30 Days Wild: Who benefits most?

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Abstract

Purpose: There is a need to provide interventions to improve well-being that are accessible and cost-effective. Interventions to increase engagement with nature are coming to the fore. The Wildlife Trusts *30 Days Wild* Campaign shows promise as a large-scale intervention for improving public engagement with nature for well-being.

Design: 273 people fully participated in a repeated measures evaluation comparing baseline measures of nature connection, health, happiness and conservation behaviours with measures post-30 days and 3 months.

Results: There were sustained and significant increases for scores in nature connection, health, happiness and conservation behaviours. Those with lower scores at baseline in nature connection, conservation behaviours and happiness showed the most benefit. Older participants and those with higher baseline scores in conservation behaviours were the most likely to sustain their engagement with the campaign.

Research Limitations: Although the design and defined outcomes meet criteria for public health interventions, the self-reported measures, self-selecting sample and attrition are limitations.

Value: The significant and sustained effects of the campaign on health, happiness and nature connection and conservation, makes this a promising intervention for improving human and nature's well-being. The large community sample and naturalistic setting for the intervention makes these data relevant to future interventions and policy.

Introduction

The rising prevalence of physical and mental health conditions places increasing demands on health services (Lozano et al. 2012). It is known that exposure to nature can improve human health and wellbeing (for a review see Richardson et al. 2017). For example, a large-scale longitudinal study by Villeneuve et al. (2012) demonstrated that urban green spaces were related to lower levels of mortality at a 22 year follow-up in a cohort of 575,000 adults in Canada, suggesting effective, equitable, and accessible nature based solutions for promoting health. There is evidence to suggest that good health can be promoted through natural environments (Mitchell & Popham 2008), which can include gardens (Buck, 2016) in order to provide greener urban environments associated with mental wellbeing (Alcock et al. 2014). From a public health perspective there is a need for large-scale interventions that promote engagement with nature and are accessible regardless of socio-economic status and can be built into day-to-day life, often in an urban environment (Burls, 2007). Such interventions can use nature based solutions to target mental well-being (Mind, 2013). Furthermore, our planet is currently experiencing a mass extinction that will have cascading consequences on the ecosystem and human civilization (Ceballos et al. 2017). There is a need to engage people with the natural world for both nature's and human well-being. For these reasons improving people's connection with nature is an important societal issue, with a number of governments implementing policies to increase people's engagement with and connection to nature (e.g. HM Government, 2018). Conservation organisations (e.g. Royal Society for the Protection of Birds; The Wildlife Trusts) are increasingly moving toward using the natural environment as a means to address health inequalities, improve quality of life, and increase the adoption of pro-environmental and sustainable behaviours.

Connection to nature, or formally the psychological construct of nature connectedness, is increasingly being recognised as an important construct for well-being

(Richardson et al. 2017). Nature connectedness relates to humans' affective and cognitive relationship with nature, and an individual's sense of self (Schultz, 2000) where humanity and nature are one and the same. Connection to nature has a role in mental health as it helps meet the challenges of stress as well as providing resilience (Cervinka et al. 2011). Nature connectedness is associated with pro-environmental attitudes and behaviour (e.g. Frantz and Mayer, 2004) and aspects of mental well-being, such as life satisfaction (Mayer and Frantz 2004), vitality (Cervinka et al. 2011), and happiness (Capaldi et al. 2014). People with a greater connection to nature are more likely to spend time in green spaces, report increased levels (and longer-term maintenance) of physical activity and report having greater social contact with others compared to those with a lower connection to nature (Loureiro et al. 2017; Lin et al. 2015 & Russell et al. 2013). A successful example of a nature connection intervention is the *30 Days Wild* campaign by The Wildlife Trusts in the United Kingdom (Richardson et al. 2016).

30 Days Wild is a large-scale longitudinal nature engagement intervention that connects people with nature by asking them to engage with nature every day for a month. The campaign's activities were informed by five values of biophillia hypothesis (Kellert, 1993; Wilson, 1984) shown to increase people's nature connectedness (Lumber at al. 2017). *30 Days Wild* has been shown to increase nature connection, health, happiness and conservation behaviours (Richardson et al. 2016). However, there is a need to confirm such findings and understand the benefits in more detail to inform future campaigns or similar interventions. Exploring who benefits the most, and who is most likely to withdraw from nature engagement interventions could help lay the foundations for future interventions to sustain motivation of participants who may otherwise drop out.

The current paper presents findings from an evaluation of the *30 Days Wild* campaign. The first aim is to confirm the benefits to nature connectedness, conservation behaviours,

health, and happiness, thus replicating previous results (Richardson et al. 2016). A second aim is to understand the benefits further in order to establish who benefits most. The third aim considers engagement with the *30 DaysWild* campaign, those most and least likely to drop-out. The fourth aim is to gain a qualitative understanding of the participants' participation in the campaign.

Materials and Methods

Design

The evaluation used a 1x3 (A-B-B) repeated measures time-series design with self-reported measures taken at three time-points: pre-participation, post-participation and follow-up after a further two months. The theoretical basis and method towards defined outcomes meet checklist criteria for public health interventions (Des Jarlais et al. 2004). As seen with evaluation designs of large-scale health promotion campaigns (e.g. Pollard et al. 2008) and applied nature activities (e.g Bruni et al. 2015) a Randomised Controlled Trial (RCT) was not a practical option. However, the repeated measures time-series approach has a record of successful application in non-medical research (Sanson-Fisher et al. 2007), particularly where there is little potential for harm (Bonell et al. (2011). In sum, this approach can provide convincing evidence of the effectiveness of an intervention in a public health context (Rychetnik et al. (2002)

Participants

6,179 adult participants in *30 Days Wild* consented to complete the baseline evaluation of the campaign as part of the main sign-up process. People under eighteen years of age weren't included owing to ethical requirements for parental consent which could not be incorporated practically into the campaign. Only 2.2% (n = 137) of the 6,179 people who signed up to take part in the current evaluation also took part in the previous evaluation. As

the baseline questionnaire was part of the sign-up process, participation dropped markedly for the follow-up (*n*=655) and the 3 months follow-up (*n*=273) as people had to respond to an email reminder. Participant numbers were three times higher than the previous evaluation (*n*=2,203) allowing more detailed analysis of benefits and engagement. Table 1 shows the participants demographics at each time point in the study.

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Table 1 about here

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Procedure

The procedure replicated that reported by Richardson et al. (2016). After providing informed consent participants completed a series of questions online. These included a computer-based version of the Inclusion of Nature in Self scale (INS; Schultz, 2001) and the Nature Connection Index (NCI; Hunt et al. 2017) to measure nature connectedness. Single items asked about general health and happiness, both measures correlated highly with full standardised scales in previous research (Abdel-Khlek 2006; Ostrove et al. 2000). Conservation behaviours were measured using a bespoke 4-item scale that included items such as 'I put food out to feed garden birds'. Throughout June participants engaged in the campaign by completing a 'wild' act every day and completed the same questions after 30 days and then at follow-up 2 months later. Participants supplied brief written qualitative data summarising in one or two sentences their most memorable wild moment. Suggested wild acts can be summarised into six categories: 1) Knowledge and discovery, including activities such as wildlife surveying, tracking animals, noting sightings or learning birdsong; 2) Artistic

activities such as sketching, writing a poem, taking photographs, making a piece of art from wild materials; 3) Conservation activities such as planting and habitat creation, rescuing an animal, switching off devices/ethical buying and volunteering; 4) Observation and sensory activities such as watching a sunset, following animals, birdwatching, walking barefoot, dipping feet in water, smelling wild scents, listening to nature; 5) Physical activities such as climbing for a view, swimming, exercising outdoors, camping, rockpooling, dancing in the rain, visiting/exploring a wild place; and finally 6) Sharing, participants were encouraged to invite a friend into nature, and share their wild spaces with others. Further detail of the development of *30 Days Wild* can be found in Richardson et al. (2016).

Quantitative Data analysis

Following screening for normality, data were analysed using a repeated measures MANOVA with scores across all study variables at baseline, post and follow-up as the within-subjects variables. The MANOVAs assessed differences in scores between baseline, post campaign and 3 months follow-up. Finally, baseline nature connection was explored as a covariate. Attrition data were explored using *t*-tests to assess the characteristics of participants who withdrew versus those who completed the campaign. A *t*-test was also used to compare participants who improved or worsened on nature connection scores to assess for whom the campaign was least or most effective.

Qualitative Data analysis

Qualitative data was collected from the one or two sentences participants supplied in July on their most memorable wild moment (n=655). This produced a 8928 word data corpus. Firstly, Linguistic Inquiry and Word Count (LIWC) software (Pennebaker et al. 2001) was used to analyse word frequencies in these sentences. Secondly, previous research has used a large collection of single sentence reflections on nature experiences for qualitative analysis (e.g. Richardson et al. 2015) and Braun and Clarke (2006) celebrate the flexibility of thematic

analysis. They note that the data set may consist of many or all individual data items in the data corpus. To identify the themes within the data, the data set was analysed using a thematic analysis in NVIVO. The analytic process followed the principles of thematic analysis outlined by Braun and Clarke (2006). A theory driven, deductive approach was taken and quotes were coded to pre-defined themes. These were the five pathways to nature connectedness identified by (Lumber at al. 2017); contact, emotion, meaning, compassion, and beauty.

Regarding reflexivity, it is acknowledged that the analysis was limited by the guidance given to those taking part in *30 Days Wild*. The provision of suggested activities was a necessary part of the campaign, but the breadth and request to identify one favourite moment gave the participants plenty of freedom. The sentences were also requested at the end of the month long campaign, likely to be some time after the materials had been looked at in most detail. Finally, it is acknowledged that the researcher conducting the analysis has an awareness of the research area that could bias the analysis.

Results

Aim 1: The Benefits of 30 Days Wild

Table 2 shows the means and standard deviations for participants' scores on nature connectedness (NCI & INS), conservation behaviours, health, and happiness at baseline, post and 2-month follow-up time points. The analysis used to explore the overall benefits showed that there were statistically significant differences between baseline, post and follow-up scores [$F(10, 263) = 24.85$, $p<.001$, $\eta_p^2 = .486$]. Further, univariate tests revealed significant increases for all of the individual study variables (nature connectedness, health, happiness and conservation behaviours ($p<.001$). There were particularly large effect sizes (as measured

by partial eta squared) for the benefits to nature connectedness (INS; .17), health (.16) and happiness (.22).

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Table 2 about here

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Aim2: Understanding who benefits

In order to understand who benefits, age was included as a covariate, however it was shown to be a non-significant factor. To assess the effect of baseline nature connectedness at the start of *30 Days Wild*, baseline scores in nature connectedness (INS) were placed into categories of low and high by performing a median-split. These categories were entered into a repeated measures MANOVA as a between-subjects variable. This covariate analysis showed that there was a significant interaction between time (baseline & post) and baseline nature connectedness scores [F (5,267) = 17.27, $p < .001$, $\eta_p^2 = .244$]. There were significant univariate interaction effects for both the nature connectedness measures, NCI ($p = .018$), INS ($p < .001$), and also for conservation behaviours ($p = .014$), and happiness ($p = .010$). These effects were explored further using a *t*-test. This revealed that participants who had lower scores in nature connection (NCI; t= -3.52, df 413, $p < .001$& INS; t= -14.83, df 413, $p < .001$) happiness (t= -2.20, df 413, $p = .029$) and conservation behaviours at baseline (t = -2.38 df 413, $p = .0018$), showed the greatest improvement in scores. Hence those with lower nature connection, happiness and conservation behaviours at baseline showed the greatest benefit following taking part in 30 days wild.

Aim 3: Understanding engagement with 30 Days Wild

To explore which participants stayed with the evaluation, attrition data were analysed using *t*-tests, with attrition (n = 5524) and retention (n = 655) as the groups. Higher baseline scores in conservation ($t = 5.22$, df 6177, $p = .000$) were associated with retention and older participants ($t = 8.61$, df 6177, $p < .001$) were more likely to complete the study.

Aim 4: A qualitative understanding of the aspects participants enjoyed.

LIWC calculates frequency values for words sorted into psychological categories (e.g. social, affective, cognitive, biological, perceptual processes), linguistic categories (e.g. personal pronouns, verbs and tense) and personal concerns (e.g. work and achievement) and allows comparison to a control library (Table 3).

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Table 3 about here

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The thematic analysis was based on pre-defined themes of contact, emotion, meaning, compassion, and beauty (Lumber at al. 2017). A commentary and example are provided for each.

Contact - This theme captures engaging with nature through the senses. Participants wrote about sensory and observational activities such as smelling plants, listening to birds, watching water flow and the sun glisten on the water, watching the clouds, touching the grass or water with their feet, stopping and observing minute details such as a spider spinning a web, observing sights and sounds with more focus and being more aware of the nature around them.

'Simply laying outside and listening to nature. We don't take enough time to stop and do nothing and just to listen. It's amazing how loud nature can be when we take the time to listen to it.'

Emotion - This theme captures an affective state of engaging with nature. Participants wrote about feeling relaxed, calm, secure, peaceful, an escape from stress and feeling a positive energy, exhilaration, excitement and feeling thrilled by new discoveries. Four participants wrote about the pleasure they felt from seeing children engage so positively with nature, they describe the children's amazement, delight and happiness.

'The instant relaxation and positive energy felt from walking somewhere new in the countryside. Spotting wildlife. Also the warm glow I get from observing my children appreciating nature more than possessions'.

Meaning - This theme captures using nature or natural symbolism to communicate a concept. Three participants wrote about a sense of place and how you could imagine a place throughout history and the many changes that place would have seen. Three people wrote about a revival of childhood memories and the associated feelings of wonder and fascination that were part of their development of a relationship with nature. Two people wrote about change, regrowth and revival.

'Seeing all the new growth, life reawakening and watching animals enjoying the natural world'.

Beauty - This theme encompasses the perceptions of qualities in nature such as colour and form that please the senses. Three participants wrote about the range and vibrancy of colours found in nature. Two people wrote about the surprising grace and agility of birds flying overhead. One wrote about the ghostly beauty of caterpillar webs spun over bushes, one wrote about a stormy sky dotted with swallows and bees.

'Cycling to work along the banks of the River Trent with the sun glistening on the water. The whole sensation was idyllic with banks of cow parsley, insects buzzing, birds singing, rabbits nibbling the grass. It was so exhilarating thinking how I could have been stuck in my car in a traffic jam instead!'

Compassion - This final theme is about extending oneself to include nature and to feel moved to caring for it. This theme had large coverage with lots of participants engaging in tasks that involved rescuing animals (*n*=28), creating habitats or providing food (*n*=64), in addition to litter-picking and conservation volunteering (*n*=16). Nine participants also wrote about feeling part of nature, of appreciating what nature gives us, of interactions with animals and of developing a greater love for animals.

'I went to a beach to help the clean only to find there was no litter at all. I was so amazed and pleased so carried on to another where we took part. I am restricted in walking but managed to help'

Discussion

The evaluation showed that *30 Days Wild* campaign brought significant and sustained improvements to happiness, health, nature connectedness and conservation behaviours. Given the replication of these results from the previous smaller scale evaluation, this indicates that the campaign shows great promise as an intervention to have a lasting effect on wellbeing. The larger sample size allowed further important insights, namely that those who start with a lower connection with nature benefit most. Also key, is that lower connection with nature did not emerge as a factor in attrition, with the older age group and those with higher scores in conservation behaviours at baseline most likely to complete the evaluation. A final clear outcome is the need to frame such interventions in order to appeal to men and a range of ethnicities.

It is clear that *30 Days Wild* is a nature based intervention that brings benefits, but there is a need to better understand which participants' benefit most, which informs both how worthwhile the intervention is and how to develop effective interventions more widely in the future. A limitation to such campaigns is that they will appeal to those already connected with nature and those who are already functioning well. However, analysis revealed that those who began the campaign with a lower connection to nature, lower happiness and greater conservation behaviours showed the greatest improvements in scores. Those with a higher baseline connection with nature tended not to benefit, possibly due to ceiling effects. This shows that the intervention tends to bring people towards a higher connection, rather than reinforcing existing differences and widening the gap. This is supported by qualitative data from six participants who wrote that it was 'preaching to the converted' and that engaging with nature was something they already did every day. Clearly, targeting those with a lower connection to nature and greater capacity for change is the best way to achieve the greatest impact.

Analysis of attrition rates revealed that older participants and those with higher conservation behaviours at baseline were more likely to remain in the study. It should also be noted this is attrition from the evaluation, rather than the campaign itself. It was not possible to robustly assess whether other demographic variables such as gender or ethnicity had an impact on attrition as the campaign failed to attract many male participants or participants from ethnic minorities; an issue in itself. With regards to the gender disparity, further research is required, but a potential explanation can be inferred from the age range of the female participants. It is possible women are more likely to be caring for children and taking part in *30 Days Wild* as part of that role. However, the thematic analysis revealed favourite moments tended not to mention children. Further, this does not fully explain why men aren't taking part. Rather than being involved in less childcare there is evidence of a 'green-

feminine stereotype' (Brough et al. (2016). Men are less likely to have eco-friendly attitudes and behaviours than women and this has been explained by differences in personality traits. Brough et al. propose the green-feminine stereotype based upon evidence of greater need for gender-identity maintenance in men. Such evidence and theories can underpin further research into this issue.

The linguistic analysis provides some insight into what participants found most memorable during the campaign. Compared to the control library text, it can be seen that the most favoured wild moments included fewer personal pronouns, social and friends words, but more family and home words, supporting the notion above regarding gender disparity and childcare. There were more perceptual words; leisure, motion, seeing words were also higher than one would expect. This would suggest these moments were not particularly focussed on themselves or social situations, rather about perception and seeing, movement and leisure, perhaps at home with the family. Unexpectedly, given the results and benefits of nature on positive affect (e.g. Capaldi et al. 2014), feelings and positive emotions were lower than control text, although sad and anxiety related words were also lower, a finding that does relate to the wider research into the benefits of engaging with nature (e.g. Martyn and Brymer, 2016).

In line with previous research into the pathways to nature connectedness (Lumber et al. 2017), further thematic analysis of the qualitative data revealed that participants wrote mostly about their contact with nature and engaging with nature through the senses. Participants described using different senses such as sound, touch and smell to interact with their surroundings. They expressed an increase in focused attention to details they would normally have missed. For the theme of emotion, participants wrote about a reduction in stress, and an increase in positive emotions such as peace, calm and security. This can be contrasted with their mention of more activated emotions such as excitement, delight, happiness and

exhilaration. The experience of these two distinct types of positive affect in nature is in line with research by Richardson et al. (2016). Recently, Korpela et al. (2018) have noted that the role of nature in affect regulation is often overlooked. They show that there is a relationship between well-being and affect regulation. Richardson et al. (2016) explain this with reference to a neurophysiological model of affect regulation developed by Gilbert (2009) which shows how people can experience threat, drive and contentment. Emotional balance between these dimension helps bring well-being which helps account for the sustained impact of *30 Days Wild*.

The theme of meaning received less coverage, but participants did write about a sense of place and history and rekindling of childhood emotions. Also receiving less coverage was the theme of beauty. Again unexpected given its emergence in previous qualitative analysis of the good things in nature (Richardson et al. 2015) and beauty has been found to moderate the psychological well-being benefits of nature connectedness (Zhang et al. 2014). It should be noted though that previous research has analysed multiple sentences per participant for themes, rather than the themes of the favourite activity. Encouragingly, the theme with most coverage was the compassion theme; that is extending oneself to include nature and to feel motivated to care for it. Large numbers of participants wrote about taking part in conservation behaviours and feeling part of nature and interactions they had with animals. Although this may be biased by participants with higher conservation behaviours being less likely to drop-out. In sum, the qualitative analysis indicates contact with nature through the sense, emotion and compassion as the three pathways to nature connectedness activated during *30 Days Wild*.

This research is not without its limitations. Due to the public engagement focus of the campaign it was not possible to include more robust health and wellbeing measures which could reveal more about the intervention in terms of improving wellbeing and assessing cost-

utility. Although a large number began the study, the attrition rate was high. The resulting sample may therefore not best represent the population. It was not possible to robustly look at gender or ethnicity as covariates in this study as the campaign failed to attract a representative sample of males and those from ethnic minorities. The campaign tends to attract more females and further research is needed to establish the reasons for gender differences and to investigate approaches to encourage more men to participate. Further, there is a need to assess how much participants engaged, whether they completed a full 30 days of activities and how involved these activities were. Finally, it is possible that taking part may have biased participants. For example, being primed to provide more positive responses in the two follow-up surveys. However, there is little evidence to support such demand characteristic effects with awareness of research aims failing to impact on self-report responses (McCambridge et al. (2012). Further, it has been found that intensive follow-ups are required to produce small 'Hawthorne Effects' (McCarney et al. 2007). Regarding the qualitative analysis, it has been acknowledged that the *30 Days Wild* activity guides were provided for participants and these will have directed participant responses, but the analysis does at he very least provide an engagement check. Further inductive analysis of longer-term campaign diaries would be a productive avenue for further research. In sum, there remains a need for robust research evidence to support the use of nature-based interventions for well-being (Burls and Caan, 2005), but the results presented provide motivation, justification and valuable insight for such work.

In conclusion, there is a need to provide interventions to improve health and wellbeing that are accessible and cost-effective, and can reduce the burden on health and social services. Given the replicated and sustained improvements in health and happiness measures, there is good evidence that campaigns such as *30 Days Wild* are suited to this task. Such campaigns engage people with nature through the senses to recognise the emotions they

feel, often in a family context. Encouragingly, those less connected to nature benefited most, but there is a need to find ways to engage men, and retain younger people and those less concerned with conservation. In addition, with the decline in biodiversity and urbanisation of decision makers, there is an urgent need to engage in activities that will increase pro-environmental attitudes and behaviour, and there is some promise with the qualitative evaluation revealing many participants wrote about taking part in conservation behaviours. The *30 Days Wild* campaign shows that nature engagement campaigns can provide solutions for both issues, with the community sample and naturalistic setting making the data relevant to future interventions and policy.

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Table 1. Participant demographics at baseline, post and follow-up

	N	Mean age (SD)	Age range	Females	Males	BME
Baseline	6,179	40.51 (11.63)	18-89	5590	589	186
Post	655	44.19 (12.90)	18-78	599	56	27
Follow-up	273	44.62 (12.97)	19-76	243	30	17

BME = Black and Minority Ethnic.

Table 2. Pre, post participation and follow-up means and standard deviations for the five outcome measures

Measure	Baseline Mean (*SD*)	Post Mean*(SD)*	Follow-up Mean*(SD)*
Nature Connection (NCI)	79.27 (22.80)	88.23(15.41)	87.47(16.12)
Nature Connection (INS)	52.45 (24.01)	63.88 (21.17)	65.64 (22.14)
Conservation behaviours	2.74(.98)	3.01 (.84)	3.05 (.85)
Health	3.53 (.87)	3.84 (.86)	3.88 (.83)
Happiness	7.01 (1.71)	7.70 (1.45)	7.93 (1.33)

Table 3. Linguistic Inquiry and Word Count dimensions and frequencies

Dimension	30 Days Moments	Control Library
Word Count	8874	11,852.99
Words per sentence	22.7	25.07
Cognitive Processes	13.52	14.99
Perpetual Processes	4.46	2.36
Motion	4.23	2.06
Leisure	3.08	1.37
Seeing	3.07	0.87
Hearing	0.73	0.73
Feeling	0.43	0.62
Negative emotion	0.41	1.83
Sadness	0.15	0.39
Anxiety	0.08	0.33
Positive emotion	3	3.75
Home	1.45	0.56
Work	0.94	2.27
Family	0.79	0.38
Social Words	6.03	9.36
Friends	0.16	0.23
Personal pronouns	6.4	9.83