

**A Novel Mindful Nature Connectedness Intervention Improves Paranoia but not
Anxiety in a Non-Clinical Population**

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A Novel Mindful Nature Connectedness Intervention Improves Paranoia but not Anxiety in a Non-Clinical Population

ABSTRACT

Paranoia and anxiety are both recognised as experiences that are widespread in the general population. Studies have investigated the use of brief mindfulness-based interventions on both conditions, with encouraging results amongst non-clinical populations in particular. However, there is also promising evidence for the effectiveness of brief nature connectedness interventions on anxiety and mental health more generally. Since mindfulness has been shown to allow individuals to feel more connected to nature, and given that connection to natural environments can foster mindfulness and mental health, the present study aimed to investigate the combined effects of a brief online mindful nature connectedness intervention (B-MNCI) on paranoia and anxiety. A total of 72 participants of non-clinical status were randomly allocated to either an online B-MNCI (10 minutes of daily guided meditation practice over five consecutive days) or a waitlist control group. Measures of paranoia, anxiety, mindfulness and nature connectedness were taken at baseline, immediately after the intervention, and at two weeks follow-up. Findings indicated that compared to the control group, the B-MNCI showed significant improvements in nature connectedness and paranoia, with changes maintained at follow-up assessment. However, no significant differences were observed for anxiety and mindfulness scores. The results provide a new approach to bringing about sustained increases in nature connectedness and confirm the relevance of such approaches for improving mental health outcomes. The study also demonstrates the potential utility of an online B-MNCI for people of non-clinical status experiencing paranoia symptoms, including for those who find it difficult to physically venture into nature.

Keywords: Nature Connectedness, Mindfulness, Paranoia, Anxiety

It has been suggested that both paranoia and anxiety are experienced along a severity continuum, from very mild to very severe (Combs et al., 2006). The prevalence of both conditions in the UK is in the order of 18-20% for those experiencing clinically significant symptoms, including amongst university students (Freeman et al., 2005; Shore et al., 2018). Although anxiety does not necessarily imply paranoia, individuals affected by anxiety often also experience paranoid thought patterns (Freeman & Garety, 2014; Hartley et al., 2013). Furthermore, paranoia invariably involves some degree of anxiety. As such, paranoia and anxiety symptoms are closely related, and are both recognized as experiences that are common in the general population, markedly associated with reduced emotional wellbeing and social functioning (Sun, 2018).

The National Institute for Health and Care Excellence (2014) recommends cognitive behavioural therapy (CBT) as the main psychological intervention for both paranoia-related conditions and generalised anxiety. However, CBT has shown only minimal effects on paranoia symptoms, and there is uncertainty concerning its efficacy and acceptability for individuals with sub-clinical symptom severity (Shore et al., 2018). Consequently, there has been growing interest into the application of other non-pharmacological interventions for ameliorating paranoia, including mindfulness-based interventions, which are typically delivered over an eight-week course (Collip et al., 2013).

Mindfulness has been described as a “process of engaging a full, direct, and active awareness of experienced phenomena that is: (i) psycho-spiritual in aspect, and (ii) maintained from one moment to the next’ (Van Gordon et al., 2015, p.592). Focussing attention on the present moment is understood to help arrest ruminative thought processes that are symptomatic as part of paranoia and anxiety conditions (Van Gordon et al., 2015). Furthermore, perceptually stepping back and observing such thought processes is asserted to facilitate letting them go, due to objectifying thoughts as observable phenomena (Shonin et al., 2015).

However, conventional mindfulness-based approaches can often be prohibitive due to time demands (a typical MBI takes place over an 8-week course), geographical accessibility, a participant's mobility or functional impairments, and/or financial or other resource limitations (Shore et al., 2018). To address this issue, a small number of studies have investigated the use of brief mindfulness-based interventions (B-MBIs) for reducing paranoia and anxiety, with some promising results (e.g., Nguyen, 2018; Shore et al., 2018). B-MBIs typically comprise 3-6 short group training sessions delivered over the course of 1-2 weeks, often using an online delivery format (Lloyd et al., 2016; Shore et al., 2018). Reduced time demands and increased accessibility in the case of online approaches, makes B-MBIs particularly relevant for sub-clinical paranoia and anxiety conditions that have a high prevalence in the general population, especially in a pandemic climate where face-to-face contact can be problematic.

There also exists promising evidence for the effectiveness of brief nature connectedness and nature-imagery interventions on anxiety and mental health more generally (e.g., McEwan et al., 2019; Nguyen & Brymer, 2018). In this context, nature connectedness (not to be confused with nature exposure), can be conceptualised as "*the affective, cognitive, and experiential relationship individuals have with the natural world or a subjective sense of connectedness with nature*" (Nisbet et al., 2009, p. 719). People living in urban areas, especially those who are less connected to nature, have experienced significant improvements in mental health through increasing nature connectedness (McEwan et al., 2019). This provides promise for such approaches given observations of increased anxiety and paranoid thinking (amongst other mental health problems) in urbanised versus rural environments (Sundqvist et al., 2004).

It should also be noted that nature connectedness itself is increasingly being viewed as a desirable outcome owing to the links to both mental wellbeing (Pritchard et al., 2019) and pro-nature behaviours (Mackay & Schmitt, 2019; Richardson et al., 2020). At present, brief interventions that bring about sustained improvements in nature connectedness are limited in

number. Existing brief interventions also tend to focus on prompting greater noticing and engagement with nature, for example the noting three good things in nature approach (Richardson & Sheffield, 2017). Therefore, the current study is also of interest as an intervention to increase nature connectedness, particularly given mindful awareness of nature has been found to improve nature connectedness (Nisbet et al, 2019).

Furthermore, given that both B-MBI and brief nature connectedness interventions have shown promise for ameliorating paranoia or anxiety symptoms, an obvious next step is to explore whether a brief intervention combining both mindfulness and nature connectedness components is acceptable and effective for individuals suffering from these conditions. Such an intervention would be consistent with traditional approaches to contemplative practice, where for thousands of years, mindfulness and connectedness to nature (and other phenomena) have been used in combination to foster mental health and spiritual growth (Van Gordon et al, 2018). More specifically, “*meditative awareness can be used to enhance the restorative and balancing qualities of nature ... and spending time in nature can in turn enhance meditative awareness.*” (Van Gordon et al., 2018, p.1656).

Thus, the aim of the present study was to investigate the effects of an online brief mindful nature-connectedness intervention (B-MNCI) on paranoia and anxiety symptoms in a non-clinical sample. This was seen as an essential precursory empirical stage to directly comparing B-MNCIs with B-MBIs and brief nature connectedness interventions in future studies (i.e., subject to salutary outcomes in this study).

METHOD

Design

A randomised controlled trial design was used to explore the effect of an online B-NBMI on levels of anxiety and stress in a non-clinical population. Thirty-seven participants were randomly allocated to the intervention group and 35 to the waitlist control group (see Figure

1). An online survey hosted on the Qualtrics platform was used to collect participant demographic information as well as responses to four psychometric instruments targeting anxiety, paranoia, mindfulness and nature connectedness. Psychometric tests were administered before (t1), immediately after (t2), and two weeks following intervention delivery (t3).

Participants

It is recommended that a study evaluating a novel non-pharmacological intervention recruits at least 50 participants (Sim & Lewis, 2011). Taking into account the potential for a moderate to high attrition rate, a minimum of 80 participants was deemed to be a suitable sample size for the present study. Power calculations were also performed using G*Power (Faul et al., 2007). The sample size was calculated based on a medium to large effect size ($d_z = 0.5$ to 0.7) for a power of 0.8 and an α of $P < 0.05$ for a test of differences (two-tailed t-test), giving an estimated sample size of 34-64 per group. Beyond being aged between 18 and 65 years old, other inclusion criteria were (i) being able to speak and read using the English language, (ii) not having any known current clinical mental health conditions, and (iii) not currently taking medication for a psychiatric illness.

Participants were recruited through the Prolific resource, a crowdsourcing online platform for the recruitment of participants for research. Out of a pool of 15,582 eligible participants registered within the platform, the first 88 participants who showed an interest in the study were invited to enroll. However, after having read the full study briefing and conditions for participation, 12 participants dropped out before completing baseline assessments. A further four participants did not meet the inclusion criteria due to reported use of anxiolytic and/or antidepressant medications. Of the remaining 72 participants, 37 were randomly allocated to the intervention group and 35 to the waitlist control group (see Figure

1). All enrolled participants completed all measures at baseline, post-intervention and two weeks follow-up.

The average age of participants was 26.3 years (SD = 7.2), with an age range of 18-50 years. A total of 59.7% ($n = 43$) of participants self-reported as being students, 20.8% self-reported as working part-time and 34.7% self-reported as working full time. The sample was diverse in terms of nationality, with the majority of participants being based in Europe, namely Portugal ($n = 12$), the United Kingdom ($n = 11$) and Poland ($n = 10$). The proportion of male participants was 56.9% ($n = 41$).

[Figure 1]

Materials

The online platform Qualtrics was used to collect informed consent, demographic information, and for administering the following psychometric tests:

Paranoia Scale (PS; Fenigstein & Venable, 1992). The PS assesses the full hierarchy of paranoid thoughts generally present within a non-clinical sample. The scale assesses non-pathological paranoia via 20 items scored on a one to five Likert scale from 1 (*not applicable*) to 5 (*extremely applicable*), with total scores ranging from 20-100. The PS does not have clinical cut-off scores to illustrate severity, but higher scores indicate higher levels of sub-clinical paranoia. In the present study, the scale had a high level of internal consistency (Cronbach's $\alpha = 0.892$).

Spielberger State-Trait Anxiety Inventory – short form (STAI; Marteau & Bekker, 1992).

The STAI was used to assess levels of state-trait anxiety and comprises six statements scored

on a four-point Likert scale from 1 (*not at all*) to 4 = (*very much*). Example items include: “I feel calm”, “I am tense”, “I feel content” and “I am worried”. Scores range between 20 and 80, with a threshold of 40 suggested to detect clinically significant symptoms (Julian, 2011). In the present study, the internal consistency of the STAI was good (Cronbach’s $\alpha = .868$).

Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013). The six-item short form NR-6 measures the level of participants’ connectedness to nature. The scale comprises six items, assessed on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Example items include: “I take notice of wildlife wherever I am” and “my relationship to nature is an important part of who I am”. The mean score for the six items is calculated, with total scores ranging from 1 to 5. Higher scores on the NR-6 indicate stronger connectedness to nature, with a mean score of approximately 3.24 being the norm in the general population (Nisbet & Zelenski, 2013). In the present study, the internal consistency of the NR-6 was high (Cronbach’s $\alpha = .831$).

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). The MAAS is a 15-item questionnaire assessing dispositional mindfulness. Respondents indicate, on a six-point Likert scale from 1 (*almost always*) to 6 (*almost never*), their level of awareness and attention to present events and experiences. MAAS items include questions such as: “I find it difficult to stay focused on what’s happening in the present”, “I break or spill things because of carelessness, not paying attention, or thinking of something else”, and “I could be experiencing some emotion and not be conscious of it until sometime later”. Scores range from one to six, with higher scores reflecting greater self-reported attention and awareness (i.e., dispositional mindfulness). In the present study, the scale exhibited good internal consistency (Cronbach’s $\alpha = 0.834$).

Procedure

An audio file was prepared based on a guided meditation adapted from the Mindfulness of Body and Breath script (Williams & Penman, 2011) as well as nature-focused meditations (Coleman, 2006). The B-MNCI focused on activating Lumber et al's (2017) five pathways to nature connectedness: (i) sensory contact, (ii) beauty, (iii) emotion, (iv) meaning and (v) compassion. A background audio recording of a soothing natural soundscape that could help the listener imagine themselves in a natural setting was used to accompany the voiceover of a native English-speaker narrator.

An overall length of 8-10 minutes was deemed appropriate for a brief intervention of this nature, and was in line with similar approaches (e.g., Howarts et al., 2016). Inspiring nature connectedness was evoked by first inviting participants to bring sensory awareness to nature's beauty, for instance by noticing the full variety of sounds being played, such as the sounds of the wind blowing through the leaves or the lapping of the water on the shore. Participants were then gently guided to imagine what the landscape they were listening to could look and feel like. As they imagined sitting within this landscape, they were invited to focus on their sensations, noticing, entering into contact with, and actively engaging with nature. In the final few minutes of the guided exercise, participants were encouraged to be aware of what emotions the natural space they imagined had evoked in them, thus becoming emotionally more engaged and reflecting on what nature might mean for them.

Questions related to the demographic composition of the sample were collected from both groups at baseline. After random allocation to one of the two groups (which was implemented via Qualtrics), participants allocated to the intervention group were given immediate access to the online intervention and asked to complete it over five consecutive days, whereas those assigned to the control group were asked to wait for the completion of

the full study before being granted access to the B-MNCI. Ethical Approval for the study was provided by the research ethics committee of the researchers' academic institution based in the East Midlands, UK. Upon completion of the final set of psychometric assessments, participants were provided with £8 as a small token of appreciation for their involvement in the study.

Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 24 (SPSS Inc., Chicago, IL, USA). Repeated measures analysis of variance (ANOVA) was used to test for interactions between group and time on all dependent variables (PS, STAI, NR6 and MAAS). Significant multivariate effects were followed by univariate analysis of each dependent variable. Effect sizes are shown using Partial Eta Squared (η^2) as well as Cohen's *d* statistic. Total changes for the dependent variables from t1 to t3 were also computed and further analyses were conducted on the intervention condition to assess whether participant benefits were related to gender, age or level of nature connectedness.

RESULTS

Using box plots for values greater than 1.5 box-lengths from the edge of the box, outliers were identified and retained in the STAI and NR6, but no outliers were found in the PS or MAAS scores. Inspection of frequency histograms confirmed a Gaussian distribution. For NR6 and MAAS scores, data were normally distributed as assessed by the Shapiro-Wilk's test ($p > .05$), and normal distribution for all scores was also confirmed by visual inspection of Normal Q-Q plots. There was homogeneity of variances, as assessed by Levene's test of homogeneity of variance, for all scores except STAI, and there was homogeneity of covariances, as assessed by Box's test of equality of covariance matrices for all scores except STAI (PS: $p = .275$; NR6: $p = .197$; MAAS: $p = .928$).

Owing to violation of the assumption of sphericity for PS and MAAS scores as assessed by Mauchly's test of sphericity, Greenhouse-Geisser correction was applied for two-way interactions for these ANOVA analyses; the assumption of sphericity was not violated for STAI or NR6 scores.

Results were significantly different for the two groups (NC-MBI and Control) across the PS and NR6 scores, whereas no significant differences were found across the MAAS and STAI scores. Results are shown individually for each measure below.

Table 1: Overview of different measures scores by different condition at baseline, post and follow-up.

		NR6			PS			STAI			MAAS		
		<i>Pre</i>	<i>Post</i>	<i>2weeks</i>									
Control	Mean	3.37	3.22	3.30	49.54	50.40	50.85	43.80	45.61	44.95	3.87	3.71	3.87
	<i>SD</i>	0.77	0.93	0.98	13.53	14.89	14.87	7.54	7.70	8.05	0.74	0.74	0.96
Nature	Mean	3.36	3.94	3.75	44.78	40.10	36.51	43.78	45.31	45.31	3.74	3.75	3.99
	<i>SD</i>	0.88	0.84	0.91	12.27	11.26	11.55	5.16	4.99	5.52	0.70	0.70	0.94
Total	Mean	3.22	3.59	3.53	47.09	45.11	43.48	43.79	45.46	45.13	3.80	3.73	3.93
	<i>SD</i>	0.93	0.95	0.97	13.03	14.05	15.02	6.38	6.41	6.82	0.71	0.71	0.94

Paranoia Scale (PS) Scores

There was a statistically significant interaction between condition (intervention/waitlist group) and time on PS scores, $F(1.599, 111.907) = 12.091$, $p < .001$. There was also a statistically significant difference in PS scores between intervention and control groups, $F(1, 70) = 994.713$, $p < .001$. Testing of between-subjects effects showed that paranoia scores were significantly lower in the intervention compared to the control group at both t2 ($M = -10.292$,

SE = 3.102, $p < .001$) and t3 (M = -14.344, SE = 3.128, $p < .001$), but not at baseline t1, (M = -4.759, SE = 3.042, $p = .122$).

Paired samples t-tests were used to further investigate differences within each group. Within the intervention group, there was a statistically significant decrease from t1 to t3 for PS scores, $t(36) = 4.859$, $p < .001$, $d = 0.79$. A statistically significant decrease between t1 and t2 for PS was also found, $t(36) = 3.235$, $p = .003$, $d = 0.53$. The decrease in post-intervention (t2) PS score to two-weeks follow-up score (t3) was also significant $t(36) = 3.377$, $p = 0.002$, $d = 0.55$. No significant differences were found within the control group from baseline (t1) to t2 ($p = .587$.) and t3 ($p = .368$). The increase between t2 and t3 PS scores for the control group was also not significant ($p = .607$).

Spielberger State-Trait Anxiety Inventory (STAI) Scores

There was no statistically significant interaction between condition and time on STAI scores, $F(2, 140) = .077$, $p = .926$, and no statistically significant main effect of time on STAI scores, $F(2, 140) = 2.146$, $p = .121$. There was also no statistically significant difference in STAI scores between intervention and control groups, $F(1, 70) = .994.713$, $p < .001$., $F(1, 70) = .000$, $p = .993$.

Nature Relatedness Scale (NR6) Scores

There was a statistically significant interaction between condition and time on NR6 scores, $F(2, 140) = 12.918$, $p < .001$, and a statistically significant difference in scores between intervention and control groups, $F(1, 70) = 1370.369$, $p < .001$. There was no statistically significant difference in scores between intervention and control conditions at baseline, $F(1, 70) = .000$, $p = .992$, but there was a statistically significant difference in scores between conditions at t2, $F(1, 70) = 14.657$, $p < .001$, and t3, $F(1,70) = 10.052$, $p = .002$. There was a statistically significant effect of time for the intervention group, $F(2, 72) = 12.811$, $p < .001$, but not for the control group, $F(2, 68) = 1.384$, $p = .257$.

Within the intervention group, there were statistically significant score differences between t1 and t2 ($M = -.662$, $SE = .142$, $p < .001$) and between t1 and t3 ($M = -.387$, $SE = .107$, $p < .001$) but not between t2 and t3 ($M = .275$, $SE = .142$, $p = .062$). For the control group, scores were not statistically significantly different from t1 to t2 ($p = .103$), t1 to t3 ($p = .464$) or t2 to t3 ($p = .343$).

Mindful Attention Awareness Scale (MAAS) Scores

There was no statistically significant interaction between condition and time on MAAS scores, $F(1.693, 118.496) = 1.537$, $p = .221$. There was also no statistically significant difference in scores between intervention and control groups, $F(1, 70) = .002$, $p = .966$.

Factors Related to Intervention Condition Score Changes (t1-t3)

In order to examine factors related to sustained changes in scores (PS, STAI, NR6 and MAAS), total score changes for these variables were computed and examined in relation to age and nature connectedness. Age, NR6 and PS total change scores had significant skew and kurtosis (z -score > 1.96) so non-parametric tests were used. No significant impact of age and nature connectedness were found.

DISCUSSION

By combining a mindfulness-based intervention with the beneficial effects of nature connectedness, this study sought to ascertain whether an online B-MNCI could improve levels of paranoia, anxiety amongst individuals of non-clinical status. Findings indicated that the online B-MNCI was not only effective in bringing about increases in nature connectedness, but also in lowering paranoia when compared with a waitlist control group. It should also be noted

that these changes were maintained at the follow-up intervention assessment phase. However, the same findings were not observed for anxiety and mindfulness scores.

The present study's findings support those of previous research highlighting the positive effects of nature connectedness on mental health more generally (Pritchard et al., 2019). The present study also extends previous research that has targeted increasing nature connectedness, through noticing the good things in nature (Richardson & Sheffield, 2017), to foster sustained improvements in the quality of life of those with mental health conditions (McEwan et al., 2019). Importantly, the results provide a new approach to bringing about sustained increases in nature connectedness and confirm that such approaches can improve mental health outcomes. Furthermore, findings extend the evidence base regarding the use of online B-MBIs, showing that even a very brief (less than 6 x 10-minute sessions) online-delivered contemplative intervention can be beneficial for people experiencing psychological distress (e.g., Shore et al., 2018).

It is worth noting that although a meta-analysis of previous cross-sectional studies have found that increased nature connectedness was consistently associated with increased trait mindfulness (e.g. Schutte & Malouff, 2018), this was not the case in the present study. It has been suggested that the experience of mindful awareness can be used to enhance nature connectedness and the restorative qualities of natural environments, and that spending time in nature can in turn enhance mindful awareness and cultivate greater insight into the present moment (Van Gordon et al., 2018). However, results from this study show that while mindfulness scores did not significantly change for both allocation conditions, nature connectedness increased only in the B-MNCI group. This is consistent with the findings of Richardson and Sheffield (2015), who observed that the correlation between trait mindfulness and nature connectedness was not associated with increases in nature connectedness when the latter was manipulated empirically (it was in fact intentional self-reflection that predicted

increases in nature connectedness). It should also be noted that in the current study trait mindfulness was measured, which by definition, is unlikely to be sensitive to short-term changes and thus does not preclude the relationship found in cross-sectional work (c.f. Nisbet et al, 2019).

Furthermore, it has been asserted that although mindfulness is linked with internal state awareness, trait mindfulness has little relation to self-reflection as it is a “pre-reflexive” perceptual function that enhances awareness of current experience (Brown & Ryan, 2003; Richardson & Sheffield, 2015). This reflective self-attention is also associated with mental well-being and involves a genuine curiosity about the thinking, attitudes, values and emotions that contribute to the self. Richardson and Sheffield have suggested that this has implications for developing interventions to increase nature connectedness and that therapeutic practice could be informed by integrating activities related to reflective self-attention. The current findings support aspects of their pre-reflective and intentional self-attention (PRISM) model of nature connectedness, that highlights the role of intentional self-attention and reflection. Furthermore, Harrison and Clark (2020) showed that mindful acceptance has been associated with an increased capacity to allow engagement with negative experiences; whereas mindful awareness relates to the capacity to pay close attention to sensory, affective, and cognitive experiences.

Limitations

The study used a waitlist as an inactive control condition, meaning that it is not possible to rule out whether non-specific factors, such as listening to the voice of a human speaker or changing the soundscapes, may have asserted a therapeutic influence. Since meditation has been shown to induce a relaxation response (Carson et al., 2004; Kristeller & Johnson, 2005), an active control group, such as one involving progressive muscle relaxation (PMR) or guided imagery,

would have been useful. Furthermore, the use of an active control condition exclusively focusing on either mindfulness or nature connectedness would enable the comparative effects of the B-MNCI to be determined.

This study was also limited by using a relatively brief follow-up assessment period (two weeks). This design choice was useful for minimising attrition, but a longer follow-up period (e.g., 3-6 months) would be more consistent with other studies of MBIs and nature connectedness approaches, and would thus make it easier to draw comparisons across intervention types. It should also be noted that although well-established psychometric instruments were used, only a single measure for each construct was used. Furthermore, the order of test completion was not random, meaning that there may have been a sequencing effect. There may also have been a priming effect as there was no gap between collection of demographic data and completion of the psychometric instruments. A more general measure of mental wellbeing could also have been included. Finally, as the intervention group consisted of a fairly small sample ($N=37$), these findings should be treated with some caution, as they may not be generalizable to the larger population.

Future Research

Further research is needed to replicate and extend the current findings to wider wellbeing and mental health outcomes. Future research should also explore how the B-MNCI might be improved. Aspects such as the speed and duration of the audio recording, the choice of wording of the instructions, and the effect of using additional media (such as the inclusion of immersive videos or images) could all be evaluated. Furthermore, since different types of natural environments have been observed to produce different degrees of positive change in wellbeing outcomes (Gatersleben & Andrews, 2013), future studies could adapt the proposed intervention to explore the effects of a wider range of natural environments. Despite

demonstrating positive effects on a non-clinical sample, future research is also needed to explore whether improvements could be observed in a clinical sample. Finally, future research could consider the causal mechanisms at work in the intervention, for example the balance and interaction between mindfulness and nature connectedness.

Conclusions

The present study is the first to investigate the effects of an online B-MNCI on paranoia and anxiety in a non-clinical sample. The B-MNCI led to improvements in paranoia and nature connectedness, which were maintained at a follow-up assessment. Although further studies using active control conditions are needed, the brief intervention is attractive due to its ease of delivery and likely cost effectiveness. The present study indicates that nature connectedness and mindfulness can work in combination as a route to cultivating healthy psychological states. The results extend the growing literature on the positive effects of brief, online contemplative interventions for improving mental health. Finally, in addition to confirming the relevance of approaches based on improving nature connectedness for improving mental health outcomes, the study provides a new approach to bringing about sustained increases in nature connectedness.

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