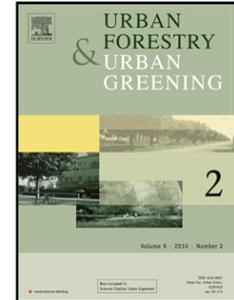# Journal Pre-proof

The good things children notice in nature: An extended framework for reconnecting children with nature

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The good things children notice in nature: An extended framework for reconnecting children with nature

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ABSTRACT

This research identifies themes emerging from a children's writing task, where they wrote about good things they noticed in nature over a five day period. Eighty four children aged nine to eleven participated, resulting in 847 written statements. Content analysis using an emergent coding approach identified ten themes, with "Active Animals" being the most frequently occurring theme. Combining the themes with Author (2017) pathways to nature connection provides an extended framework to inform children's activity programmes, design of school grounds and urban spaces, aiming to connect children with nature. Future research could extend the framework into a practitioner's tool kit.

KEYWORDS: Children, nature connectedness, noticing nearby nature, writing task, practitioners' framework

INTRODUCTION

Overview

Nature connectedness is a multi-dimensional psychological construct that is emerging as an important predictor of both mental well-being (e.g. Windhorst and Williams, 2015; Capaldi et al., 2017) and pro-environmental behaviours (Nisbet, Zelenski and Murphy, 2009). At a time of crises in both children's mental health and the health of the natural environment, attention has turned to improving children's connection with nature. Interest in the importance of reconnecting young people with nature has grown in recent years and campaigns to enhance

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this have been instigated by various groups and organisations from conservation groups to government (e.g. DEFRA's 25 Year Environment Plan, 25YEP, 2018) to. This concern is international, with Louv, (2006, 2010), highlighting the importance of allowing children the opportunity to connect with nature for their personal development, well-being and general physical and mental health, coining the term "nature-deficit disorder" to describe the way in which children appear to be becoming increasingly disconnected from nature. Coupled with this Louv goes on to outline the importance of increasing opportunities for children to spend time outdoors in nature, which can bring a variety of health, developmental and emotional benefits. This paper provides an extended framework to inform the design of those opportunities through combining the pathways to nature connectedness (Author 2017) with an analysis of the 'good things' that children notice in nature en-route to improved connectedness.

Nature connectedness involves the feelings people have in nature or towards nature, including concepts such as emotional affinity and inclusion of nature in self (Mayer & Frantz, 2004). The UK based Royal Society for the Protection of Birds (RSPB) recently commissioned research in to the measurement of nature connection in children (Bragg, Wood, Barton and Pretty, 2013) and this measure was subsequently employed in research commissioned by the RSPB which identified the links between nature connection in ten to eleven year olds and measures of health, life satisfaction, pro-environmental behaviour, pro nature behaviour (Author, 2016).

The benefits to health and well-being of nature connectedness in adults is increasingly well evidenced e.g. (Author, 2017; Capaldi, Dopko and Zelenski, 2014) whilst the benefits of nature exposure to health and well-being is well documented with children (Wells and Evans, 2003; Davis, Rae and Waite, 2006). The psychological rewards associated with nature connection broadly cover feeling good and functioning well, with specific outcomes such as

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vitality, personal growth, creativity and inspiration. In their meta analysis with adult samples, Capaldi, Dopko and Zelenski (2014) found a small but significant effect where higher levels of nature connectedness were associated with increased levels of positive affect, vitality and life satisfaction, whilst Author (2017) review the positive links between both nature exposure and connectedness for both general health and well-being. Therefore, simple interventions that may encourage people to spend more time in nature are valuable.

The present paper presents a content analysis of the writings of nine to eleven year old children who took part in a positive psychology intervention, writing about three good things in nature each day for a five day period. This intervention formed part of a larger study aimed at examining the utility of the intervention to increase nature connectedness and wellbeing. Exploration of the things the children wrote about will identify what they see as being good about the everyday nature they encounter, therefore providing insight into potential ways to engage children and enhance connection to nature through future interventions.

Pathways to nature connection and the values of biophilia

The biophilia theory describes an evolutionary perspective that humans are predisposed to have an innate biological need to affiliate with nature, where opportunities for survival abound, through provision of food, water and shelter (Wilson, 1984; Kellert, 1993). Kellert (1993) identified 9 values of biophilia which provide a framework through which to understand the different ways in which people experience and express connection to nature as shown in table 1.

*******Table 1*******

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These values were examined by Author, (2017) in relation to engagement with nature and nature based activities, leading to the identification of five pathways through which people may experience connection to nature. This research demonstrated an increase in nature connection through the operationalisation of these pathways during a walking intervention where the greatest increases in nature connection were seen in participants walking in nature environments as compared to the built environment. The five pathways identified by Author (2017) are shown in table 2 which highlights the relationship between the pathways and Kellert's biophilic values.

*******Table 2********

Author's, (2017) go on to suggest that the five pathways to nature connection provide an alternative to the traditional frameworks and values, highlighting in particular, the absence of a pathway to nature connection through knowledge and identification. In their research, knowledge and identification did not emerge as a pathway to nature connection and did not appear to be related to increased nature connection. In conclusion they suggest that researchers and practitioners wishing to engage participants with nature should focus activities around these pathways, rather than using knowledge and identification based activities. The present research will consider if these pathways emerge through the children's nature writing and how the emerging themes may be used in conjunction with these pathways to inform potential interventions which might encourage children to connect with nature.

The positive benefits of short writing interventions

The psychological and health benefits of short writing interventions are well documented (Smyth, 1998; King, 2001; Burton and King, 2004; Frattaroli, 2006). Several studies have used the positive psychology intervention of writing three good things a day (e.g. Rippstein-Leuenberger, Mauthner, Sexton and Schwendimann, 2017. This is a brief intervention and

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requires participants to simply write down three things that were good about each day, over a

period of a week or two. This intervention has been found to increase happiness and decrease

depression (Seligman, Steen, Park and Peterson, 2005). This ability to be aware of positive

things has been shown to be a strategy that results in increased well-being and showing

appreciation for the surrounding environment and positive things in life, resulting in

increased positive effect. Bringing about a positive state equips people with better coping

resources which subsequently improve their psychological and physical health (Frederickson,

2004). Much of the research in this area has been conducted with adult samples (Burton and

King, 2004, 2008; Author, 2017) whilst the present study extends this research to a sample of

children.

The idea of a brief and easy task is attractive in many respects for both participants and

therapists. It has been suggested that the amount of writing time does not reflect the time

spent thinking or processing the information written and research has found benefits from

writing about a positive life experience for just two minutes for two days (Burton and King,

2008). Further research with adults expanding the writing task to one focussed on 3 good

things in nature has shown promising results regarding enhanced connection to nature and the

well-being benefits outlined above (Author 2017). Expanding this research to focus on

children is a logical step forward and using this research to explore the variety of good things

children notice in nature will provide greater insight into their everyday perceptions of nature.

Noticing everyday nature and the mundane

Given the increasing concern that children are spending less time playing outdoors in nature

(Louv, 2006; 2010) alongside the increasing urbanisation (Barnosky and Kraatz, 2007) and

way in which people may be living lives less connected with the natural world, it is noted that

engagement with nature takes place increasingly within urban settings (Dunn, Gavin,

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Sanchez and Soloman, 2006). It is therefore important to identify ways in which children may be encouraged to connect with nature. Newman and Dale, (2013) highlight the increasing importance of mundane nature to modern society which may strengthen ecosystems and social relations. They suggest people may be able to reconnect with supportive ecosystems through noticing mundane nature, identifying four types of mundane nature: remnant nature, referring to undeveloped spaces such as river banks or uncultivated parks; accidental nature, along roadsides, or abandoned spaces; cultivated nature such as living walls and roof top gardens; and finally, nature as display, including parks, gardens, zoos and aquariums. The importance of nearby nature is also noted by Kaplan and Kaplan (1989) and it is likely that this type of nature may be more accessible, and any activities to draw it to the attention of the population may be helpful in increasing nature connection. It is possible that these types of mundane nature may be noticed by the children completing the present writing task and this is something that will be considered.

A short writing intervention was employed by Author (2015) where adult participants were asked to note three good things in nature each day over a five-day period. Following content analysis, a total of ten themes emerged as shown in table 3. Links can be seen between these themes and elements of the pathways to nature identified by Author 2017) for example the beauty pathway clearly maps onto the beauty or wonder of nature theme. Similarly, the emotion pathway maps onto the good feelings from nature. The present research will extend these findings to themes emerging when children complete the three good things in nature writing task.

*******Table 3********

It is possible that the children in the present study will write about good things in nature which reflect similar themes to those emerging from Author's (2015) work with adults. This research used an inductive coding approach in which themes were identified within the writing without a predetermined hypothesis or framework in mind. A data driven approach led to the identification of various aspects of the good things in nature including beauty of nature, colours and sensations, fauna and flora, weather and changes in the seasons. Such themes may also be present in the children's writing in their *three good things in nature* writing task. In addition, it is possible that the values of biophilia may emerge from the children's nature writing. However, it is also important to note that children do not necessarily share the same concerns and values as adults (Kellett, 2005). Consequently, the themes to emerge from the children writing task may differ considerably to those emerging from the adult research. In response, this paper adopts a child centred approach advocated by Faulkner and Joubert (2006) which gives children a voice and enables them to take the lead in identifying aspects of nature which matter to them.

The proposed research is novel in two ways. Firstly, writing about three good things in nature with adults is known to increase nature connectedness (Author, 2017) and several emergent themes were identified (Author, 2015), the present research extends this area to children and will allow comparison between the adult themes and those arising from the children's writing. In addition, the present research will utilise an emergent coding approach to identify themes relevant to children and consider the possible relevance of the pathways to nature identified by Lumbar et al. 2017 and Kellert's (1993) biolphilic values. Exploration of aspects of mundane nature as identified by Newman and Dale, (2013) will also be considered. The present research also affords the opportunity to consider ways in which children might be encouraged to engage with nature through themes arising from their writing task.

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THE STUDY

The content of the "three good things in nature" writing task undertaken by children over a five-day period will be analysed and will provide insight into the things in nature that children notice on a daily basis.

Method

Participants

In total, 84 primary school children aged nine to eleven years, with a mean age of nine years eleven months, in school years five and six took part. The participants were evenly split across gender with 42 girls and 42 boys completing the nature writing task. These children also took part in a larger study which explored a variety of questionnaire data in addition to the writing task reported here, where an additional 82 children who also participated were assigned to a control writing condition, the details of which are reported elsewhere.

Procedure

An invitation to participate issued to head teachers at several state primary schools across the Derbyshire and Nottinghamshire, UK, resulted in three schools agreeing to take part. Parents were contacted via the schools and were given the opportunity for their children to take part or opt out of the research. They were provided with information about how data would be stored and used, how to opt out and who to contact if they had any concerns or questions. Further consent was gained from the children themselves at the start of data collection. The schools ranged in size with the smallest school having one year five/six class (aged nine to eleven years) and the largest having four year five/six classes. Parents were contacted via the school to inform them of the research and seek informed consent.

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Schools agreed the dates at which the research would take place and all sessions took place between the months of March and June. On a Friday the researcher attended the schools, briefing the teachers and participating children about the study. The children in the nature condition were asked to notice good things in nature during the weekend as they would be asked to write about them the following Monday. In contrast, children in the control condition were asked to notice any things of interest over the weekend, rather than good things in nature. Children also completed a number of questionnaires and provided demographic data at this first time point. On the following Monday, participating children were issued with a booklet where they could record the three good things they noticed about nature each day. The task guidance asked them to "*Think back over the last 24 hours and write down three good things you noticed in nature each day. Things you list can be small things or quite big things. For example, it could be that you noticed how beautiful a butterfly was as it flew by, or it could be that you noticed how wonderful the view of the trees and fields nearby looked. It could be something very small like noticing the song of a garden bird. Please write one sentence for each good thing in nature you can remember.*" Children in the control condition were issued with similar instructions but were asked to write about any three things they had noticed. The examples did not involve nature. Children in both conditions completed the respective writing tasks as the start of each school day for a five day period, Monday through to Friday. At the end of the final writing task, children in both writing conditions completed the questionnaire measures for a second time. Following completion of the data collection children were debriefed and a debriefing letter was also sent home to their parents reiterating information about the study and reminding them of their right to withdraw post study should they wish. Approximately two months after the second set of data was collected, researchers visited the schools again to collect the questionnaire data at a third time point. A further debrief was issued after the final data was collected. At

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this point, the schools were presented with a gift pack containing nature related items, such as bird feeders, nest boxes and a variety of nature related books to thank them for their co-operation with the study.   Schools were not aware that they would be provided with these goods at the outset of the study so no coercion was involved.

Ethical Considerations

The study was approved by the University of Derby's Psychology Research Ethics Committee and conformed to the British Psychological Society's (BPS) Code of Conduct and Ethical Principles (BPS, 2009).

Coding the data

Data from the 84 children asked to notice the good things in nature was included in the analysis resulting in a data corpus of 847 sentences. Some missing data occurred due to absence from school, but any data provided was included in the analysis.   Content analysis, informed by an emergent coding approach, was used to generate themes and code the data (Krippendorf, 1980; Weber, 1990). This method provided a systematic technique suitable for coding a large qualitative data set. It also facilitated a data driven coding approach which enabled the generation of themes pertinent to the participants rather than the researchers' expectations.

 In line with the procedure outlined by Haney, Russell, Gulek, and Fierros (1998) the first and second authors independently read through 50 items from the data set and grouped the items into coherent themes. At this point the first and second authors met to compare the themes generated and a good level of agreement was discovered. Minor disagreements were discussed and resolved. Each theme within the agreed list was given a title and a concise summary of the theme was written. The agreed themes were then used by the researchers to

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independently code a further 20 items. This enabled minor amendments to be made to the themes and subsequently a further 20 items were independently coded. A third meeting between the first and second authors revealed an excellent level of agreement. This enabled the themes to be finalised and a coding manual, which provided a description of each theme and examples of items that would be coded in the theme, was written.

 In order to establish inter-rater reliability, the first and second authors use the coding manual to independently code 150 randomised items from the wider data set.   Ten themes were identified, and Kappa coefficients were calculated using the Landis and Koch (1977) guidelines. These suggest that for a kappa coefficient of 0.01-.20 the strength of agreement is slight; 0.21-0.40 fair; 0.41-.06 moderate; 0.61-0.80 substantial; and 0.81-1.00 almost perfect. Six themes had almost perfect agreement, three had substantial agreement and one theme had moderate agreement. This is likely due to only three instances of this theme occurring within the 150 item reliability sample. Kappa coefficients ranged from 0.49 through to 0.94 with a mean value of 0.77.

Further discussion took place between the first and second authors regarding those items where there was a difference of opinion regarding theme classification. Agreement over the most appropriate theme was reached for these items. Given the overall high level of agreement the second author then used the coding manual to code the whole data set. An eleventh theme of "other" was included in the coding manual to account for any items that did not fit within the ten agreed themes.

Results

The ten specific themes generated through content analysis are detailed below along with the additional other category.

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Active animals

Items within this theme recorded the child's observation of animals with reference to their movement. Comments within the theme related to (i) flying 'saw a bird of prey flying', (ii) movement on the ground 'a ladybird crawling across a daisy in a garden', (iii) eating 'I saw pigeons taking the robin's food' and (iv) species specific activity 'I saw a woodpecker pecking at a tree'.

Weather

Items within this theme related to the child's observations of a specific aspect of the weather or an interaction between the weather and the surrounding landscape. Comments in this theme commonly referred to the (i) sun 'I saw a sparkling spiders web that shimmered in the sunlight after it rained', (ii) wind 'The trees blowing in the wind' or (iii) cloud formations 'I saw the clouds form a dragon shape'.

Description of a specific animal

Items which made reference to a specific animal without wider contextual information surrounding the habitat or movement were coded in this theme. There was a mix of statements which (i) simply stated an animal that the child had encountered 'I saw a buzzard' and (ii) gave an accompanying description 'elegant butterflies.'

Sounds of nature

This theme captured the different sounds that children reported when engaging with nature. Largely the theme was dominated by birdsong 'I heard the garden birds sing' but reference was made to other sounds from the wild 'frogs croaking' and domestic settings 'my pet was howling to the harmonica'.

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Description of a specific plant

Items that simply mentioned a specific plant 'I saw a sunflower' or referenced a plant with an accompanying description 'pretty bushes' were grouped together in this theme.

Appreciation of landscape

This theme captured references to a specific aspect of the landscape that the child described 'There were millions of shiny pebbles' or an account of a particular view that child had experienced 'I also noticed a really nice view at Matlock on Sunday with all the cliffs in the view and all sorts'.

Changing seasons

Items which documented the changing seasons were collated in this theme. The majority of comments related to changes in trees and plants in terms of growth 'I had saw bright red cherries ripen' or death 'I saw a leaf fall off on oak tree'. A small number of items explored changes in animal behaviour 'more and more animals are coming out of hibernation' and changes in the environment 'getting darker later than usual'.

Animals in habitat

This theme grouped together all the items which placed animals in a particular habitat without making reference to movement. Comments within the theme made reference to wild habitats (i) 'I saw a grass snake in a bush' (ii) farming environments 'last night I saw cows in a field' and (iii) domestic settings 'I saw a fly in my Grandma's living room'.

Growth

This theme grouped together items that referred to growth, which was not linked to seasonal change. Items explored growth in (i) farming 'I saw the crops growing in the field' (ii) wild 'I

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noticed that the flowers in the meadow were growing' and (ii) domestic contexts 'I saw flowers grow in my mama's garden'.

Feelings from nature

Items in this theme related to the feelings that children reported when engaging with nature. Comments all referred to positive states such as feelings (i) of peace and relaxation 'I walked through the woods and noticed how quiet and relaxing it is' and (ii) happiness and fun 'I have know test a bee which made me happy'.

Other

Items which did not fit into the themes 'I like seeing the people have carved faces into trees' and items that were not clearly expressed 'I seen the slaane' were collated into this theme.

Frequency

The frequency at which each theme occurred is outlined in table 4. This shows the most frequent themes to emerge were *active animals*, *weather, description of a specific animal* and *sounds of nature*. Theme which emerged least frequently was feelings from nature.

*******Table 4********

Comparison between the themes and Author's (2015) themes to emerge from a similar writing task with an adult sample was undertaken. The results are presented in table 5.

*******Table 5********

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There is considerable overlap between the child and adult samples. Whilst the theme titles may differ slightly it is clear that the content of the children's writing task and that of the adults, share a number of similarities. Three additional themes also emerged from the adult sample which were not reflected in the children's writing task, these were: *colours of nature*; *reflections on the weather* and *wildlife interacting.*

Further comparison between the themes was made with Lumber et al's (2017) pathways to nature connection and Kellert's (1993) values of biophilia. Details of this comparison are shown in table 6 and highlights overlap between Lumber et al's pathways of contact, beauty and emotion with the themes of *sounds of nature*, *appreciation of landscape and feelings from nature* respectively. Interestingly within the two themes of description of a specific animal and description of a specific plan, the pathways of both contact and beauty were noted as many children commented on aesthetic elements of the animal or plant they described. Evidence of this is shown in the descriptions of these themes at the start of the results section. The other themes did not appear to relate directly to Lumber et al's pathways. Of Kellert's nine values of biophilia, ecologistic-scientific appeared to reflect the themes of *description of a specific animal* and *description of a specific plant*, whilst the aesthetic value was reflected in the theme *appreciation of landscape, description of a specific animal* and *description of a specific plant.*

Conclusions

The theme to emerge most frequently was that of *active animals*, being identified in nearly a quarter of the written statements. The observation of animals in the natural environment is clearly one which children identify with very frequently, particularly as two further biotic (living organism) themes relating directly to animals also emerged: *Description of a specific animal*; and *animals in habitat*. Taken together these three themes account for just over 40%

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of all the nature statements and abiotic, non-living parts of the ecosystem, were less frequent. *Weather* emerged as the second most referred to statement, with the *description of a specific animal; sounds of nature;* and *description of a specific plant* all following relatively closely. Less frequently mentioned were *appreciation of the landscape; changing seasons; animals in habitat;* and *growth. Feelings from nature* was mentioned least frequently.

Comparison of the themes with those emerging from Author's (2015) research with adults highlights close overlap for several themes. *Active animals* and *animals in habitat* are both reflected in Author's *wildlife active in habitat*; whist *weather* clearly overlaps with Author's *effect of weather*. Description of a specific animal and *description of a specific plant* both appear to overlap with Author's *specific aspects of nature*, and in some instances, both themes also contain references to beauty, thus providing overlap with Author's *beauty and wonder of nature. Sounds of nature* is reflected in *sensations of nature* and *Appreciation of landscape* is reflected in Author's *beauty of wonder of nature*, whilst *changing seasons* and *growth* are both reflected in *growth and temporal changes. Feelings from nature* is also reflected in Author's *good feelings from nature*.

It is reassuring to note the close overlap between the themes emerging from the children's three good things in nature writing task and those to emerge from Author's (2015) adult writing task. Examination of the descriptors associated with each theme indicates a higher level of complexity in the adult writing compared with the children's, which is to be expected. Three further themes also emerged in Author's adult writing task: *colours of nature*; *reflections on the weather* and *wildlife interacting.* Whilst some of the children's writing did refer to colour, these were coded within other stronger themes and colour did not emerge as a strong theme from the children's nature writing. These three themes which did not emerge may reflect the more complex adult writing when compared with the children's observations. In sum, the consistency in the good things in nature noted by children and

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adults findings provide an indication that there can be similarity in the broad themes used to engage children and adults with nature for connection, although specific approaches will be age dependent.

The three good things in nature intervention is designed to increase nature connectedness and there is value in identifying the pathways to nature connectedness that have been activated. The comparison between themes and Lumber et al's. (2017) pathways to nature connection, which are a subset based on Kellert's (1993) nine values of biophilia revealed some overlap. Table 6 shows where overlap could be identified, with three of the five of Lumber's pathways and themes showing overlap along with wider and associated values of biophilia. The symbolic meaning and moralistic compassion aspects of Kellert's values and Lumber et al's. pathways to nature are deeper relationships and unlikely to emerge through the children's *three good things in nature* writing task which by design focussed on noting good things, rather than deeper forms of relationship. This analysis suggests that the three good things in nature intervention taps into the contact, beauty and emotion pathways to nature connectedness.

*******Table 6********

Importantly, the current research also provides an extended framework for practitioners creating activities to engage and connect children with nature. That is, the existing five pathways and ten themes produce fifty potential approaches, providing an extended framework to support potential activity development (Table 7). This is particularly worthwhile as the ten content themes are known to be the 'good things' in nature as seen by children. As an example, an activity could be focussed on active wildlife, with elements that draw out the deeper relationships of meaning and compassion not seen when simply noting the good things. Children can be engaged in activities that cover the needs of the wildlife,

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asking why they are active (e.g. gathering food) and moving onto to care, habitats and appropriate feeding of wildlife. For the meaning theme, the good thing of active wildlife can be explored with activities that allow deeper reflection on why wildlife being active is a good thing or exploring active wildlife through artistic pursuits. This extended framework does not aim to provide a detailed list of activities, rather it provides a structure through which activities can be developed to suit the given circumstances.

The importance of "mundane nature" in urban environments was highlighted by Newman and Dale (2009; 2013) arguing that as over half the human population interact with nature primarily in urban settings, it is increasingly important to be aware of the nature present within these urban settings. The schools in the present study were located in a mixture of urban and semi-rural areas, providing plenty of opportunity for the children to notice "mundane nature", and show that it is far from mundane. Given the mix of good things in nature that were noticed by the children, they appear to be very aware of the nature around them, even if some of that nature might be considered mundane due to the environmental setting in which it was observed. It appears that asking the children to notice 3 good things in nature and write about them, drew their attention to the nature around them. Given the positive benefits of nearby nature, such as increased life satisfaction and happiness (Brereton, Clinch, and Ferreira, 2008), it is good to see what a range of positive aspects of nature the children noticed and wrote about. This indicates that nature can be accessible to everyone, as many of the children wrote about nature they noticed on the way to and from school and whilst going about their daily activities.

The present research was not without limitations. Instructions provided for the writing task included examples of what the children might write about. This was necessary to maximise the effectiveness of the writing intervention, but it is possible that they may have influenced the children's writings. This is also noted by Author, (2015) in their work with adults. In

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line with Author's work, the examples used for guidance were theoretically based, for example referring to beauty which represents the aesthetic value of biophilia (Kellert, 1993). The instructions used birdsong as an example. Themes which reflected the instructions did emerge through active animals, appreciation of the landscape and sounds of nature. However, a number of additional themes also emerged independently of the instructions. This adds confidence that the instructions did adversely impact on the content of the writing task. It should also be noted that the study took place during April through to July, where nature goes through a period of rapid growth and change. Growth and seasonal changes did emerge as themes from the writing task, however these seasonal changes do occur throughout the year.

For the future, further research into the three good things in nature writing task could be conducted with children living in densely populated urban settings such as inner-city areas. Nature of some form will be present in these areas, and by drawing the children's attention to everyday nature may bring about some of the positive benefits that are well documented. Steps to increase children's awareness of the nature present in their immediate neighbourhood may bring positive benefits for both the children, their families and society more generally, as their interest in the nature around them increases. The use of the combined good things and pathways can also be used to develop and test specific interventions which take into account the good things children notice in everyday nature in their local environment.

However, there is also a need to go beyond making the most of the pockets of nature currently available, to providing a greater variety of nature for the benefit of both people and wildlife. The results presented are novel in that they provide initial insight into the components of school grounds and urban green spaces that are valued by children and can provide the foundations for an individual's mental wellbeing. Urban planners should

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recognize that encounters with biotic elements are important and provision of viable habitats is essential for human well-being.

In conclusion ten distinct themes emerged from the good things children notice in nature. At a time when children's disconnection from nature is an international concern and Government initiatives (e.g. Nature Friendly Schools programme in the UK, DEFRA 25 YEP (2018)), these themes provide insight into the types of nature children notice. Animals, including birds/insects etc., featured strongly in their writing, as did the weather, landscape and seasonal changes/growth. This provides by informing the precise good things individuals are grateful for. Combined with the pathways to nature connectedness this research provides a wider framework of micro-activities for programmes and green spaces designed to connect children with nature, for both their own and nature's well-being.

AUTHOR CONTRIBUTIONS

Dr Caroline Harvey was responsible for the initial conceptualization of this research, design of the methodology, data collection, analysis and writing of the original draft, review and editing.

Dr Jenny Hallam was responsible for leading the formal analysis of data, writing the original draft, review and editing.

Dr Miles Richardson was responsible for the initial conceptualization of this research, the extended framework and writing through reviewing and editing.

Rachel Wells was responsible for data collection and writing through reviewing and editing.

DECLARATION OF INTERESTS

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The authors have no competing interests.

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Table 1: The nine values of Biophilia, (Kellert, 1993).

Value	Description
Utilitarian	Material benefits gained from the natural world.
Dominionistic	A desire to control and master nature for functional advantage, increasingly destructive.
Negativistic	Antipathy, fear and aversion from nature, particularly threatening aspects.
Ecologistic-Scientific	The urge to understand nature and its interconnections through systematic study.
Symbolic	The symbolic use of nature reflected in the development of language and thought.
Humanistic	Deep emotional attachment expressed as love and care of individual elements of nature.
Naturalistic	Satisfaction from contact with nature. Encompasses the complexity and diversity of nature and the resulting fascination, wonder and awe.
Aesthetic	The beauty of nature and the natural landscape. Includes the awe of physical appeal.
Moralistic	Affinity and reverence for nature leading to ethical responsibility. Includes harmony, connection and spiritual meaning in life.

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Table 2: Pathways to nature and associated biophilic values, Author (2017).

Pathway to nature	Definition	Biophilic value
Contact/Senses	Direct engagement with nature through the senses.	Naturalistic
Beauty	The perception of aesthetic qualities including shape, colour and form that please the senses.	Aesthetic
Meaning	Using nature of natural symbolism to communicate a concept that is not directly expressed.	Symbolic
Emotion	An affective state or sensation that occurs as a result of engaging with nature.	Humanistic
Compassion	Extending the self to include nature, leading to a concern for other natural entities that motivates understanding and helping/co-operation.	Moralistic

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Table 3: Themes emerging from the 3 good things in nature writing task (Author 2015).

Theme	Description
Sensations of nature	Reflects the sensory experience of nature "the smell of cut grass"
Growth and temporal changes	References to changes in the seasons "soft new leaves emerging on our beech hedge"
Wildlife active in habitat	Animals engaging in some kind of activity within habitat "squirrel running into a tree"
Specific aspects of nature	Reference to a specific plant or aspect of nature within little or no context " a purple thistle; bright rainbow"
Beauty or wonder of nature	Reference to the beauty or wonder of nature "the intricacy of a spider web on a bin"
Effect of weather	Effect of the weather on plants or other aspects of nature "the breeze in the trees"
Colours of nature	Statements with a specific emphasis on colour "green on the leaves"
Reflections on the weather	These statements included a judgement of the weather "how nice the weather was; dramatic hail storm this morning"

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Wildlife interacting	Statements referring to animals engaging in an activity with at least one other animal or acting together harmoniously "a blackbird and thrush pulling worms out of the ground"
Good feelings from nature	Reference to nature creating positive feelings "people smiling at the sun; walking by the brook at university was very peaceful"
Other	These statements did not fit into themes, and did not form a theme of their own "a nice house made of wood"

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Table 4: Table outlining the frequency and percentage of each of the 11 themes identified in the data set.

Theme	Frequency	Percentage
Active animals	208	24.6
Weather	106	12.5
Description of a specific animal	94	11.1
Sounds of nature	91	10.7
Description of a specific plant	79	9.3
Appreciation of landscape	69	8.1
Changing seasons	66	7.8
Animals in habitat	55	6.5
Growth	48	5.7
Feelings from nature	17	2.0
Other	14	1.7

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Table 5: Comparison of themes with Author. (2015)

3 Good Things in Nature themes	Author (2015) themes
Active animals	Wildlife active in habitat
Weather	Effect of weather
Description of a specific animal	Specific aspects of nature
Sounds of nature	Sensations of nature
Description of a specific plant	Specific aspects of nature
Appreciation of landscape	Beauty of wonder of nature
Changing seasons	Growth and temporal changes
Animals in habitat	Wildlife active in habitat
Growth	Growth and temporal changes
Feelings from nature	Good feelings from nature
Other	Other

Table 6: Comparison of the 3GT themes with Author. (2015); Author (2017) and Kellert (1993)

3 Good Things in Nature themes	Author (2017) pathways	Kellert's (1993) nine values of biophilia
Active animals		
Weather		
Description of a specific animal	Contact/Beauty	Naturalistic, Ecologistic-scientific, Aesthetic
Sounds of nature	Contact	
Description of a specific plant	Contact/Beauty	Naturalistic, Ecologistic-scientific, Aesthetic
Appreciation of landscape	Beauty	Aesthetic
Changing seasons		
Animals in habitat		
Growth		
Feelings from nature	Emotion	Humanistic
Other		

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Table 7: Fifty potential ways to engage children with nature for connectedness. Indicative examples of how the pathways to nature connectedness and the good things in nature can be combined.

	Pathways to nature				
3 Good Things in Nature themes	Contact/ Senses	Beauty	Emotion	Meaning	Compassion
Active animals	Watch a bird take off	Notice the beauty of movement	Notice the joy and calm of flight	How can active animals be used to communicate ideas?	Ask why the animals are busy?
Weather	Go out & experience the rain	Find a beautiful cloud	Enjoy the sunshine	Is sunshine happy and rain sad?	Help birds in cold weather
Description of a specific animal	Look and draw an animal	Describe the colours and beauty	Describe your feelings about the encounter	Do different animals mean different things?	How can the animal be helped?
Sounds of nature	Listen to birds sing	Do you find some birdsong more attractive?	How does birdsong make you feel?	Find a birdsong to communicate an idea	Why do birds sing?

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Description of a specific plant	Look and draw a flower	Describe its beauty	Which plants make you feel happy or calm?	What do different flowers mean to you?	Take care of a seedling
Appreciation of landscape	Look around you at the sky and the land	What makes landscapes beautiful?	Do woods feel different from fields?	What ideas do hills represent?	Is the landscape healthy?
Changing seasons	Catch a falling leaf	What's beautiful about the change of the seasons?	Do different seasons bring different emotions?	What are the signs of spring?	What do the seasons mean for wildlife?
Animals in habitat	Find a bug in some grass	Are animals in their home more beautiful?	Do you have a close bond to wildlife in its home?	Use metaphors to describe wildlife at home	Consider why this is its home
Growth	Watch how new leaves change each day	When does a flower become beautiful?	Do your feelings about a plant change as it grows?	What ideas can growing plants represent?	What do plants and wildlife need to grow?
Feelings from nature	Find something calm and something exciting	How does the beauty of nature make you feel	Identify emotions in nature rather than plants & wildlife	Use plants and wildlife to represent different emotions	How does it feel to look after nature?

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