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A Multidimensional Approach to Strengthening Connectedness with Nature in Everyday Life: Evaluating the Earthfulness Challenge

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Abstract: Connectedness with nature benefits not only human health and well-being, but also our engagement with and taking action for nature. Despite the importance of nature in everyday life, we are increasingly disconnected from nature. Consequently, the calls to reconnect with nature are increasingly loud, but how can we reconnect with nature in the midst of a busy (urban) life? In order to answer this question, we sought to contribute to understanding how people express their connectedness with nature in different contexts and how this can be strengthened through multiple pathways. To do so we used a mixed-methods approach to evaluate, with the use of leverage points, the experiences of people who participated in the Earthfulness program, a 21-day challenge with exercises to strengthen their connectedness with nature in everyday life. Earthfulness participants already felt a relatively strong connectedness with nature at the start of the challenge, and they sought ways to solidify, sustain, express, and enrich that connectedness. By participating in the challenge, people experienced a stronger connectedness with nature, expressed more dimensions of connectedness with nature, and indicated an increased willingness to act for nature. Participants identified gratitude, a reciprocal relationship with nature, and humility as drivers of their willingness to act for nature. We conclude that there are various pathways to strengthen connectedness and that leverage points represent a useful lens through which to study, understand, and implement this diversity.

Keywords: action for nature; human–nature relationship; relational values; mindfulness; nature experiences

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1. Introduction

Scientists generally agree that human activity has had a significant impact on the planet's climate and ecosystems, which led to the decision to name the current epoch the Anthropocene. In tracing the historic origin of the Anthropocene, scholars point to different events over time, such as industrialization, farming, or the use of fire [1]. Regardless of its origin, a combination of socio-historic influences accelerated (Western) anthropocentrism [2]. For example, the Judeo-Christian tradition has been considered to promote domination over nature, and during the Renaissance, a view of nature as being lifeless and mechanic and separate from humans gained traction [2]. A "great acceleration" of the Anthropocene has been noted since the 1950s [1], and human disconnection from nature is still increasing because several causes are amplifying one another, such as consumerism [3], urbanization, and a lack of accessible natural areas [4].

The consequences of our disconnection from the natural world are visible in both ourselves and the world around us. Previous research has shown that connectedness with nature benefits our health, well-being, positive mood, sense of meaningfulness, and vitality [5–10]. Moreover, connectedness with nature has been shown to be an important driver of action for nature and the environment [11–19].

Recognizing the importance of connectedness with nature also has a long history, and calls to reconnect with nature have become increasingly loud and frequent, especially in Western societies [14,20]. Consequently, connectedness has been increasingly studied over the past few decades in a variety of fields and disciplines, such as biology, psychology, and education [13,14,21,22]. This has resulted in different concepts and measures related to a similar notion [23], and several frameworks for reconnecting with nature are being developed and tested [14,24–27] (also see Section 1.1.2).

Despite these efforts, the calls for reconnecting with nature remain vague [14] for two overarching reasons. First, the term "connectedness with nature" remains elusive, as it has different meanings in different contexts and encompasses various dimensions [22]. To contribute concrete insights into how connectedness with nature in everyday life can be strengthened, we sought to understand the (context-dependent) meanings that people ascribe to connectedness with nature.

Second, the underlying mechanisms for (re)connecting with nature are undertheorized [28], unspecified [21], and unclear [20], as the research is fragmented across domains and disciplines [13]. Therefore, more concrete and specific insights are required in order to understand how to answer the calls to connect with nature [14]. We aim to contribute to the understanding of how complementary pathways can strengthen connectedness with nature.

To achieve these aims, we studied the case of the Earthfulness challenge through participant interviews, surveys, and diary entries. This challenge is aimed at strengthening people's connectedness with nature by completing exercises with, in, and about nature for 21 days. This challenge is the first activity carried out by the Earthfulness Foundation, which has a director and a board from different backgrounds (e.g., healthcare, arts, ecology). The director was in charge of the practical organization of the challenge (e.g., recruiting participants, distributing the challenge). The researchers and authors of this article ensured the reliability of the theoretical foundation of the pathways and exercises in the challenge and the scientific quality of the evaluation of the challenge. This challenge is rooted in a literature review on pathways to strengthen connectedness with nature. In Section 1.1, we present this theoretical foundation, the research gaps, and our contribution to the project, which resulted in a research question for each of the two aims. A more detailed case description is given in the first part of the Methods section (Section 2).

1.1. Theoretical Framework

This section describes research on the meanings of connectedness with nature (related to the first aim) and the different pathways toward strengthening connectedness with nature (related to the second aim), upon which the Earthfulness challenge was built.

1.1.1. Meanings of Connectedness with Nature

Research on connectedness with nature has increased considerably over the past few decades [13,21,22], and several concepts and measures have been developed, with strong convergence among them, but also differences that need to be recognized [23]. Connectedness with nature has proved to be a useful concept in multiple disciplines; thus, it risks becoming a catch-all term, making it challenging to have a comprehensive understanding of the concept [16]. Recent review articles have structured this diversity in terms of, for example, different dimensions of connectedness [13] and types of connectedness [22]. Previous studies showed that the meaning ascribed to connectedness with nature requires considering a specific context, as it may differ depending on the type of nature [29,30] or the cultural context considered [28]. Moreover, connectedness with nature is influenced by situational context, individual demographic differences, and internal psychological states [28]. Using previous research [22], we distinguished three ways to understand connectedness with nature (Figure 1). It is a relationship between humans and nature where:

(1) They are separate yet intertwined entities; for example, the "relation between humans and the natural world" [31].

(2) One is part of/includes the other; for example, "the extent to which an individual includes nature within his/her cognitive representation of the self" [18].
(3) They are one indistinguishable entity; for example, "people and nature are not different things, and cannot be taken apart" [3].

Figure 1. Three types of connectedness with nature [22]. Reproduced with permission from Van Heel, Van den Born, and Aarts, *Ecopsychology*; published by Mary Ann Liebert, Inc. publishers, 2023.

Ives and colleagues [14] structured five dimensions of connectedness with nature along a spectrum of people's inner and outer worlds:

- Material (most external): the consumption and use of materials from nature.
- Experiential: direct interactions with a natural environment.
- Cognitive: knowledge about and attitudes toward nature.
- Emotional: feelings or empathy toward nature.
- Philosophical (most internal): worldview of and reflections on our relationship with nature.

These dimensions overlap and can strengthen one another. The more external dimensions (e.g., material) have less leverage than the more internal dimensions (e.g., reflective) in influencing sustainable change [14].

As described in the previous paragraphs, several recent review articles discuss and problematize the variety of definitions regarding what connectedness with nature means to people. Our study fills the gap by empirically investigating the different meanings of connectedness with nature expressed by people in specific situations. We relate these outcomes to the theoretical framework described in the previous paragraphs.

To unravel the different context-dependent meanings of connectedness with nature, we applied a broad understanding of the concept: it is an intertwined, inclusive, and/or indistinguishable type of connection people have with what they consider to be nature, encompassing material, experiential, cognitive, emotional, and/or philosophical dimensions. Our understanding of nature was broad, following the study participants' understanding of nature, as we wanted to unravel what it is people feel connected to themselves and not impose our own definitions.

Through this bottom-up approach and by reflecting on the participants' answers through a theoretical lens, we addressed research question 1: how do Earthfulness participants express (dimensions of) connectedness with nature in different contexts, and do their expressions resonate with the types categorized as intertwined, including, and indistinguishable?

1.1.2. Pathways through which Earthfulness Is Strengthening Connectedness with Nature

Through our literature review, we found that most studies on interventions to strengthen connectedness with nature have focused on single interventions, for example, barefoot walking [32] or listening to bird sounds [33]. A recent meta-analysis concluded that most studies on activities aimed at strengthening connectedness are rather one-dimensional, despite evidence showing that a wider range of activities is needed, because the activities may amplify one another [34].

As a theoretical foundation for this study, we therefore categorized single interventions in terms of pathways. In a broader review of these empirical studies, four pathways were identified: connectedness with nature through experiences, learning and curiosity, emotions, and identification [22]. These pathways reflect the dimensions of connectedness with nature described by Ives et al. [14], with the exception of the material dimension. The single-intervention studies can all be categorized using the five dimensions of connectedness established by Ives and colleagues [14] (see Section 1.1.1).

Studies focusing on a combination of pathways to reconnect with nature [26,27] also reflect the dimensions described by Ives et al. [14] (Table 1). Lumber and colleagues [26] deduced five pathways from two online surveys on activities based on biophilic values (e.g., fishing, listen to birds, learning about animals): contact, beauty, meaning, emotion, and compassion. Richardson and colleagues [27] studied how such pathways have been used by four organizations in the UK and New Zealand.

Previous studies on strengthening connectedness with nature have also described the importance of mindfulness and awareness. Nisbet and colleagues [9] found that mindfulness in nature strengthens connectedness with nature, as mindfulness can intensify one's experiences and subsequently strengthen one's connectedness with nature [35]. Richardson and colleagues [36] stressed the need for "actively noticing nature" instead of relying on a "passive largely unconscious receipt of the sensory information" about nature. Connecting with nature requires "attention, awareness, and intention"; i.e., not just spending time in nature, but spending time engaging with nature [36]. Therefore, the Earthfulness challenge exercises were infused with elements of mindfulness and attentiveness, as this has been found to contribute to strengthening connectedness with nature [9,36] (Figure 2).

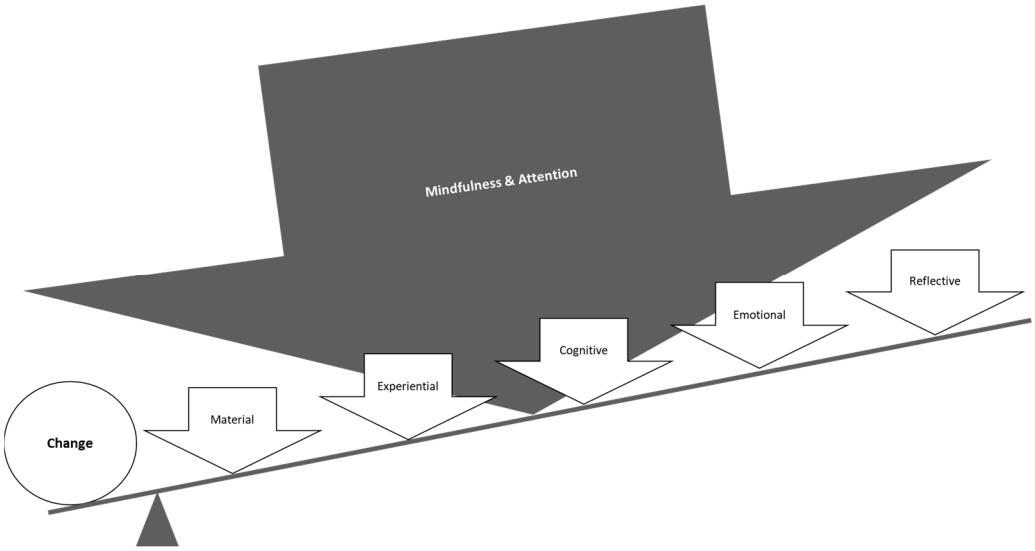

Figure 2. Adjustment of model by Ives and colleagues [14] describing the leverage of hypothesized mechanisms of connectedness with nature. Attention and mindfulness were added as overarching pressure on leverage points.

Contributing to the body of literature on interventions to strengthen connectedness with nature through a multitude of pathways, the Earthfulness challenge exercises combine all five dimensions (material, experiential, cognitive, emotional, and reflective) [14] along with mindfulness and attentiveness [9,36]. In addition to including all five dimensions, our approach is a novel addition to the previous studies as it evaluates these complementary pathways through a mixed-methods approach. This not only allows for an in-depth understanding of how people experience these pathways, but also for linkages to the different context-dependent meanings of connectedness with nature.

Table 1. Pathways to reconnecting with nature [22,26,27] sorted into Ives and colleagues' dimensions of connectedness with nature [14], complemented with added values of attention, awareness, intention, and mindfulness while spending time in nature [9,36].

Dimensions by Ives et al. [14]	Material	Experiential	Cognitive	Emotional	Reflective
Pathways by Van Heel et al. [22]		Experiences	Learning and curiosity	Emotions	Identification
Examples of activities based on values by Lumber et al. [26]	Growing food, hunting	Listening to birds, going rock climbing	Studying nature	Feeling a deep emotional attachment	Thinking about the meaning of natural icons
Pathways by Lumber et al. [26] and Richardson et al. [27]		Contact through senses		Beauty, emotion	Meaning, compassion
Nisbet et al. [9]	Mindfulness				
Richardson et al. [36]	Attention, awareness, and intention				

To ascertain how various pathways can strengthen connectedness with nature according to the participants, we asked research question 2, related to the second research aim: how do Earthfulness participants experience the material, experiential, cognitive, emotional, and reflective exercises as pathways to strengthen their connectedness with nature?

2. Methods

2.1. Case Description: Earthfulness

The 21 daily exercises of the Earthfulness challenge (see Supplementary Data S1) reflect different pathways toward (re)connecting with nature based on the dimensions of connectedness with nature [14] and incorporate elements of mindfulness, being present in the moment with a focus on one's thoughts, feelings, and bodily sensations, and attentiveness, directing one's attention and senses to the surrounding natural environment (Figure 2). The exercises were designed to be accessible and applicable in an everyday urban context, and could be performed in 15 min or less per day for 21 days.

We used the Earthfulness challenge as a single case study; it represents a bounded system and context with a rich unit of study, allowing us to understand how participants were influenced by participating [37]. This allowed us to test how the complementary pathways described by Ives and colleagues [14] combined with elements of mindfulness [9] and attentiveness [36] to strengthen connectedness with nature.

The challenge was held throughout the Netherlands in spring 2022. The Netherlands is one of the most densely populated countries in Europe [38], making it a relevant context for a case study on how connectedness with nature can be strengthened in an urban context. Every day for 3 weeks, people received that day's exercise by e-mail. Anyone could sign up to participate by sending an e-mail to the director of the Earthfulness Foundation, and received a personal confirmation of their enrollment. The challenge was announced primarily via the Earthfulness website and social media. Additionally, participants were recruited through snowballing, which the Earthfulness Foundation and the authors of this paper started by contacting people in their own networks (including people whom they expected would have little connection with nature). Finally, an article about the challenge was published in an environmental magazine. We do not know the exact size or the demographics of the entire sample of people who participated in the challenge, only the sample that participated in the research (see Section 3.1 for the demographic composition of the study sample). All participants in the challenge were invited to participate in the research, no selection was made.

2.2. Methodological Approach

In order to perform a more in-depth evaluation of Earthfulness, a mixed-methods approach was applied, using complementary methods [39], enabling the retrieval of a rich

dataset within a single case study [37]. We studied, for the first time, people's expressions of connectedness with nature using three types of understanding of connectedness with nature [22] through a quantitative and qualitative approach, using a modified version of the Inclusion of Nature in Self (INS) scale [18] (Figure 3) and semi-structured interview questions (Supplementary Data S2). Surveys were used to understand how the challenge was generally experienced, and daily questions provided an understanding of how specific exercises were experienced. The semi-structured interviews allowed for a better understanding of any variations in the meaning of connectedness with nature and motivations to act for nature during the challenge. Together, these methods allowed for triangulation and crystallization through viewing multiple facets [39,40]. Each method is described in detail as follows:

- Pre- and post-challenge surveys: All participants received an invitation to participate in an online survey at the start and the end of the challenge to record their motivations, expectations, and evaluations. This allowed us to compare their connectedness with and action for nature before and after the challenge. The pre-challenge survey was completed by 132 participants (RS1–RS132) and the post-challenge survey by 63 (RE1–RE63), even though people who quit the challenge were also explicitly invited to complete the post-challenge survey. If the data are presented using different numbers of respondents, this is indicated. See Section 2.3. for the survey design.
- Daily questions: All participants were invited to answer daily questions in a diary about that day's exercise in order to gain an understanding of their experiences. They could answer these daily questions in a text file on their computer or on paper, with a return envelope provided. In total, 32 participants sent their diary entries after the challenge. Not all 32 were complete, as some participants quit the challenge or skipped a few days. Quotes from the daily questions are referred to as D1–D32. See Section 2.3. for the design of daily questions.
- Pre- and post-challenge interviews: All participants were asked to undergo two semi-structured interviews [41], one before and one after the challenge (on average, approximately an hour each, in person or via videocall, depending on the interviewee's preference). Semi-structured interviews were chosen, as they allow comparison as well as individual stories [41]. These interviews were used to gain a more in-depth understanding of how the interviewees' defined nature and their connectedness with nature, and how this was influenced by participating in Earthfulness. In total, 14 participants were interviewed before the challenge and 13 after, as one participant withdrew for family reasons. The interviewees were selected based on diversity, in order to cover as broad a range as possible in terms of how engaged with nature they already were, how they became involved in the challenge, and their level of urbanism. Two participants were partners and were interviewed simultaneously. Quotes from interviewees are referred to as I1–I14. See Section 2.3. for the interview design.

2.3. Design of Survey, Daily Questions, and Interviews

Experiences in nature, connectedness with nature, and action for nature were studied using each method. Reasons for participating and evaluations of the challenge were also incorporated. For the surveys and interviews, demographics were included. See Supplementary Data S2 for an overview of the questions included in each method.

With regard to the design of the survey, it consists of validated measures from previous research:

- People were asked about spending time and doing activities in nature to gain insight into their experiences.
- Connectedness with nature was measured with the NR-6 on a Likert scale of −3 to 3 [42], the sense of human–nature relationships was measured with the HaN scale on a Likert scale of −2 to 2 [43], and additional statements were measured with Mayer and Frantz's [44] connection to nature scale. To reflect the different ways of understanding connectedness with nature [22], an adjustment was made to Schultz's [18] Inclusion

of Nature in Self scale (see Figure 3). The images on the scale represent humans and nature as separate (A), separate yet intertwined (B), or indistinguishable (C), humans as part of nature (D), and nature as part of humans (E). For the surveys and interviews, demographics were included. See Supplementary Data S2 for an overview of the questions used for the three methods.

- To measure taking action for nature, we used a modified version of Stern and colleagues' [45] measurement of environmental citizenship [46] and Ganzevoort and Van den Born's [47] intentions.

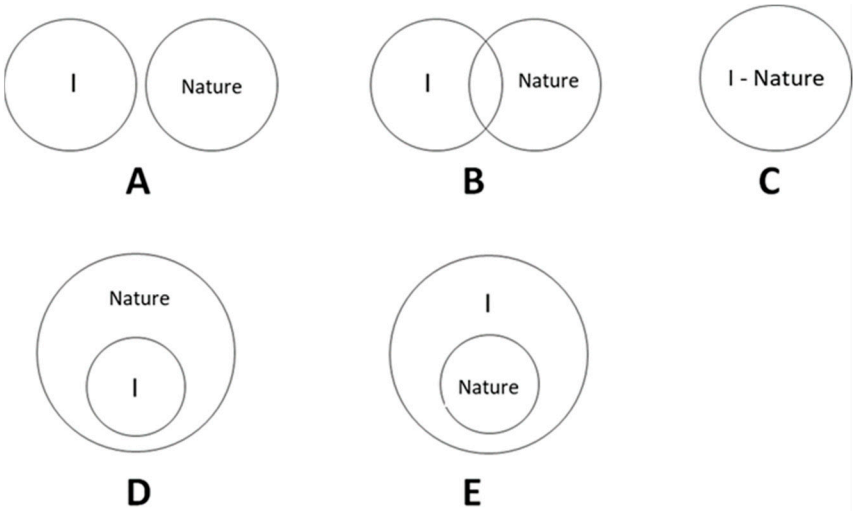

Figure 3. Adjustment of Schultz's [18] Inclusion of Nature in Self scale. Instead of representing only degrees of overlap between a person (I) and nature, this adaptation represents three ways of understanding connectedness with nature [22]. The images on the scale represent humans and nature as separate (**A**), separate yet intertwined (**B**), or indistinguishable (**C**), humans as part of nature (**D**), and nature as part of humans (**E**).

The daily questions were designed based on the studies in the theoretical framework and included:

- Reflection on the experience of the day's exercise.
- Evaluation of the exercise.
- Potential effects of the exercise.

The interviews were designed based on the studies in the theoretical framework and consisted of the following parts:

- Pre-challenge interview:
  - Getting acquainted.
  - Motivation to participate in the Earthfulness challenge.
  - Connectedness with nature and consideration for doing something for nature and the environment.
  - Expectations about the Earthfulness challenge.
- Post-challenge interview:
  - Experience of the Earthfulness challenge.
  - Evaluation of the Earthfulness challenge.
  - What the challenge brought to the individual.
  - Connectedness with nature and consideration for doing something for nature and the environment.

2.4. Analysis of Surveys, Daily Questions, and Interviews

The survey data were cleaned and analyzed in SPSS 27 to calculate descriptives. Due to the relatively low number of respondents to the post-challenge survey and the large

difference between the numbers of respondents to the pre- and post-challenge surveys, no statistical tests are presented. Answers to open-ended questions in the surveys were thematically coded. The daily questions were digitalized (if they were not already) and interviews were recorded and transcribed. Both the diaries and interviews were coded descriptively [48] and analyzed thematically [49]. The theoretical framework was used for coding and themes (e.g., for connectedness with nature, the three ways of understanding connectedness with nature by Van Heel et al. [22] and the five dimensions of connectedness with nature by Ives et al. [14] were coded), as well as a number of additional themes that emerged from the data related to the research questions.

2.5. Ethics and Informed Consent

The research ethics committee of the Faculty of Science of Radboud University reviewed and approved our data management plan and informed consent procedure. All data were anonymized and stored securely. Written informed consent was obtained from participants for the interviews and daily questions, and the survey respondents received information and provided their consent at the start of the online questionnaire. To further protect our their anonymity, the respondents are referred to as they/them.

3. Results

In the results, we describe the findings thematically. First, the demographics of the study sample are identified in Section 3.1. Next, in Section 3.2 we present their reasons for participating in the challenge, and in Section 3.3 how they expressed connectedness with nature (research question 1). This is followed by their experience of the challenge and its underlying pathways in Section 3.4, and how they expressed the interrelatedness between their experience in nature through the Earthfulness challenge, their connectedness with nature, and taking action for nature in Section 3.5 (research question 2).

3.1. Demographic Composition

The pre-challenge survey revealed a highly educated group (89% had completed higher education or had a university degree, $n = 130$), with relatively more women (73%), and a diverse age group (average age was 50 years, within a range of 24–86 years; $n = 130$). Over half of the survey respondents had a full-time job. Among the interviewees, 10 were female and 4 were male, with ages ranging from 25 to 67 years. We do not have the demographic composition of those who participated through the daily questions.

At the start of the challenge, most participants were already engaged with nature. Among the pre-challenge survey respondents who were enrolled in school or had a job at the start of the challenge, 42% ($n = 125$) had a job or educational path related to nature and the environment. Moreover, 72% were members of or donated to a nature organization ($n = 128$), 86% visited nature daily or weekly, and the average NR-6 score was relatively high ($\mu = 1.47$; SD = 0.92). The participants showed their relatively strong affinity with nature by indicating on a scale of 1–10 how engaged they felt with nature, the environment, and sustainability, scoring each one an 8 on average ($\mu_{nature} = 7.93$, SD = 1.24; $\mu_{environment/sustainability} = 8.03$, SD = 1.38).

Among the respondents, 20% of those who filled out the post-challenge survey did not complete the challenge, and half of them skipped one or more days. The most frequently mentioned reasons for quitting or skipping days ($n = 13$) were time constraints (60%) and forgetting (46%). In the pre-challenge survey, participants already indicated that they had very busy lives; 80% rated this at 7 or higher (on a scale of 1–10). Among the interviewees, one person quit both the challenge and the study due to family circumstances; everyone else finished the challenge, but some skipped a few days. One interviewee skipped most of the exercises because they did not have time. They participated with the aim of finding more time to spend in nature and said that they found it frustrating that they enjoyed the exercises and looked forward to doing them, but that they "don't have time for anything" (I3).

3.2. Motivations for Participating in the Earthfulness Challenge

People participated primarily to increase their connectedness with nature. A weighted ranking (based on Admiraal et al. [50]) in the pre-challenge survey shows that the highest ranked motivations were (1) being outdoors, (2) having contact with nature, (3) promoting good mental health, and (4) having a strong relationship with nature (Figure 4). With the exception of promoting better mental health, these motivations all relate to fostering connectedness with nature.

Figure 4. Motivations for participating in Earthfulness challenge as ranked by participants in pre-challenge survey, with weighted averages. Based on Admiraal et al. [50].

Four ways to strengthen connectedness with nature emerged from the interviews and diaries. First, the relationship could be strengthened in terms of quantity, as the participants indicated that they were motivated to spend more time in nature or outdoors. Multiple respondents hoped that the challenge would function as an incentive to actually make the time to be in nature.

Second, interviewees indicated that they wanted more conscious contact with nature. One interviewee worked in nature every day, but wanted "to see if I can make myself really conscious of what I am sitting in" (I12). In the diaries, people wrote that they wanted to experience their environment in "a conscious manner" (D14), and that they were seeking "a new, real connection, very conscious. . . . Especially in 'familiar' places where I often am/walk/work/etc., but where I am also rarely really present" (D32).

Third, participants intended to connect with a different type of nature than they were used to. They especially wanted to find ways to capture the feeling of connectedness that they had in vast natural areas close to home. Participants referred to noticing the "the smaller things, like nature 'close-by'—for example, a bird on the balcony or plants next to the road" (D15).

Finally, participants longed for a tighter connection with nature. One respondent wrote in their diary that they wanted to "figure out if the exercises can deepen my experience of nature. . . . Once I experienced nature more immanently, I would want that again" (D13).

3.3. Expressing Connectedness with Nature

The interviews and diaries showed the nuances in people's expression of their connectedness with nature: one said, "I realized my connection to 'nature' can differ per moment/situation" (D13), and another referred to "what you consider to be nature" (I12). Three elements appeared to play a role in why and when people expressed different types of connectedness with nature.

The first element is that connectedness with nature can differ in different physical contexts. Interviewee I2, for example, mentioned throughout the interview that they considered themselves part of nature, but living in an urban environment made them experience "some more distance from nature". The influence of the type of environment was reflected in some respondents' desire to connect with a different type of nature (Section 3.2). There were also respondents for whom the type of nature did not influence their connectedness; for example, because nature "is actually everything, the entire world" (I12).

Different types of connectedness were mentioned regarding different dimensions of connectedness. For example, I3 made a clear distinction between how they experienced connectedness (experiential dimension) and how they thought about it (cognitive dimension). A survey respondent wrote: "For me, there is a difference between knowing [cognitive dimension] and feeling [emotional dimension]. I know rationally that I would go for image D. I am part of a much bigger whole. But yet it does not feel that way" (RE9).

Finally, different expressions of connectedness reflect differences in ideals and practices. For example, I4 said that they recognized "humans as a small part of nature and the entire earth", with nature continuing way beyond our lifetime. They explained that there is a difference between the way things are and "the way it should be", but they also know they do not live that way, because in practice humans act as if they stand above nature.

3.4. Experiencing the Earthfulness Challenge

In this section, we provide a general evaluation of the challenge and describe how people expressed connectedness with nature after the challenge.

3.4.1. General Evaluation of the Challenge

On average, participants who completed the post-challenge survey were largely positive about the challenge and the opportunities it provided to connect with nature. Most of them rated it as a 7 or 8 on a scale of 1–10 (73%), while fewer (20%) rated it as a 9 or 10. When asked what they found positive about the challenge, most frequently mentioned was increased awareness and looking at nature with more attention (41%); they also indicated that the challenge was easily accessible (29%) and the exercises were diverse (20%). Moreover, people said the challenge provided the incentive they needed to actually make time to go outside and experience nature despite their busy schedules. Some of them explicitly mentioned the dimensions of Ives and colleagues [14]; for example: "it opened the senses" (experiential; RE56), it was "educational" (cognitive, RE59), and the exercise was "humbling and quickly gives you a feeling of appreciation" (reflective; RE60).

Fewer ideas on what could be improved emerged from the survey. Almost as many respondents considered the exercises too easy or familiar (17%) as those who found it too difficult, time-consuming, or not accessible enough (19%). Some found that the exercises tapping into the cognitive/reflective dimension were too abstract (10%), whereas others (5%) sought more reflection. When respondents who quit were asked what could have helped them to finish the challenge, they suggested adding a social component, such as partnering with someone or sharing the experience via social media.

3.4.2. Connectedness with Nature after the Challenge

The post-challenge survey responses indicated differences in the participants' experience of connectedness: 40% (n = 63) indicated that they had a stronger connection with nature, 54% had more appreciation for nature, and 43% learned about nature. This is supported by the qualitative data. Earthfulness participants might not have experienced a completely different type of connectedness, but a stronger overlap between humans and nature, for example. Participants felt that their connectedness with nature was strengthened; it might not have changed, but it was "underlined" (I9) or "confirmed" (RE62). Connectedness may grow gradually, as one respondent commented: "My contact with nature grew because of the challenge. I feel an additional layer of being more aware than I

already was and that is nice. I believe that this is a process that will always deepen and is infinite" (D7).

Three types of experience with connectedness emerged from the qualitative data. Most commonly, participants noticed that they were paying more attention to nature around them (70%); for example: "I experience it more consciously, with more attention, because of the challenge" (RE35).

People also experienced connectedness with nature in other physical contexts because of the challenge; for example: "I have discovered that because of the exercises, I was more aware of my connectedness with nature, and that this is also there if you live in the center of Amsterdam [capital of the Netherlands]. I realize more how important it is that we have a garden and a cat, and that a park and the river Amstel are close to our home" (D12).

Finally, participants mentioned shifting to a more internal dimension of connectedness with nature, which, according to Ives and colleagues [14], provides more leverage for sustainability and change. One survey respondent stated that they increasingly reflected on whether their type of connectedness was desirable or "good". D19 said that their cognitive ecological focus on nature was complemented by a more philosophical, reflective focus: "I was already very involved with nature around me. The challenge brought me [to being] . . . now engaged with it in a philosophical way".

3.5. Connectedness with and Action for Nature

In this section, we describe our findings on how connectedness with nature is related to taking action for nature, and how participating in the challenge influenced taking action for nature.

Before the challenge, respondents already expressed a willingness to act for nature. Almost all interviewees were aware of the tension between threats to the climate and biodiversity and their individual and collective capability, or lack of capability, for averting crises. On the one hand, people said they want to protect nature, and considered themselves to be a small part of this effort and mentioned that species would be lost, but said that others would survive over humans: "I give us as humans lower odds than many animals and plants" (I5). The immense worry of being overwhelmed by the many actions that could be taken and the little impact they might have forces individuals to find balance, as illustrated by the same participant: "I cannot have full control over any of this [biodiversity loss], but I do have control over my own behavior and my own life. So, I try my best in good conscience and within my own capabilities" (I5).

In terms of the relationship between connectedness and taking action for nature, a sense of both responsibility and shame emerged. Recognizing that humans are part of nature, D27 wrote, "because of that I also feel responsible for the deterioration of nature". Yet, even respondents who made very conscious decisions about the impact of their behavior on nature and the environment mentioned that they struggled with feeling like they are not doing enough. One respondent said: "When thinking about how we relate to nature . . . the word 'shame' popped up. . . . Sometimes you are ashamed that you're human. . . . There is actually a lot of things I could still be ashamed about, about how we interact with nature" (I10). This is partially because people experience tension between the actions that are needed and the way society is organized. I11 summed it up like this: "You cannot, and do not want to, set yourself outside society entirely, it [living in as ecofriendly a way as possible] would only be possible if you live in a cabin in the woods together".

While they felt overwhelmed by all the potential actions they could take, people also experienced a lack of agency: "I think it is very bad if [nature] keeps declining. But I also notice that there is not a lot I can do about it" (I2).

3.6. Challenges in Taking Action for Nature

After taking part in the Earthfulness challenge, 30% of the participants reported that they talked more about nature with others and indicated that they were more willing to do something for nature. Moreover, 32% and 41% said they were more aware of the

vulnerability of humans and nature, respectively. Over half of the respondents said they intended to visit nature more, and 50% that they intended to learn more about nature.

Regarding their relationship with nature and the possible actions they could take, respondents mentioned gratitude, reciprocity, and humility, which were strengthened by participating in Earthfulness. These values are part of the reflective dimension of connectedness, which is argued to have the strongest leverage in changing behavior [14].

The challenge gave participants a (strengthened) sense of gratitude toward nature and their relationship with nature. This gratitude could be related to specific senses (e.g., hearing birds sing); being aware and conscious (e.g., "[whilst eating fruit attentively], I felt actually a sense of gratitude. I suddenly noticed, and was touched by, that beautiful pear that was grown for me" (D32)); places ("I am grateful for the large yards with big trees in the city center where I live" (D2)); practices ("showing gratitude is important, and I sometimes don't do that enough" (D10)); and generally "what nature gives" (D2).

Gratitude implies reciprocity, inspiring a willingness to act for nature in return. One respondent said: "Gratitude says something about 'receiving', about something that nature gives us. Regularly during the challenge, I asked myself the question: What do I do for nature? What do I 'give' her? Actually, I don't have a good answer to this" (D13). Another respondent explicitly related gratitude to having an attentive experience in nature and acting for nature: "By being more aware in nature, by opening up to Earthfulness, I live my quality as human more. This gratitude is reciprocal; conserving nature around me then [becomes a] necessity of life!" (D6).

Participating in Earthfulness also evoked humility and a sense of perspective about humanity through a (strengthened) awareness of the relative insignificance of individual humans compared with nature. One participant said: "I am more aware of the importance of nature and my own nothingness. I would say that I am also more aware of my dominance. Now I see the perspective of animals and plants more, also from a future perspective" (R9). This sense of humility also relates to wonder and amazement: "Nature is so grand, so ingenious, there is so much we as humans know nothing about" (D23); as well as vulnerability: "I felt extra vulnerable in contrast to the everlasting rocks" (D15). The latter quote also reflects a temporal scale, which was especially experienced in the exercise where participants gazed at the night sky: "infinity, eternity, we are just merely ants on earth" (D29).

4. Discussion

We now discuss the extent to which Earthfulness contributed to participants' connecting with nature and the roles of different pathways. We close with a methodological discussion and directions for future research.

4.1. Strengthening Connectedness

Earthfulness participants were motivated to participate in the challenge in order to strengthen their relationship with nature and their (mental) health. Instead of focusing mainly on "reconnecting" with nature [51], our study shows that many people who already feel connected with nature still seek ways to strengthen, broaden, or express this connection. The participants' connection is not lost or "hidden" [51]; instead of reconnection, they seek a connectedness with different types of nature that is stronger and more frequent, mindful, and attentive. This calls for providing opportunities for people who feel connected to nature to nourish this, including in overscheduled urban lives. Our participants had a strong internal connection with nature and reflected on their gratitude and humility toward nature and the reciprocity of their relationship; this shows that they have potential to take action for nature. Previous studies have also mentioned the role of gratitude [52,53] and reciprocity [54] in the relationship between connectedness with nature and taking action or caring for nature. Humility may be linked to self-transcendence [55], and self-transcendence relates to engaging in action for others, including nature [56,57]. The gratitude, humility, and reciprocity that emerged in our study reflect a more internal, reflective dimension of

connectedness with nature, and nourishing these traits could provide more leverage for sustainable change.

Our study corroborates a clear need for opportunities to nurture connectedness with nature in daily life in the form of rich and attentive nature experiences. People's relationship with, awareness of, and engagement with nature should be recognized and fostered on a regular basis. Most strategies seem to focus on reconnecting people with nature because they have lost their connection or feel disconnected [58], but it is also of the utmost importance to provide opportunities for strengthening the connectedness with nature of those who already experience it. Because individual changes could become interwoven into a stronger, communal force toward change [59], providing potential ambassadors for nature such opportunities could contribute to countering the dominant system that invites humans to control or even spoil nature, and support the transition to a nature-inclusive society.

4.2. Multiple Forms, Pathways, and Prerequisites

Our respondents' perspectives reflect the many ways to understand connectedness with nature, as has also been found in previous studies [13,21,22]. Earthfulness participants noticed a difference between the rather distanced way they experienced connectedness with nature in their busy lives, often in an urban context, and their strong feelings about and reflections on being a small part of a large omnipresent natural world. Previous studies have shown that the strength of connectedness can vary according to differences in social context [60] or physical context [29,61], or awareness in the moment [9,36]. In addition to these studies, we found that the multidimensional approach of the Earthfulness exercises led not only to increased intensity but also to experiencing multiple types of connectedness [22].

Our challenge highlights the importance of having diversity in activities, tapping into different dimensions of connectedness, in order to strengthen people's connectedness with nature, as was also shown by Sheffield and colleagues [34]. Our study demonstrates that different pathways will suit different people, and multiple forms of connectedness require diverse activities to stimulate these pathways. This implies that searching for a single one-size-fits-all pathway will not be fruitful. Instead, we should strive to better understand the underlying mechanisms through which multiple pathways can strengthen one another [28].

Despite efforts to make Earthfulness an easily accessible challenge, some participants could not find enough time to meet the challenge, even though they wanted to. Our study thus points to the importance of investing in preconditions for connectedness to flourish in busy lives. Our findings thus demonstrate the importance of having access to nature close to home in order to frequently encounter nature in everyday life and strengthen connectedness, which will benefit human health and well-being and encourage taking action for nature and the environment [7,62,63].

4.3. Reflection on the Methodology and Recommendations for Future Research

The triangulation of quantitative and qualitative methods proved useful for ascertaining how the challenge was experienced and the interplay between experiences in nature, connectedness and taking action for nature, and the meaning that people attach to it. The surveys provided more general insight into the evaluation of Earthfulness, and the diaries and interviews provided more in-depth understanding. Moreover, the methodology contributed to strengthening connectedness with nature by allowing reflections, especially through the interviews and diaries. As our single case study took place in the Netherlands, a densely populated Western country, our findings are limited to the Western context and extrapolating beyond that should be done with caution. Future studies could explore these issues in other parts of the world, where the meanings and practices of connectedness with nature might differ, using multiple case studies.

To gain insight into the different ways of understanding connectedness with nature, this study was the first to use an adjusted INS (Figure 3) based on the three types of understanding that emerged from the review by Van Heel and colleagues [22]. Moreover, to our knowledge, this is the first study focusing on a combination of five complementary pathways based on the framework of Ives and colleagues [14] with mindfulness and attentiveness [9,36]. The adjusted INS proved useful in gaining more nuanced insights into the different context-dependent meanings of connectedness with nature among people. Ives and colleagues' [14] model of leverage points and dimensions of connectedness with nature proved to be a valuable basis for exploring pathways toward connectedness with nature (Section 4.2) and reflecting on the relationship between connectedness and action for nature (Section 3.5).

An Important limitation to our study was the large difference in the number of respondents in the first and final surveys, and bias may have resulted from socially desirable answers and self-reporting. Furthermore, although participants who were critical of or quit the challenge were explicitly invited to complete the final survey, it is possible that those who did not complete the final survey did not complete the challenge or felt that it did not suit them. To help overcome this difference, it might be useful in future studies to monitor the participants during the challenge continuously rather than mainly at the beginning and the end.

Finally, the participants were relatively uniform in terms of their connectedness with nature and level of education. When attempting to engage more diverse groups, the Earthfulness Foundation ran into issues similar to other initiatives aiming to engage broader and more diverse groups of people, especially in terms of socioeconomic status and cultural background. Arguably, this will not change if the approach to engaging people does not change; in addition to the current strategies, other strategies should be explored. Organizations encouraging people to reconnect with nature can learn from other domains such as public health, which demonstrate the importance of taking initiative using a collective approach, focusing on social networks and meeting places, and a participatory context-specific approach [64].

5. Conclusions

In the context of biodiversity loss and nature experiences [4,65], calls for reconnecting with nature become prominent, as connecting with nature is crucial for human health and well-being, and motivates people to take action for nature and the environment. People who already feel a strong connectedness with nature search for ways to solidify, sustain, express, and enrich their connectedness. These are the people we reached with the Earthfulness challenge, which clearly provided them the opportunity to spend more (mindful and attentive) time in nature and enriched their existing connectedness with nature. We conclude that there are many forms of connectedness with nature and pathways to strengthen connectedness, and it is important to include this variety in both research and practice. The leverage points described by Ives and colleagues [14] represent a useful lens through which to study, understand, and implement this diversity. Although Earthfulness could reach a more inclusive group, its multidimensional approach appeared to meet the needs of those who already wanted to strengthen their connectedness with nature.

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