

Three good things in nature: Noticing nearby nature brings sustained increases in connection
with nature.

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Abstract

Connecting people more fully with nature is emerging as a societal issue owing to the state of nature, links to pro-environmental behaviour and benefits to wellbeing. Simple, low-cost, interventions that deliver sustained increases in nature connectedness would be valuable. Participants (n=50) noted three good things in nature each day for five days and a control group noted three factual things (n=42). The intervention group showed sustained and significant increases in nature connectedness compared to the control group. Increases in nature connectedness were associated with psychological health improvement in the intervention group. Noting the good things in nature each day can deliver sustained increases in peoples' connection with nature.

Keywords: nature connection, nature connectedness, well-being, psychological health.

1. Introduction

There is a government acknowledged need to reconnect people with nature (e.g. Department for Environment, Food & Rural Affairs, 2011) owing to the state of nature (e.g. Barnosky et al., 2011), the links to pro-environmental behavior (e.g. Frantz & Mayer, 2014) and the benefits to human health and well-being (e.g. Howell, Dopko, Passmore, & Buro, 2011; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009). Recently, a connection to nature has been shown to relate to happiness with a similar effect size to established social factors such as income and education (Capaldi, Dopko, & Zelenski, 2014). Connecting people more fully with nature is emerging as an important construct and a societal problem that has been the focus of several recent high profile campaigns around the globe (e.g. 30x30 Nature Challenge! by the David Suzuki Foundation, 2016; Wild Network, 2016). Given the acknowledged benefits and campaign interest, simple interventions to increase people's connectedness to nature in a sustained manner would be valuable for human well-being and nature conservation. This paper presents such an intervention.

1.1 Connectedness to Nature

Connecting people to nature is fundamentally concerned with an individual's sense of self (Schultz, 2000) and their sense of inclusion in nature and understanding of human interconnectedness with nature (Nisbet, Zelenski & Murphy, 2009). A more developed ecological-self is associated with greater respect for nature and pro-environmental behaviours (Nisbet et al., 2009). Nature connectedness consists of an affective and experiential sense of belonging to the natural world (Mayer & Frantz, 2004). A connection to nature has been shown to correlate significantly with pro-environmental behavior (see review by Frantz & Mayer, 2014) and aspects of human well-being, including happiness (Capaldi et al., 2014; Nisbet, Zelenski, & Murphy, 2011), life satisfaction (Mayer & Frantz, 2004), vitality (Cervinka, Röderer, & Hefler, 2011) and prosociality (Zhang, Piff, Iyer, Koleva, & Keltner,

2014). A connection to nature has also been found to mediate the relationship between happiness and improvements in health (Richardson, Cormack, Roberts, & Underhill, 2016). Finally, a connection with nature is an important construct emerging alongside established societal factors such as income and education (Capaldi et al., 2014; Richardson et al., 2016); it is time to identify ways to improve it.

1.2 Improving Connection to Nature

Nisbet and Zelenski (2013) have acknowledged how a brief exposure to nature led to a temporary promotion of connectedness in previous research (e.g. Mayer et al., 2009). They also highlight the need to, and the applied challenge of, encouraging nature connection in order to produce lasting changes (Frantz & Mayer, 2014). However, there have been few empirical manipulations of nature connectedness. Although not designed as interventions to deliver sustained increases in connection to nature, there are a number of studies that have tested and quantified the short-term impact of various activities on connectedness to nature, often using the Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004). For example, Tam, Lee and Chao (2013) found that reading, writing or drawing posters and newsletters with an emphasis on anthropomorphising nature increased CNS immediately after the materials were engaged with. Most of those interventions that have demonstrated an increase in nature connectedness are wilderness experiences (e.g. Barton, Bragg, Pretty, Roberts, & Wood, 2016) or education programmes away from the everyday home location, and therefore require substantial time and resources.

1.3 Intervention Approach

The human-nature relationship and our experience of natural environments is complex, and there is a need to keep our thinking about this relationship in touch with experiences of real places. Phenomenology and gestalt psychology has been proposed as a route of enquiry in this area (Schroeder, 2007), with combinations of quantitative and

qualitative approaches yielding a more complete understanding (Schroeder, 1991). Such work has revealed the qualities of human experience in nature (Schroeder, 1991), and the things that make natural places special (Schroeder, 2002) and meaningful (Spartz & Shaw, 2001; Coles, Millman, & Flannigan, 2013).

Such work highlights the ‘good things’ that humans are likely to identify when experiencing natural places, for example trees, flowers, smells, colours, sounds, seasons, peace, beauty and solitude (Coles et al., 2013; Schroeder, 1991; Spartz & Shaw, 2001). The proposed intervention provides a prompt to notice the good things in everyday nature, rather than a retrospective capturing of experience and meaning from those who enjoy natural places. Therefore, an underlying rationale for the intervention presented stems from calls to value ‘nearby nature’ (Kaplan & Kaplan, 1989) or ‘mundane nature’ (Newman & Dale, 2013) within the more urban landscapes that will increasingly be the prime location for our interactions with nature (Dunn, Gavin, Sanchez, & Soloman, 2006). More specific direction is provided by previous research that has noted the impact of nature focussed note-taking on feelings of connection to nature (Richardson & Hallam, 2013). Such extended prose does not present a practical intervention, but brief positive psychology interventions (PPIs) do. Brief PPIs have been shown to be effective in improving range of outcomes including happiness and well-being (Seligman, Steen, Park, & Peterson, 2005). The PPI we have adapted is writing three good things a day, usually for a period of a week or two, as recent research has highlighted the benefits of recording good things on a daily basis and engaging in extended periods of reflection (Seligman et al., 2005; Emmons & McCullough, 2003). This ability to be aware of good things has been shown to be a strategy that results in well-being (Emmons & McCullough, 2003). Further, the simple act of writing three good things has had significant and sustained effects for up to six months (Seligman et al., 2005).

It should be noted that the adaptation from ‘three good things’, to ‘three good things in nature’ shifts the key focus of the original PPI, from inward aspects of noting positive emotions to outward identification of the good aspects of nature. Therefore the adapted task is no longer a PPI, rather, and as intended, it is a NCI - a Nature Connectedness Intervention. Thus, we propose that the adapted intervention will deliver sustained increases in nature connectedness, an outcome that previous research has found to be associated with benefits related to psychological well-being and ultimately mental health (e.g. Hartig et al., 2011; Howell et al., 2011; Mayer et al., 2009).

1.4 Intervention Design

There is a need to consider how the task of writing three good things in nature is framed in order to achieve an increase in nature connectedness. Insight can be gained from a thematic analysis of a transition to nature connectedness informed by biophilia and its nine dimensions (Kellert, 1993). Richardson and Hallam (2013) note the naturalistic and aesthetic dimensions of connection with nature, with the latter at the fore. This key role of the aesthetic dimension also ties into the effortless appreciation of the aesthetic aspects of nature, one of the four elements of Attention Restoration Theory required for restoration in the natural environment (Kaplan & Kaplan, 1989). Further, being attuned to the beauty of nature has been related to benefits in well-being (Zhang, Howell, & Iyer, 2014). Finally, although the three good things task is not intended to promote systematic mindful practice, it has been informed by the approach of intentionally attending to whatever is arising in the present moment (Shapiro, 2009) because mindfulness has been shown to strengthen nature connectedness through enhancing the impact of experience in nature (Richardson & Sheffield, 2015; Howell et al., 2011).

The brief intervention proposed is attractive for its simplicity and potential outcomes, and it is proposed that a ‘three good things in nature’ task will promote an increased

connection to nature. To our knowledge, such an intervention has not been used before. In order to test the outcomes of using the three good things in nature intervention an experimental group will be compared to a control group directed to write three factual statements each day for five days. A connectedness to nature measure will be undertaken at baseline, end of task (one week) and two months after completion, with a general psychological health measure included at baseline and two months. It is predicted that the three good things in nature intervention will lead to improvements in nature connection across the timeline and in comparison to the control group. Given the range of associated benefits of a connection to nature, we also hypothesized that participants in the three good things in nature group would show improvements in psychological health compared to the control group. The relationship between changes in nature connectedness and psychological health will also be explored.

2. Method

2.1 Design

The study was a 2 (group: nature, control) x 3 (time: baseline, post-intervention, follow-up) mixed design where self-reported scores were taken at three times, pre-intervention, post-intervention and follow up at two months, from participants randomly assigned to one of two groups. The control group were required to describe three factual things each day and the intervention group (referred to as the 'nature' group) had to write three good things in nature each day. Results from a second control group using the original three good things PPI are not reported; as expected it had no impact on nature connection. This took place during the five days of a working week.

2.2 Participants

Following an invite sent to campus and online students of the University of Derby and circulated by social media, 92 participants successfully completed both the weeklong

intervention and the two-month follow-up, see Table 1 for breakdown. The study was designed to detect a medium effect ($f=.2$; cf. Tam et al., 2013), with a power of .9 and an alpha of .05. The sample at follow-up comprised 66 females and 26 males with an age range of 18 to 65 years, mean age of 32.61 years ($SD = 10.28$). Thirty-two participants were full or part-time students, 36 were working only, 22 were working and studying part-time and two were not working or studying. They were primarily UK ($n = 83$) and non-UK but EU ($n=9$) based. All participants had to have access to the Internet and their email every day during the week and be in sight of trees during their typical day, be that roadside, urban park, garden or suburban estate. Participation was voluntary and all participants who completed the study received a £10 voucher and were entered into a prize draw to win £100.

Table 1 about here

2.3 Materials

Measures were taken using a set of psychometrically tested scales. For pre-intervention baseline measures the first page consisted of a statement of consent to take part in the study. The second page was a demographics questionnaire which asked age, location, gender, ethnicity, marital status, employment status and perception of access to an environment with trees. The scales reported in the results were then completed within a wider battery of scales. A short debrief statement and explanation of the task procedures was then given. The one week post intervention measures did not include the consent, demographics

or General Health Questionnaire-12 (GHQ-12) owing to the timescales in their wording (e.g. “we want to know how your health has been in general over the last few weeks”). The two month follow up measures included GHQ-12, and had a final debrief section.

Connectedness to Nature Scale - State. Mayer and Frantz (2004) present the connectedness to nature scale, “a measure designed to tap an individual’s affective, experiential connection to nature” (p. 504), although it has been suggested CNS measures people’s beliefs about their connection to nature, rather than emotional connections (Perrin & Benassi, 2009). The CNS measures respondents sense of kinship with plants and animals, sense of oneness with the natural world, and sense of equality between nature and the self (Mayer & Frantz, 2004). The reworded 13 item state version was used as it has been used successfully to measure differences due to experimental manipulation (Mayer et al., 2009). Items include: ‘right now I’m feeling a sense of oneness with the natural world around me’ and ‘presently, I feel like I am part of the web of life’. A high score is associated with a greater connection to nature, with possible scores ranging from 13 to 91. Reliability analysis showed the scale was reliable ($\alpha = 0.94$ pre, 0.94 post, 0.93 follow-up). Results of a second nature connectedness measure, NR-6 (Nisbet & Zelenski, 2013), are not reported as they were similar.

General Health Questionnaire. There are several versions of the General Health Questionnaire with the GHQ-12 being the shortest version (Goldberg, 1972; Milne, 1992). This twelve-item scale is a commonly accepted measure of current mental health and psychological well-being with a lower score associated with better health, with possible scores ranging from zero to 36. Although a number of items are worded to capture ‘ill-being’, it has been found to tap into positive affect (Avey, Luthans, Smith, & Palmer, 2010; McKee-Ryan, Song, Wanberg, & Kinicki, 2005). For example; ‘have you recently been able to enjoy your normal day-to-day activities? Have you recently felt you couldn’t overcome your

difficulties? Have you recently been feeling reasonably happy, all things considered?’ This is a highly reliable and valid instrument that is sensitive to short-term variations over multiple time-points across many weeks. The measure has more than 90 validations and has been used by the World Health Organisation (Goldberg et al., 1997). Reliability analysis showed the scale was reliable ($\alpha = 0.91$ pre, 0.92 follow-up).

Linguistic Inquiry and Word Count – Linguistic Inquiry and Word Count (LIWC) software (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007) was used to analyse word frequencies in the sentences. LIWC calculates frequency values for a dictionary of words sorted into linguistic (e.g. personal pronouns, verbs and tense) and psychological categories (e.g. social, affective, cognitive, biological, perceptual processes) and personal concerns (e.g. work and achievement). Word frequencies were used to help check that participants in each group wrote with a focus in line with instructions given. Further analysis of the sentence content is published separately (Author, 2015).

2.4 Procedure

Messages and emails with a link to a participant information sheet were sent out requesting participants for a study “exploring the benefits of short writing tasks”. Each complete study week began on a Friday and ended on the following Friday, with the intervention running from Monday to Friday. A survey website was used to administer the questionnaires and record participants sentences each day following daily email reminders.

Participants were randomly allocated to the task groups. At the start of the week participants were contacted via email with instructions about the start of the study and given a link to the questionnaires and asked to complete them over the weekend. After completion another email was sent out with a link to their first task, which started on the Monday. They were instructed to complete this in the evening and were repeated each day for five days from the Monday before ceasing. After completing the five days another email was sent out with a

link to the questionnaires (CNS). Two months later the questionnaire pack was sent out by email for the final time (GHQ-12 and CNS).

The control group were instructed to write three factual non-nature based things about a different topic each day, items in the kitchen, on a desk, things they did in the living room, wore or ate. The nature group were instructed to “write three good things in nature that you noticed today” and the task guidance stated “Things you can list can be the beauty of small things at any one moment or wider aspects that arise from attending to the diversity and wonder of the natural world around you. For example, it could be as seemingly trivial as noticing the song of a robin or movement of a tree in the breeze.”

The study was repeated over several different weeks from April to June 2013 in order to accommodate participants’ preferred dates to take part, and to avoid public holidays. The two-month follow-up was conducted between June and August 2013. Additional data, with different participants, was collected over the same period during 2014.

2.5 Ethical Considerations

The study was approved by the department’s Psychology Research Ethics Committee and also met the conditions of the British Psychological Society’s (BPS) Code of Conduct and ethical principles for carrying out research (BPS, 2004).

3. Results

Table 2 shows the means and standard deviations for the nature connectedness measures (CNS) by group at pre-intervention baseline, post-intervention at one week and follow-up at two months. It also shows the one-week and two-month changes in these measures.

Table2 about here

3.2 CNS Results

To investigate these differences more formally a mixed 2 (Group) x 3 (Time) ANOVA with group as the independent samples variable and time as a repeated measures variable was conducted on the CNS scores. The main effect of group was not statistically significant, $F(1, 90) = 1.12, p = 0.29, \eta^2 = 0.01$. Mauchly's test indicated that the assumption of sphericity had been violated ($\chi^2(2) = 6.68, p = 0.35$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.93$). Time had a statistically significant impact on CNS scores, $F(1.87, 167.86) = 8.76, p < 0.01, \eta^2 = 0.09$. There was also a statistically significant interaction effect between time and intervention group, $F(1.87, 167.86) = 3.30, p = 0.04, \eta^2 = 0.04$, demonstrating that the interventions were having different effects. The difference between groups at baseline was also tested using a one-way ANOVA and showed that there was no statistically significant difference, $F(1, 91) = 0.14, p = 0.90$.

Further one-way ANOVAs showed that participants change in CNS over the study week was greater for the nature group compared to the control group and this difference was statistically significant, $F(1, 91) = 4.26, p = 0.04, d = 0.43$. This difference in CNS change between the nature group and control group was maintained for two months and this difference was significant, $F(1, 91) = 5.30, p = 0.02, d = 0.48$.

Paired samples t-tests were used to further investigate differences within each group. Within the nature group, there was statistically significant increase from pre-intervention baseline CNS to post-intervention CNS, $t(49) = 4.75, p < 0.01, d = 0.39$. A statistically significant increase from pre-intervention baseline CNS to two month follow-up CNS, $t(49) = 2.52, p = 0.02, d = 0.25$, was also found (p-values meet thresholds for multiple comparisons using Holm's sequential Bonferroni [Holm, 1979]). The difference between post-intervention CNS to two month follow-up CNS was not significant ($p = 0.08$). No significant differences were found within the control group from pre-intervention baseline to post-intervention ($p = 0.06$) and two-month follow-up ($p = 0.40$). However, the decrease between post-intervention CNS and two-month follow-up CNS was significant, $t(41) = 2.13, p = 0.04, d = 0.22$. Finally, correlational analysis of demographic variables and CNS change scores did not reveal any significant associations.

3.3 Psychological Health

It was hypothesized that participants in the three good things in nature group would show improvements in psychological health compared to the control group. Table 3 shows the GHQ-12 results for each group. Using a one-way ANOVA no significant differences between groups were found at baseline for GHQ-12, $F(1, 91) = 0.16, p = 0.69$. There were no differences in the changes in GHQ-12 between the groups, $F(1, 91) = 1.57, p = 0.21$. However, the control and nature groups both showed statistically significant improvements in health over two months as measured by GHQ-12; for control group, $t(41) = 2.11, p < 0.04, d = 0.41$ and for nature group, $t(49) = 4.34, p < 0.01, d = 0.63$. To further explore, correlation analysis of changes in nature connectedness and psychological health were conducted and revealed a significant relationship between CNS and GHQ-12 changes over the two-month follow-up period in the nature group ($R = -0.44, p < 0.01$), but not within the control group ($R = -0.01, p = 0.92$). To investigate this relationship further, regression analysis of the nature

group data showed that 19.3% of the variance in health was related to the increase in CNS ($R = 0.44$ and Adjusted $R^2 = 0.18$, $F(1,49) = 11.46$, $p = 0.01$), compared to 0.0% in the control group, the ($R=0.13$ and Adjusted $R^2 = -0.01$, $F(1,41) = 0.70$, $p = 0.41$), with no relationship between CNS change and GHQ-12 change being found.

3.4 Word Frequency Analysis

The nature group wrote 241 words per participant on average and control group 134 words. Reporting and further analysis was limited to the LIWC super-ordinate level categories with usage frequencies above one percent, see table 4. The frequency analysis shows broadly that the nature group tended to write more often about the perception (e.g. hearing and seeing) of things; indicated by the frequency of perceptual process and articles associated with nouns. LIWC does not have a category for nature, but further analysis of the sentence content was always nature specific (Author, 2015), for example, “Listening to the sparrows chattering in the hedge”, “I saw a crow, flying not as the crow flies but more like a scaled-up butterfly, progressing through the air in lurching, wind-affected zigzags” and “Sun reflecting off the river”. The control group’s topic focus was directed to factual items each day, so content analysis is less informative. It does provide a manipulation check though, for example participants were asked to write three items they ate and this is reflected in the higher frequency of words related to biological processes such as ingestion. Sentence examples from across days include, “A dark brown leather coaster”, “jam on toast for breakfast” and “I vacuumed the floor”.

Table 4 about here

4. Discussion

It was predicted that the three good things in nature intervention would lead to improvements in nature connection over time, in comparison to the control group. The sustained and significant increases in nature connectedness within the nature group when compared to the control group give good reason to consider the first use of the three good things in nature intervention a success. Having a simple and quick task that can improve people's self-reported connection to nature is of great potential value given the international campaign interest. The present research focussed on proof of concept, and provides sound foundation for further work to identify whether the associated benefits of nature connectedness, such as pro-environmental behaviour, are promoted by noting three good things in nature each day. The results related to the secondary aim, associations between CNS and variation in the health measure also provide good reason to continue this work further.

The changes across the two time points are informative. The increase in nature connectedness measures within the nature group was statistically significant at one week. It is suggested that the state version of the CNS measure is likely to be more sensitive to the short-term change than trait focussed measures. At the two month follow-up, the nature connection measures for the control group had returned to baseline or lower. The CNS state measure had dropped back as might be expected, but still showed a significant increase from baseline to two-months and the change was significantly greater than the control group. Such long-term effects have been seen with brief PPIs (Seligman et al., 2005) and the changes at two months show a medium effect size; this gives further reason for confidence in the intervention.

Although, non-significant, there were observable increases in CNS for the control group at one week, immediately after completing the five days of writing three sentences a day. It is suggested that initial completion of the scale was a cause for some participants' to

reflect on their relationship with the natural world owing to the nature of the questions (Mayer & Frantz, 2004). However, the return to baseline at two-months strongly negates this as an issue. It does though relate to the possibility some participants might have guessed the purpose of the study from the scale questions and instruction to notice three good things in nature each day. This is difficult to overcome and an issue with any intervention with pre and post self-report measures. Ultimately, only further research that also demonstrates associated benefits such as pro-environmental behaviours and well-being can overcome this concern more fully. However, it should be noted that a recent systematic review found little evidence to support such demand characteristic effects (McCambridge, De Bruin, & Witton, 2012) and good practice was observed in the study design. Participants were not informed of the purpose of the study and independent and dependent variables were concealed. Further, a between participant design was used and a research assistant employed for data collection.

Accepting a significant effect of the three good things in nature intervention the results can be discussed in more detail. As a new intervention, the present research was focussed on showing outcomes rather than mechanisms and process. However, the items within the CNS scale tap into some deep philosophical issues: the respondents' oneness with nature, sense of self and human interconnectedness to other life. For these reasons, a general phenomenological and cognitive integrationist perspective can be used to explain how writing about the good things in nature can improve connection to nature (Author, 2015). Richardson and Hallam (2013) showed how sustained daily engagement with, and writing about, nature can lead to profound changes in the consideration of one's place in the natural world. Although writing three good things in nature is a short task, the amount of writing time does not reflect the time spent thinking or processing the information written. The act of writing, even if it is for a couple of minutes each day (Burton & King, 2007), can shape thinking (Menary, 2007), with identifying three good things requiring attention to nature

throughout the day. The cognitive integrationist perspective where mind and environment operate as a coupled system (Clark & Chalmers, 1998; Thompson, 2010) is fundamental to the proposition that the creating and manipulation of text during writing drives cognition (Menary, 2007). From this perspective, what we perceive or attend to in the environment alters our cognition. So exposure to and engagement with nature impacts our cognition, especially when writing. Potentially developing thinking about an individual's sense of inclusion in nature and understanding of human interconnectedness with nature (Nisbet et al., 2009). Cognitive integration has its foundation in phenomenology and the philosophical work of Merleau-Ponty, which suggests a shared place in the natural world (Merleau-Ponty & Lefort, 1968; Schroeder, 1991). Thinking that developed into embodied cognition (e.g. Clark, 1997; Gallagher, 2005; Lakoff & Johnson, 1999) and the extended mind thesis, where the mind extends beyond the body to be embedded in the wider environment (e.g. Jacob, 2012). Which returns us to our connection to nature and place as embodied biological beings evolved to fit and understand our landscape (Noë, 2010). Such thinking is supported by anthropologists' observations that native peoples often perceive nature to be integrated within their own self (Sabloff, 2001). Further, research in this area should consider how the vehicle of writing about nature develops the thinking about one's self required to change responses to the nature connectedness measures.

The results of the linguistic analysis also offer some insight into the mechanisms behind the results, which can inform future research. The frequency of linguistic word categories used in the nature sentences reveals a higher frequency of prepositions and articles associated with noting items in nature, with psychological process words related to cognition and perception (e.g., knowing what is seen and heard) also appearing often. Further, the sentence content reveals no evidence of the anthropomorphism of nature (Tam et al., 2013), so that seems like an unlikely explanation of the results. It was also suggested that, although

positive, the adapted intervention might no longer be a true PPI and this is supported by the results of the linguistic analysis. Words related to positive emotions and the self were only marginally higher than the control group and below the levels of cognition and perception. Although the linguistic analysis did not reveal a high frequency use of words related to positive emotion, the inclusion of a more specific measure of positive affect (rather than GHQ) in further research would provide further understanding (Mayer et al., 2009). With regards to the wider themes, content analysis of the sentence content is published separately (Author, 2015). This revealed themes related to the everyday good things in nature that were broadly related to previous research (e.g. Coles, Millman, & Flannigan, 2013; Schroeder, 1991; Spartz & Shaw, 2001): sensations, temporal change, active wildlife, beauty, weather, colour, good feelings and specific aspects of nature.

Looking forward, further research could compare general attending to good things in nature, to specifically attending to three good things in nature, to three non-natural good things, and attending to non-natural things; although as reported in the design section, results from a second control group using the original three good things PPI had no impact on nature connection. Threshold levels of writing should also be considered. The original PPI that has been adapted has received greater attention and writing less than three things would appear to be less effective, but there could be a dose response relationship. Future research could consider the impact of varying the instructions to ascertain if noting three good things in nature is optimal.

Research is required to explore how the intervention might be refined. Factors such as the frequency and duration of the writing and the wording of the instructions could be tested in adults; the task is also well suited for use by children and future work could focus on them. Future studies should also look for changes in behaviour following the intervention, in pro-environmental actions or increased time spent outdoors for example, and formally investigate

anecdotal evidence that some participants continued with the intervention beyond the study week. Further, larger studies would allow demographic issues to be considered; for example the interaction of environment, age, gender with increases in nature connectedness. Finally, as has been seen with the original three good things PPI, the three good things in nature NCI provides many options for wide implementation. It can be implemented using pen and paper, or web-based or smartphone technology that can provide daily prompts. Such applications allow an enriched and engaging intervention to be developed by including social-media sharing of the good things in nature, for example. Further, additional media (e.g. images and sound) can be included. Finally, GPS based location data would allow the location of good things in nature to be identified and combined with biodiversity mapping to expand future research opportunities further.

Returning to the relationship between changes in nature connectedness and psychological health, previous research suggests a positive impact on well-being and health. In the nature group, CNS is a significant predictor of the improvement in psychological health and 19.3% of the variation in the psychological health measure is associated with the changes in CNS over two months, compared to 0% in the control group. There is reason to be hopeful that such interventions might improve well-being and health. It is also noted that the health of the control group improved, but this was not predicted by changes in CNS and it is possible seasonal changes linked to the two-month follow-up were involved (De Graaf, Van Dorsselaer, Ten Have, Schoemaker, & Vollebergh, 2005). Larger studies with well-being measures that can be used at more frequent intervals are required to unpack this relationship further.

In conclusion, as argued by Newman and Dale (2013), the more ordinary nature of our everyday landscape can be embraced and does allow people to better understand their connection to nature. The simple intervention of noting three good things in nature each day

can deliver sustained increases in nature connectedness required in order to enhance well-being and sustainable behavior towards the natural world.

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Table 1. Participant ages and the breakdown of self-reported environment for each group.

Table 2. Mean CNS scores by time point and condition.

Table 3. GHQ-12 results by condition (* denotes significant improvement).

Table 4. Ranked frequency analysis of linguistic categories used during the writing task.

	N	Mean Age	SD	Range	Rural	Semi- Rural	Suburban	Urban
Control	42	32.62	11.53	18 to 65	9.5% (n=4)	23.8% (n=10)	40.5% (n=17)	26.2% (n=11)
Nature	50	32.60	9.23	18 to 55	10.0% (n=5)	18.0% (n=9)	50.0% (n=25)	22.0% (n=11)

		Pre	Post	2 months	1 week change	2 month change
Control	Mean	4.36	4.54	4.26	0.17	-0.10
	SD	1.21	1.19	1.34	0.58	0.81
Nature	Mean	4.39	4.82	4.66	0.43	0.27
	SD	1.15	1.07	1.01	0.64	0.76
Total	Mean	4.38	4.69	4.48	0.31	0.10
	SD	1.17	1.13	1.18	0.62	0.80

		GHQ Pre	GHQ 2 months	GHQ Change
Control	Mean	13.55	11.24	-2.31*
	SD	5.97	5.29	7.11
Nature	Mean	14.08	9.96	-4.12*
	SD	6.63	6.50	6.71
Total	Mean	13.84	10.54	-3.29
	SD	6.31	5.98	6.92

Running head: THREE GOOD THINGS IN NATURE

Control	Category	Nature	Category
11.93	Prepositions	19.74	Relativity
12.05	Relativity – motion, space & time	16.39	Prepositions
9.76	Cognitive Processes	14.52	Articles
8.01	Verbs	8.29	Cognitive Proc.
7.96	Biological Processes – body, ingestion.	7.55	Perceptual Proc.
7.93	Articles	5.90	Verbs
7.60	Personal Pronouns	4.18	Pers. Pronouns
5.70	Perceptual Processes – see, hear & feel.	3.92	Affect
4.75	Past Tense	3.74	Conjunctions
4.01	Conjunctions	3.41	Positive Emotion
3.92	Auxiliary Verbs	3.33	Auxiliary Verbs
3.68	Social Processes – family & friends.	3.24	Past Tense
3.62	Work	2.53	Adverbs
3.46	Leisure	2.15	Leisure
2.82	Present Tense	2.13	Present Tense
2.61	Affect	2.04	Home
2.16	Positive Emotion	2.03	Social Proc.
2.07	Home	1.34	Quantifiers
1.87	Adverbs	1.30	Biological Proc.
1.43	Quantifiers	0.93	Achievement
1.26	Achievement	0.70	Work