms. This interesting finding, drawn from analysis of multiple combined data sources, highlights the need to investigate how the nature-connecting capacity of different psychedelics varies.

4.1. Transpersonal

States of unity and interconnectedness were commonly reported by participants and appear to be a particularly important mediator underlying shifts in the connection to nature elicited by psychedelics. The unitive experience is typified by a sense of connection to all things, an experience commonly reported in psychedelic states [55], and it has been reported in numerous quantitative and qualitative papers (e.g., [24,56–59]). Unitive

experiences are understood to play an important role in the positive value of a psychedelic experience [60], and interconnectedness has been identified as a key theme underlying spiritual nature experiences, which in turn may contribute towards feelings of environmental responsibility [61].

Interconnectedness is also considered a key aspect of numerous other transpersonal or exceptional human experiences, including near-death experiences (NDEs) [62,63], out-of-body experiences (OBEs) [64], the overview effect [65,66], alien abduction experiences [67] (p. 118), and mystical experiences [68,69]. The states of interconnectedness that underpin these experiences have been proposed to catalyse empathy, concern, and stewardship towards other beings and the wider biosphere, and enduring shifts in people's relationships with nature have been associated with all of these experiences.

This interconnectedness with and empathy for nature resonates with many indigenous/shamanic perspectives, whereby the ecosystem is respected as a living, interconnected entity of which humans are but a part (e.g., [70–73]). Perspectives of deep interconnectedness with nature are an important aspect of many indigenous belief systems shared by numerous cultures separated by time and space, such as the Māori worldview (te ao Māori), which acknowledges the interconnectedness of all living and non-living things [74], and the Rarámuri worldview, which encompasses 'iwigara': the total interconnectedness of all life, physical and spiritual [73].

Communication with plants and other non-sentient aspects of nature during psychedelic experiences enabled some participants to connect with the natural world. Instances of transmogrification had similar effects. The concept of communication with and embodiment of other entities under the influence of psychedelics has been noted by anthropologists studying animist societies [75]. Communing with other species is often an aspect of the psychedelic experience [76] and shamans in some animist societies use psychoactive medicines with the precise intent to engage in this process [77], as is frequently prevalent in Amerindian shamanism, and termed 'perspectivism' [78]. This "intimate communication" [79] (p. 144) with nature has also been noted in non-shamanic psychedelic use [79,80], and even in clinical research settings.

Spiritual connections with nature were sometimes framed in the context of an undefined energy or essence and encompassed the planet, or biosphere, as a whole, with this energy attributed to both animate and inanimate aspects of nature in some cases. In other instances, elements of nature or the psychedelic substances themselves were personified. This may be partly aligned to perspective shifts following psychedelic use that seem to relate to more animist beliefs, with greater adoption of panpsychist views [41], and a greater attribution of consciousness or life force to both animate and inanimate objects in nature [81]. Animistic beliefs are highly ancient and transcultural and are often linked to shamanism, and personification of the earth or natural elements appears to be tied to such beliefs [77], such as the Andean Aymara and Quechuan concept of *Pachamama* [82,83] and Māori concept of *Ranginui* (Sky Father) and *Papatūānuku* (Earth Mother) [84] (p. 131). Spiritual agency may also be attributed to the psychedelic substances themselves and, in a previous survey, was widely reported to occur with the ingestion of naturally occurring psychedelics [85] and has been referred to as *animaphany* [86].

Research also links empathy for nature and anthropomorphism [87], providing an explanation of motivation to value non-human aspects of nature and incorporate them into one's own worldview. An anthropomorphic understanding of nature is proposed to "generate a sense of connectedness to the anthropomorphized entity" [88] (p. 519), potentially leading to increased nature connectedness and pro-environmental behaviours (for a review, see [89]). Empathy towards the living planet and all its flora is proposed to operate in a similar way to the extension of empathy humans offer to animals [87,90] and planetary empathy may better predict pro-ecological behaviours than inter-human empathy [91]. Unitive experiences may provide a visceral experience of this felt empathy. For a review of empathy enhancement and ecodelic mechanisms with psychedelics, see [5].

4.2. Revealer

The theme revealer describes the experience of feeling a closeness with the natural world that participants were previously unaware of or had not experienced prior to psychedelic use. Participants described how, through unitive experiences, they came to have novel perceptions and understandings about nature. Insight and mystical-type experiences have an individual but correlated role in the benefits to the psychedelic user [92]; for a review, see [93]. Insight arising in psychedelic-assisted therapeutic work may be arrived at through contemplation and subsequently consolidated through integration; however, the revealing of new worldviews, such as an increased connectedness to nature, might be arrived at in a more tacit or intuitive way.

Psychedelic experiences, in particular, are regularly described as having noetic properties, or conveying innate truthfulness [94]. The perceived veracity of, and confidence in, new understandings are considered more calcitrant when obtained through insight [92]. In line with Timmermann et al.'s [41] "context-independent belief shift" (p. 8), a number of participants expressed worldview shifts away from those consistent with materialism (cf. [94]). Combined, this stickiness of restructured beliefs and their increased potential to arise through psychedelic use suggests that long-term changes in metaphysical beliefs and worldview revisions (e.g., ecocentrism), such as those highlighted by participants' transpersonal experiences, may be possible.

The subtheme of awe was included in the revealer category, as definitions of awe include an element of wonder or surprise. These instances of awe were evident from a number of sources: visual appreciation, beauty, interconnectedness, and impressions resulting from transpersonal experiences. The experiences of awe were not necessarily limited to those aspects of the natural world commonly reported in the literature such as dramatic landscapes or colossal forces of nature [32], but also included the microscopic and mundane as well as beauty in the machinations of nature, a concept proposed by Beery and Wolf-Watz [95].

The description of nature and its ability to create awe put forward by Keltner and Haidt [32] is associated with the idea of the vastness of nature and the perception of the "small self", an idea also echoed in some participant responses.

4.3. Amplifier

A large number of participants whose experience was identified through the amplifier theme detailed substantial previous experiences in nature, with a large proportion of these individuals referring to their proximity to wilder nature as being important. Psychedelic substances have been proposed to act as an "unspecific amplifier of mental processes" [96] (p. 6), and an intensification or renewal of a pre-existing sense of connection to nature/spirit was a central theme to emerge in a qualitative study of ayahuasca usage [56]. While time spent in nature has been associated with nature connectedness [42,97], contact with nature during childhood appears to be a key predictor of connection to nature in later life [98–100]. Contact with natural settings of higher biophilic quality or harbouring higher biodiversity has also been associated with higher levels of nature connectedness [97,101,102]. Such settings exhibit a richer sensorial tapestry than less nature-enriched areas, which is likely to positively influence nature connectedness, with some participants stating that shorter-term or experiential visits to such places were also important in the development of their relationship with nature.

Psychedelic experiences were interpreted as playing an important role in the development of individuals' eco-consciousness, regardless of whether this was a novel understanding or a deepening of pre-existing beliefs. Therefore, lifestyle choices—including dietary changes—also formed a lower-order theme within the amplifier theme, which included the accounts of participants with a pre-existing connection to nature who found psychedelics to enhance and solidify it. Some participants altered their diet in line with perceived pro-ecological choice (e.g., veganism). Dietary change can occur through a

number of ways including internal and external triggers, such as critical self-perception [103] and non-ordinary states of consciousness (e.g., OBEs) [64]. Dietary change has also been associated with psychedelic use [24,80,104]; these findings suggest one mechanism through which this may occur.

4.4. Psychedelic Use in Nature

Participants reported use of psychedelics in natural settings, and a pre-existing relationship with nature seemed to influence this. The nature-connecting capacity of psychedelics was considered to be enhanced using psychedelics in natural settings, and some reported that such experiences could promote feelings of stewardship towards nature. Feelings of interconnectedness with nature may be particularly prominent in the context of contact with natural settings and recognition of our place in the web of life [105–108], and the perceived influence of access to nature during psychedelic experiences has been positively associated with increases in nature relatedness among those rating below-average in the trait in one study sample [18]. Furthermore, mystical experiences occurring within natural settings may be more likely to elicit positive change in pro-environmental behaviour than mystical experiences occurring in indoor settings [109].

Several individuals reported a preference for using psychedelics in natural settings, and others felt that nature could buffer against anxiety and challenging experiences while under a psychedelic. Natural settings may be commonly selected for psychedelic experiences [20,110], and one thematic analysis of psychedelic experience reports suggests that such settings may play a role in de-escalating adverse reactions to psychedelics [111]. The Swiss chemist Albert Hofmann played a pivotal role in initiating the modern psychedelic renaissance through his creation and discovery of LSD and isolation and synthesis of psilocybin. When asked about the optimal context in which to ingest psychedelics, he stated "Always use it in nature" [112] (p. 47). Natural settings are preferred by many if not all psychedelic-using indigenous groups, including the Wixáritari (Huichol) of Mexico, considered the world's oldest surviving psychedelic-using culture [71]. Using psychedelics with the intent to connect with nature may be a common motivation behind usage [113] and has been associated with greater likelihood of mystical experiences and greater well-being scores in comparison with a number of other potential motivations [114]. In addition, it has been argued that natural settings may function as positive settings for psychedelic experiences, thanks to their psychologically and physiologically soothing and restorative qualities and capacity to reduce anxiety. However, it should be noted that outdoor nature settings are inherently unpredictable and less controlled then indoor settings, but clinical settings may benefit from the inclusion of more nature content [10].

5. Study Limitations and Future Research

Our sample was a self-selecting sub-population of psychedelic drug users being asked about experiences of nature connection; as a result, it is perhaps not surprising that psychedelic drugs featured heavily as factors in the development of pro-environmental attitudes. This also makes disentangling their potential impact from those factors socially determined and culturally influenced difficult. The reporting of ineffable experiences occasioned by psychedelic experiences poses a particular challenge for scientific investigations [115] and the limitations surrounding our method of data collection are also a consideration. It is, however, also possible the approach we employed may harbour positive benefits, such as limiting researcher bias in the process of data collection. Online survey capture also provides a larger dataset from which to investigate common themes than individual interviews might allow.

It is important to note that the quotes highlighted here represent the views of a group of people who had chosen to attend a psychedelic conference, or partake in an online user group, suggesting an enthusiasm for and positive experience with psychedelics. Negative experiences with psychedelics are not rare and appear to be more likely to occur in unsafe and unsupervised settings [116]. While our findings generally constitute positive

experiences, taking psychedelics does not guarantee a positive or nature-connecting experience, and for the potential benefits of these hugely powerful tools to be realised, a cautious and responsible approach is required.

6. Summary

Psychedelics were cited as having both an independent effect on positive relationships with nature and a compounding effect, most commonly through transpersonal experiences of increased interconnectedness. These unitive experiences generally increased participants' connection to nature through the generation of new perspectives on nature and individuals' place within it. Individuals with prior experiences of access to natural settings often expressed a pre-existing connection to nature; however, it was often reported that psychedelics played a role in confirming and amplifying these pre-existing attitudes and beliefs.

Psychedelics were also understood as being tools to help strengthen, cement, and crystalise pro-environmental attitudes and behaviours, and some individuals described huge changes in worldview that led to increases across both domains.

7. Conclusions

Thematic analysis of qualitative user accounts suggests that psychedelics have the capacity of kindling a sense of kinship with nature in those without a prior nature-centric relationship, as well as deepening this connection for those individuals with a pre-existing relationship. They appear to reliably induce experiences and insights that can cultivate the formation of an 'ecological self' [117], encompassing a more expansive and transpersonal sense of self built on the perspective of the fundamental interconnectivity and kinship of humans with the rest of nature [70]. Given the importance and urgency of coming back into balance with our planet, it makes sense that the great Albert Hofmann came to view the potential of psychedelics in helping address our disconnection from the natural world as perhaps their most fundamental role [118].

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Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

Conflicts of Interest: R.W. developed Acer Integration, an integration community facilitating connection to the self, others, and the natural world through a 12-month program.

Appendix A

Appendix A.1. Survey Questions

Which factors (social network, media, upbringing, psychedelics etc.) do you feel have contributed most to your pro-environmental attitudes?

Describe how you feel your environmental attitudes have changed over time.

Please give details about an important experience, or series of experiences, that has/have affected your environmental attitudes.

If you haven't already. Please tell us if psychedelics have, in any way, positively impacted your eco-conscious attitude(s) and behaviours.

Is there any specific substance or encounter that you feel had the most significant influence on your concern about nature? If so, please specify the substance and the experience.

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