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The good things in urban nature: A thematic framework for optimising urban planning for nature connectedness

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Highlights

- Adults (*n*=228) used an app to notice the good things in green spaces
- Notes were thematically analysed producing ten themes.
- Key themes were: wonder at wildlife, appreciating street trees, and awe at views.
- There are implications for optimising city planning and green health interventions.

Abstract

Green interventions which connect people with nature to improve wellbeing are increasingly being applied to tackle the current crisis in mental health. A novel Smartphone app intervention was evaluated amongst (n=228) adults including (n=53) adults with common mental health problems, with the aim to improve wellbeing through noticing the good things about urban nature. The app prompted participants once a day over 7 days to write notes about the good things they noticed in urban green spaces. Notes were thematically analysed and ten themes emerged. The three themes with the greatest representation were: i) wonder at encountering wildlife in day-to-day urban settings; ii) appreciation of street trees; and iii) awe at colourful, expansive, dramatic skies and views. Through combining the above themes with the pathways to nature connectedness this paper provides an extended framework of activities to inform activity programming, nature engagement media content, and 'green health' interventions. Moreover, the findings have strong implications for optimising city planning, design and management for the wellbeing of both humans and wildlife.

Introduction

There is currently a mental health crisis, affecting more than one in six people across the European Union in any given year and costing 4% of the GDP (OECD/EU, 2018). In the UK alone, the Department of Health (2011) indicated that mental illness constitutes 22.8% of the burden of disease and is the most common disability in the country. Increasingly, nature-based solutions for the crisis in mental health are being utilised; for example, through *Shinrin-Yoku*, or Forest Bathing (Hansen et al., 2017; Authors et al., 2016a) or other self-guided woodland walks aimed at reducing stress and increasing the connection between self and nature (Korpela et al., 2016, 2017; Tyrvainen et al., 2014). So-called 'green interventions' are more frequently being offered as social prescriptions in an attempt to tackle mental health and reduce demands on health providers (such as the NHS in the UK (Bragg & Atkins, 2016)). In a programme of research aiming to Improve Wellbeing through Urban Nature (IWUN), a Smartphone app wellbeing intervention was developed which prompted users to notice the good things about nature in their city, thus cultivating gratitude for one's surroundings. The intervention lead to clinically significant improvements in mental health through increasing nature connectedness and positive affect (Authors et al., 2019a). Understanding the 'good things in nature' that produced the improvement in mental health is important. Such knowledge concerning quality of space and outdoor experience can help inform new and improved interventions and can further ascertain the most beneficial themes to focus on. The current paper aims to identify common themes in the good things in nature identified by participants. Further, those themes are combined with the pathways to nature connectedness to develop a framework for the generation of activities that can inform efforts to connect people to the natural world.

Gratitude interventions and three good things in nature

The Smartphone intervention described here is based on brief gratitude interventions. Practising gratitude in controlled psychological intervention settings has been shown to have lasting effects on dispositional gratitude and psychological wellbeing (Seligman et al., 2005). Seligman's 'three good things' intervention has been successful in increasing positive affect. The three goods things approach has recently been adapted to target nature connectedness (i.e. how close an individual's relationship is with nature) and associated wellbeing through noticing 'three good things in nature' over 7 days in a web-based intervention (Authors & Sheffield, 2017). The comparatively recent psychological construct of nature connectedness was targeted owing to the benefits to mental wellbeing, broadly feeling good and functioning well (Pritchard et al., 2019) and to pro-environmental behaviour (Mackay & Schmitt, 2019).

Authors et al., (2015) completed a content analysis of the thousand single sentence statements written by participants when asked to note three good things in nature each day for five days in a range of environments, rural to urban. From these statements, ten themes emerged: i) Sensations (sounds, smells, feelings of grass); ii) growth and temporal change (blooming flowers); iii) effects of weather; iv) reflections on the weather; v) colours of nature; vi) wildlife being active in their habitat; vii) wildlife interacting with each other; viii) wonder at the beauty of nature; ix) good feelings from nature; and x) specific aspects of nature.

Beyond the simple 'good things in nature' intervention, using the nine values of biophilia as a framework, Lumber et al., (2017) identified five pathways to nature connectedness: i) contact through the senses; ii) emotions; iii) appreciation of nature's beauty; iv) finding meaning in nature and v) displays of compassion for nature. These five types of activity were found to be related to nature connectedness, whereas activities related to utility, dominion, science and fear were not. Therefore, these five pathways to nature

connectedness provide a framework for the design of nature engagement experiences. For example, they informed the design of the activities suggested as part of The Wildlife Trusts *30 Days Wild* campaign. The pathways also provided a framework for qualitative analysis of the campaign (Authors et al., 2016b). Themes emerging from the campaign included the senses and referred to colours, sounds, sensations and the experience of emotions relating to awe and relaxation (Authors et al., 2016b). Through combining the themes generated when analysing the good things in nature with the pathways to nature connectedness there is potential to develop an extended framework containing activities that can inform specific efforts to connect people to urban nature. Therefore, through using themes in the current analysis and relationships identified in previous research (Lumber at al., 2017) this approach is specific to improving nature connectedness rather than exposure to nature. This activity and nature connection focus differs from wider research into types of natural environment associated with restoration outcomes (Korpela & Hartig, 1996).

Enquiry into how nature is regulating and promoting wellbeing through the restoration and regulation theories below is of great value in elucidating how to optimise contact and connection with urban nature. By highlighting the essential role and value of nature in human wellbeing, the mechanisms are also important in terms of preventing further loss of both urban nature interactions and engagements of future generations with the natural world. The mechanisms accounting for the benefits of green interventions and exposure to nature are often explained by restoration based theories such as, Kaplan's (1995) Attention Restoration Theory (ART) and Ulrich's (1979) Stress Reduction Theory (SRT). ART proposes that being in, and looking at, nature allows the brain to recover from mental fatigue and restore attentional focus (Kaplan, 1995). Ulrich's (1979) Stress Reduction Theory (SRT) proposes that nature can benefit wellbeing through its stress reducing properties. However, there are indications that the benefits of nature connectedness are not explained by these

theories (Capaldi et al., 2017; Gidlow et al., 2016), in part because it has also been noted that nature brings benefits when attentional or emotional resources are not depleted (Beute & De Kort, 2014). Johnsen et al. (2013) found that people seek out nature for emotional regulation when happy *and* sad and the role of nature in affect regulation is often overlooked (Korpela et al., 2018). Authors

Returning to the mechanisms by which nature connectedness brings wellbeing, there has been little research in this area. However, it has been suggested that our relationship with nature is central to the process of emotional regulation (Jordan, 2009) and initial results suggest that emotional regulation mediates the relationship between nature connectedness and wellbeing (Authors and Authors, 2018). Authors and Authors, (2018) also found that engagement with nature's beauty mediated the relationship between nature connectedness and wellbeing. A further likely factor is positive affect and noting three good things is known to increase positive affect (Authors et al., 2019a). The broaden and build theory (Fredrickson 2004) proposes that positive emotions have an important role in optimal functioning over the long term, enabling the individual to build resources and grow psychologically.

Further research of people's daily encounters with nature is needed to explore more fully the mechanisms behind the impact of nature connectedness on wellbeing. One way of measuring daily nature connection habits is through the use of mobile technology. Smartphones provide a unique data collection tool allowing for 'experience sampling technique' or recording of momentary everyday experiences, providing some of the best evidence on the influences of a variety of variables on wellbeing (Shiffman et al., 2008). It is through a Smartphone app that we aimed to further elucidate the mechanisms between nature connectedness and wellbeing in an urban environment.

Shmapped

Shmapped (Sheffield, Mapped) was a Smartphone wellbeing intervention app (Authors et al., 2019b), designed to improve mental health by connecting people with *urban* nature. The app storyboard was developed by the researchers and then the app prototype was developed and refined through several iterations of workshops with app-developers (Furthermore Ltd) and end-user testers to produce a final version of the app which was published on the Apple store and Google Play (see Authors et al., 2019b for details of app development). With increased urbanisation (United Nations, 2014) there are fewer opportunities for people to access and engage with nature. Urban natural environments provide daily access to residents who would not normally have the time or inclination to travel further distances to natural environments (Baur & Tynon, 2010). Therefore, interventions are needed to connect people with *urban nature* close to home (Dunn et al., 2006; Newman & Dale, 2013).

In a novel Smartphone extension of the 'three good things' intervention (Authors et al, 2019a), participants were randomised by the app to an intervention condition of noticing the good things about green spaces or an active control condition of noticing the good things about built spaces. The app prompted users once a day to notice and write brief notes about the good things about urban green or built spaces. The app also prompted users to answer questions about their experience of that place and gave the option to take and share photographs. The app collected participants self-report data on wellbeing and nature connectedness at baseline, post 7 days app use and post 1 month's app use; in addition to recording users' location in green spaces via GPS tracking and geofence data. As the wider IWUN research study had several aims, the empirical testing of the three good things in nature intervention is reported separately (Authors et al., 2019a). Additional aims related to peoples experience and quality of engagement. As the noticing good things in green space condition was the 'active' intervention, with noticing the good things about built spaces as a

control condition, only data from the green space condition is reported here. The current paper moves beyond previous work (Authors et al., 2015) by identifying common themes in the good things in nature that led to clinically significant improvements in wellbeing in an urban environment. Further, the pathways to nature connectedness approach (Lumber et al., 2017) is extended to develop a matrix of activities that facilitates efforts to connect people with nature.

Materials and Methods

Design

The design was an experimental study where 70% of participants were randomised to an intervention condition (noticing the good things about green spaces) and 30% of participants were randomised to a control condition (noticing the good things about built spaces). The quantitative data from the study measuring wellbeing and nature connectedness are reported in another paper (Authors et al.,2019a).

Participants

The app was promoted to adults living in Sheffield, and to pilot the app as a social prescription, adults with a self-reported common mental health difficulty (mild to moderate anxiety &/or depression) were targeted. The app was promoted through a stakeholder event and via local organisations, social media, and guided walks to try Shmapped. A total of 414 participants supplied baseline data in the green space condition with 228 completing the post-intervention measures and therefore providing full data for the current analysis. For the data analysed in the present study 130 participants were female and 98 male, with 47 participants

identifying as Black, Asian and Minority Ethnic (BAME), with a mean age of 29.19 years (*SD*=10.81).

Procedure

A full description of the development of Shmapped can be found in Authors et al. (2019b). After providing consent through the app, participants were randomised to either noticing the good things about green spaces or built spaces and were prompted once a day over 7 days. Participants were given examples of good things to notice, such as 'newly emerging flowers in Spring'. The examples were derived from the content analysis of the three good things intervention (Authors et al., 2015). In addition to writing daily text about the good things they noticed, at the end of 7 days participants were asked to enter text about their best and worst experiences overall. This is a replication of the method used in the Wildlife Trusts 30 days wild campaign (Authors et al., 2016b; Authors & Authors, 2018) and allows collection of participants most memorable positive experiences and any negative experiences they had.

Results

In terms of fidelity, there were 24 references to built space and the green features and water features that are part of these spaces (e.g. planters, green walls & fountains): 'Some grass growing in the gutter on a bus stop'; 'Pretty planters near diamond building'. Eleven of these comments referred to built space specifically with no mention of green features and could be seen as poor fidelity with noticing the good things about green spaces. The mean number of observations made per participant over 7 days was 6.34 (*SD*=3.23; range= 1-13)

indicating good adherence to the study. A total of 1,445 observations (i.e. brief written text in response to the app prompting them to notice the good things about green spaces) were recorded by the participant in the app.

Transcript observations were imported and thematically analysed using NVIVO 12 .. Guidance on thematic analysis was taken from Braun and Clarke (2006) following their six phases of analysis two researchers: i) familiarised themselves with the data; ii) generated initial codes; iii) searched for themes; iv) reviewed themes; v) defined and named themes; vi) produced a draft report for discussion and agreement. Themes were coded inductively by one researcher (KM) and then independently coded by a second researcher (FF) to minimise bias from subjectivity and to exhaust the themes present in the text. The quotes felt to best represent each theme were agreed upon by both researchers. Themes were extracted at an explicit level and themes with fewer than 10 references are not reported. The researchers met and discussed the themes and the rationale for their generation. There was discussion on what each researcher found to be the best represented themes in terms of how many observations had been grouped together as a theme. There was strong replication of themes by the second coder leading to agreement on 10 themes. Of the ten themes, the researchers agreed that three major themes had emerged which had the most representation in observations made by participants, the remaining seven themes were classed as minor themes. Major themes included: i) wonder at encountering wildlife in day-to-day urban settings; ii) appreciation of street trees; and iii) awe at colourful, expansive, dramatic skies and views. The ten themes are summarised in Table 1.

[Insert Table 1 around here]

Major themes

Wonder at encountering animals

The most common theme (*n*=83 references) was the wonder participants expressed at encountering animals (birds and mammals mostly) in day-to-day urban settings and these animals being seemingly unfazed by the activity of humans and traffic around them. For example: 'Slap bang in the middle of a pavement surrounded by roads, there's a crow digging out the moss growing round a drain cover. The cocky hop and inquiring tilt of its head are just made to lift your spirits'; 'Just saw 3 foxes one after the other in broad daylight! Commuters everywhere...I've assumed it's 2 males pursuing a Vixen'. The majority of references to wildlife concerned birds, followed by squirrels and foxes. Seven participants' comments about wildlife related to the enjoyment of seeing a wide variety of species. A large number (*n*=28) of comments about wildlife related specifically to bird song and the pleasure participants experienced in hearing bird song from their windows, especially in the mornings or when they were unable to get outside: 'Had to work all evening and into the night, it was great to hear bird song early in the morning'. Many of these observations came from people's gardens or views from their home windows (*n*=22), highlighting the importance of having access to a garden and green views.

Gratitude for trees

The second most common theme (*n*=55 references) related to trees. Quite a few participants (*n*=13) expressed gratitude at having street trees along their commutes to work and university and enjoyed looking out of their office or home windows and seeing street trees. Participants (*n*=14) noticed the passing of the seasons through the state of the trees, for example: 'The silver birch catkins are out!'; 'Really beautiful winter tree - as we are saying bye to winter'. Some participants (*n*=8) mentioned enjoyment of listening to the wind rustling

through the leaves of trees. A few participants (*n*=3) made reflective comments about trees, for example: 'It's great to have something so old and huge to be around'; 'I noticed a line of trees with snow on and it looked idyllic. Made me think there is a silver lining on everything.'; 'The tree silhouettes make me feel reflective'.

Awe at dramatic skies and views

The third most common theme (*n*=41) related to the awe expressed at wide expanses of colourful, dramatic skies and views from high up looking down over the city. For example: 'The sky looks relaxed and calm as the sun is setting out of my kitchen window, the horizon has turned a warm orange colour and there is a large cloud moving across it'; 'Walking to the bus this morning just before dawn and the moon looks amazing. It is a really clear waning crescent but still able to see the hint of the rest of it and a faint halo around the edge..... Below these the sky is lightening which gives a pleasing gradient of blue into the deep rich colour around the moon. There are streaky clouds nearer the horizon and the whole effect is very satisfying.' Participants made references to the beauty of sunrises, sunsets, the night sky ('The moon is so bright away from street lamps!'), the blueness of the sky and the variety of colours, the way the sun looked through the trees and shining on the hills, and the views across parks.

Minor themes

The remaining themes comprised: 4) references to flowering plants (*n*=22) and how these signified the start of spring ('Crocuses coming through. Colour and the promise of spring'); 5) references to water (*n*=17), of rivers and brooks running through woods and ponds in parks ('Lovely walk along Wyming Brook, babbling brook and bird song'); 6) 14 participants made specific references to the beauty of nature ('The water in the park is

reflecting the sun so beautifully'); 7) 12 participants spoke of feeling relaxed, peaceful, tranquil, of escaping and feeling refreshed ('Even though it was freezing, walking around the hills of Sheffield was refreshing and I was able to clear my head'); 8) 10 participants spoke of awe ('Made my heart swell'); 9) 10 participants commented on fields and grassland ('large open fields with birds and mist'). Finally, in the tenth theme 12 participants reported they were not able to notice a good thing about nature that day due to staying indoors working or it being too cold to go outdoors.

Best and worst experiences

When asked about their best experience from the 7 days, the majority of participants comments related to animals (*n*=48) and the surprise at encountering animals in urban areas: 'Hearing a woodpecker just over a mile from Sheffield city centre'. Again, the majority of these comments related to birds and the pleasure in hearing bird song. The second most common reported best experience was seeing and being amongst trees (*n*=31): 'Ecclesall Woods. Walking the dog and being very quiet, yet relatively close to two quite major roads'. The third most common theme was again colourful skies and views across the City (*n*=22): 'The best experience for me was the first day when I looked from my window and the view was beautiful. It made me feel like I want to go all the way up to the hills and explore these places where I've never been'. Places with water were mentioned frequently (*n*=21) with enjoyment of streams, frozen lakes and duck ponds. Participants (*n*=18) commented on the surprise they felt at finding green spaces and wildlife so close to busy parts of the City: 'Weston Park in Sheffield. A peaceful and beautiful place of nature right in the middle of the city'. Eighteen participants spoke about the ability of green spaces to make them feel relaxed, refreshed and less stressed: 'I was completely stressed out about an exam and I stare for a while and listen to the sound of the river, snowflakes falling, and bird singing. It helped me

relax much more than I could ever imagine'. Finally, 10 participants mentioned their enjoyment of seeing flowering plants newly emerged.

When asked about their worst experience from the 7 days, most comments related to green space that participants felt looked uncared for and had problems with litter (*n*=44): 'In the really crowded places, when I wanted to enjoy nature but the little nature I saw was full of garbage and that completely ruins the beauty of nature'. The second most common theme was comments about poor quality green space (*n*=26), which tended to be described as places with little wildlife, lack of trees and diversity of planting in addition to spaces that did not feel natural: 'Devonshire green, because it was just grass, with very little diversity in terms of plants'. Other common themes were bad weather (*n*=23) stopping participants from getting outside, or making the experience unpleasant or difficult; and the lack of green spaces (*n*=17), particularly around the city centre. It is worth noting that 37 participants were unable to think of any worst experiences of green space: 'Sometimes even a tiny bit of green space can cheer one up'. Themes are summarised in Table 2.

[Insert Table 2 around here]

Discussion

As part of a wider study to improve wellbeing through urban nature (IWUN), an app-based wellbeing intervention prompted users to notice the good things about their surroundings. Quantitative results are reported elsewhere (Authors et al., 2019a), however, wellbeing and nature connection scores showed statistically significant increases, whilst these increases were both statistically and clinically significant in participants who self-reported mental health issues. Qualitative analysis of participants' observations about the good things

in urban green spaces revealed 10 themes which were supported by participants' responses to being asked what their best and worst experiences of those green spaces were.

Main themes

The dominant theme which emerged was participants' wonder at encountering animals in day-to-day urban settings. This is consistent with the themes of wonder at nature and appreciation of active wildlife emerging from the three good things intervention (Authors et al., 2015). Previous literature suggests that these everyday connections with nature are increasingly important for wellbeing, given rapid urbanisation (United Nations, 2014). Newman and Dale (2013) emphasised the importance of 'mundane nature' found in urban environments, especially considering that more than 50% of the world's population finds its source of nature interaction in an urban environment. Furthermore, Dunn et al. (2006) describe the "pigeon paradox", whereby nature conservation is predicted to increasingly depend upon connecting people who live in built areas to urban nature and urban wildlife.

Within this theme of appreciating urban nature, a large number of observations in the present study related to the enjoyment of hearing bird song. Research has shown that pleasant natural sounds were associated with better physiological recovery (measured with skin conductance) from stress (Medvedev et al., 2015) and recovery from mental fatigue (Abbott et al., 2015). Ratcliffe et al. (2013) found that when asked to imagine being stressed and then to imagine a restorative place, 35% of participants mentioned bird song. Many of the observations about animals and bird song came from people's gardens or views from their home windows, highlighting the importance of having access to a garden and green views as a common and frequent 'point of contact' with nature (Cameron et al., 2012). This is consistent with correlational analysis which found that garden size was significantly

associated with wellbeing, even when considering other variables such as socioeconomic status (Brindley et al., 2018).

The theme with the second largest representation of observations was that of expressing gratitude at having street trees along commutes to work and university; and enjoying seeing street trees out of office or home windows. There was some replication of the theme of growth and temporal change from Authors et al. (2015) with participants noticing the changes of season through the trees. There is a wealth of data on the health and wellbeing benefits of the presence of trees (see Karjalainen et al., 2010) and the presence of street trees (Taylor et al., 2015). In Japan, a major public-health intervention, *Shinrin-Yoku*, or 'Forest Bathing', involves spending time being mindfully aware in woodland settings. Reviews of Forest Bathing found that the intervention increased self-reported feelings of wellbeing, but also physiological indices of wellbeing such as heart rate variability (Hansen et al., 2017; Authors et al., 2016a), consistent with models of natural settings acting as a source of affect regulation (Jordan, 2009). It is interesting to note that it was on participants' commutes that they particularly appreciated trees. A recent study found that despite commutes generally being associated with poorer wellbeing outcomes, commutes through green spaces had positive effects on mental health (Zijlema et al., 2018) and tree-lined roads were associated with fewer incidents of road rage (Cackowski & Nasar, 2003) and crime (Troy et al., 2012).

The third most represented theme was the awe participants expressed at wide expanses of colourful, dramatic skies and views from high up looking down over the city. This replicates themes of wonder and colour in the three good things analysis (Authors et al., 2015). A recent paper found that generating feelings of awe through natural views has the ability to reduce anxiety and contextualise one's life-problems as seeming relatively minor (Phuong et al., 2018). Indeed, having open views of nature, with less evidence of urbanisation (such as coastal views) has been shown to be of particular benefit to wellbeing (White et al.,

2013). In the present study participants expressed appreciation of green views from their office windows. There is evidence that even window views can be restorative and fend off frustration and boost enthusiasm at work (Korpela et al., 2016); lower arousal and anxiety (Chang & Chen, 2005) and increase job satisfaction (Lottrup et al., 2013).

Of the main themes, it is interesting that biotic themes (e.g. Wonder at encountering animals; Gratitude for trees) had greater representation than abiotic themes (e.g. awe at dramatic skies and views). This is consistent with the dominant themes emerging from previous studies of nature connectedness interventions (Authors et al., 2016b) and may be indicative of our 'biophilia' (Wilson, 1984), although criticisms of the biophilia hypothesis (e.g. that 'biophilia' is option to various and conflicting interpretations, that empirical findings supporting biophilia can be explained by other hypotheses and the evolutionary reasoning behind biophilia is unclear Joye & De Block, 2011) should be acknowledged.

Minor themes included: green planting amongst built space; noticing flowering plants; mentions of water; natures beauty; feelings of awe; feeling calm/relaxed; noticing fields and grassland. These match the themes of wonder at nature's beauty and positive emotions emerging from the previous analysis of the three good things in nature intervention (Authors et al., 2015). Further, the themes show the good things in nature intervention activated four of the five pathways to nature connectedness (contact, emotions, appreciation of nature's beauty, and meaning-Lumber et al., 2017).

Best and worst experiences

When asked for their best experience of engaging with urban nature, the same three dominant themes of wonder at animals (especially birds) in urban settings, gratitude for trees and awe at views emerged. In addition, places with water were mentioned frequently and participants spoke about the ability of green and blue spaces to make them feel relaxed,

refreshed and less stressed. This supports the importance of blue spaces in addition to green spaces for wellbeing (White et al., 2013) and lends support to emotion-regulation models of nature connectedness and wellbeing (Jordan, 2009; Authors et al., 2016a). Once again, the themes show activation of a number of the five pathways to nature connectedness (Lumber et al., 2017) with participants writing about sensory experiences, especially bird song; experiencing emotions, mainly feeling calm and relaxed in addition to feeling awe; and appreciation of nature's beauty.

Participant's worst experiences mainly comprised encountering poor quality green spaces with little diversity and litter, or finding a lack of green spaces generally. These findings are important for local authorities managing green spaces and is consistent with evidence that the wellbeing benefits of nature are increased in areas *perceived* as having higher biodiversity (Dallimer et al., 2012) and areas that have *actual* higher biodiversity (Fuller et al., 2007; Osei-Wusu Adjei & Kwaku Agyei, 2015; Wolf et al., 2017).

The themes also provide some insight into the mechanisms behind the benefits of noticing nature for wellbeing. The references to both activating (wonder and awe) and soothing positive affects (calm, and relaxed) show a variety of emotions, those sought out and needed for balance (Johnsen et al., 2013) which fits an account of nature being central to emotion regulation (Jordan, 2009), although this is often overlooked (Korpela et al., 2018). Feelings of calm can be related to stress reduction and restoration, but this did not emerge as a clear theme. Further, expression of positive emotions is known to be important for wellbeing (e.g. Fredrickson, 2001). The importance of trees, known to help regulate emotions in Forest Bathing, also supports an emotion regulation account.

Improving our appreciation of urban nature

Urban green spaces such as city parks have been shown in this study to be of value, highlighting that the importance of everyday nature should not be underestimated. Previous literature suggests that there is a need to improve the impression of 'mundane nature' (McGinlay et al., 2017), given that in an ever-expanding urban world, more than 50% of our experiences with nature are city-based (Newman & Dale, 2013). A start would be removing 'mundane nature' from the lexicon, everyday urban nature may be framed as 'mundane' but to improve the appreciation of urban nature there is a need to show that it is much more than mundane. The current research shows that people can find good in the 'mundane' and a key recommendation is to refrain from using that phrase. Various factors influence the likelihood of a particular species being evaluated in a positive way. McGinlay et al. (2017) noted that individuals tend to favour animals that are seen as "charismatic", such as birds for example. This observation can be used to inform biodiversity interventions, where in the future the public could be better educated about placing value on less obviously engaging species. Given that loss of biodiversity is an issue of global concern (Newbold et al., 2016), it is important to understand the implications this has on wellbeing.

Street trees are a particularly beneficial way of introducing nature to urban areas and this study has shown the appreciation people have for trees planted in places of work, residence and commuting. Shanahan et al. (2015) found that lower levels of neighbourhood tree cover were associated with a reduced frequency and duration of visits to green spaces, highlighting that availability of nature close to home is a critical step to protect people's experiences of nature and their desire to seek out those experiences. A link between street trees and wellbeing was found by Taylor et al. (2015) who showed that areas with more street trees had lower rates of antidepressant prescriptions, after controlling for potential confounders. Given that street trees are a highly accessible way of exposing people to urban

nature, and the largest source of indirect contact with nature (Cox et al., 2018) their use should be encouraged. Another important way of encouraging appreciation of urban nature identified in the current study, was having access to green views around workplaces. This supports an earlier finding by Gilchrist et al. (2015), who found that the presence of green space around the workplace was related to higher self-reported wellbeing in employees.

The good things in nature data and themes generated, provide an insight to what people appreciate in urban nature. Therefore, when setting out to engage people with nature it is sensible to highlight these themes. Further, the pathways to nature connectedness (Lumber et al. 2017) provide a theoretical background and framework of the types of activity in nature required to improve nature connectedness. The themes and the pathways can be combined as each pathway activity can be developed around a theme of the good things in nature. Such matric of themed activities can inform specific efforts to connect people to urban nature; the successful 30 Days Wild intervention has shown the value of proving prompts (Authors et al., 2016b). Further, through using themes in the current analysis and relationships identified in previous research (Lumber at al., 2017) this approach is specific to improving nature connectedness rather than exposure to nature. This activity and nature connection focus differs from wider research into types of natural environment associated with restoration outcomes (e.g. Korpela & Hartig, 1996). Through combining the themes of the good things in urban nature with the pathways to nature connectedness (Lumber et al., 2017), Table 3 provides an extended framework for improving the appreciation of urban nature. The matrix of 40 activities are indicative suggestions generated from combining the data themes and pathways. They aren't intended to be exhaustive and provide example prompts and a wide range of nature connectedness focussed activities. Content for the matrix can also be adapted or revised from differing perspectives such as mental health or urban planning through consulting experts and practitioners in those domains. Given the basis in the pathways to

nature connectedness and the good things in urban nature, they can be used for a variety of purposes around engaging adults with urban nature. For example, they can inform activity programming (especially when combined with a range of arts from photography to creative writing), social-media content for nature engagement and the design of green spaces. As an example, an activity could be focussed on water, with elements that draw out the deeper relationships of the compassion and meaning pathways not seen when simply noticing the good things. The meaning theme provides a prompt for deeper reflection on why the good things in urban nature are inherently good, using metaphors to communicate these ideas. Therefore the water-meaning intersection provides a prompt for those involved in cultural programming in urban areas with access to water. Or, from the perspective of the urban planner or designer the water-meaning intersection provides a prompt to allow space for cultural programming close to water or specific infrastructure (e.g. social spaces, art installations, boardwalks) designed to to afford the activities and encourage deeper relationships between people and nature. .

[Insert Table 3 around here]

Limitations

A limitation of this study was the lack of richness or elaboration provided in the participants observations. The app prompted participants to notice the 'good things' in green spaces, and whilst many participants provided at least one sentence per day, many other participants only provided 1-2 words per day and no further elaboration (e.g. 'Sunny park!'). This presented a challenge for the extraction of themes by the two researchers and meant that there was a smaller pool of observations which provided enough text and detail to extract themes from. This tendency for some participants to provide richer data than others is consistent with the

types of observations participants recorded in the Wildlife Trusts 30 days Wild campaign (Authors et al., 2016bAuthorsAuthors). Although the app provided examples of things that participants might notice, future versions of the app might include more examples with some going into more depth than others.

Conclusion

This qualitative study assessed individuals' observations of the good things in urban nature, through the use of a Smartphone wellbeing app. The results are pioneering in that they begin to define the components of urban green space that have most value and meaning for urban citizens; values and meanings that may strongly underpin an individual's mental health. Through thematic analysis, the main themes of wonder at encountering animals, gratitude for trees and awe at dramatic skies and views were extracted. As such, city planners need to recognize that encounters with biotic elements (animals and trees) are highly important to urban citizens, and that processes that retain/facilitate new, viable, resilient ecosystems within the urban matrix should be viewed as essential in optimising human wellbeing. In light of this, policies that, for example, promote new housing development without gardens and green space, must be seen as sub-optimal for creating an environment that supports mental health through engaging with nature. Therefore aside from the immediate wellbeing benefits of using the app, there are also opportunities for insights from urban planners which could bring wider benefits in terms of bringing more green space into new developments or retrofitting greenspace into existing developments. The main themes extracted from this paper can also be used to isolate key areas of research to focus on. Further, green interventions are increasingly being regarded as a way to tackle the mental health crisis we face in an increasingly urbanised world. The results from this study add valuable insight to the notion that simply noticing the good things in nature can improve wellbeing, by informing as to the precise good things individuals are grateful for. Through

combining the themes with the pathways to nature connectedness, this paper provides matrix of activities to prompt activity programming, nature engagement media content, interventions and urban design. Given the benefits to wellbeing and pro-environmental behaviour, it is important to align the aspects of urban nature that people enjoy with activity programming, intervention design, policy makers' and town planners' views of how best to design and develop cities.

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Tables

Table 1: Themes from the green space condition

Theme	**N**
Wonder at encountering animals	83
Gratitude for trees	55
Awe at dramatic skies and views	41
Green planting amongst built space	24
Flowering plants	22
Water	17
Natures beauty	14
Feeling calm/relaxed	12
Feeling awe	10
Fields/grassland	10

Table 2: Best and worst experiences in the green space condition

Best	**N**	**Worst**	**N**
Wonder at animals	48	Litter	44
Trees	31	No bad experience	37
Skies/views	22	Poor quality green space	26
Water	21	Bad weather	23
Surprise in green space	18	Lack of green space	17
Feeling calm/relaxed	18		
Appreciating new flowers	10		

Table 3. Matrix of micro-activities/prompts

	Senses	Emotions	Beauty	Meaning	Compassion
Wonder at encountering wildlife	Look out for and listen to wildlife	Find wildlife that prompts joy and calm	Note the beauty of wildlife.	Consider what encountering wildlife means to you.	Do something to care for wildlife
Gratitude for trees	Take a moment to notice trees	Find an awesome and calming tree	Note the beauty of trees.	Think about what trees mean to you. Do you have a favourite tree?	Do something to care for trees.
Awe at dramatic skies and views	Look up and out at the sky and views	Notice how you feel as the sky changes. Different skies, different feelings?	Take a moment to notice the beauty of clouds.	What does your favourite view mean to you?	What do the changing skies mean for nature and wildlife?
Green planting amongst built space	Notice everyday nature in urban spaces.	Compared to built spaces, how do green spaces feel?	Notice the beauty of natural forms within the city.	Use metaphors to describe plants in the city.	What do plants in the city do for wildlife?
Flowering plants	Take a moment to notice flowers	How do flowers make you feel?	Capture the beauty of flowers in words, images or music.	Do different flowers mean different things?	What do flowers do for wildlife?
Water	Look at the movement of water, listen	Notice how still and running water make you feel.	Does the beauty of water depend on light?	How can you use water to communicate a thought or idea?	What can you do to help stop water pollution?
Nature's beauty	Find beautiful sounds in nature.	What emotions does the beauty of nature bring?	Why is nature beautiful?	What does nature’s beauty symbolise?	Can nature’s beauty bring care for nature?

Feelings	Look and listen for nature that brings calm and joy	Complete a tick list of emotions in nature rather than wildlife	Emotions are natural, are they beautiful?	Does nature help regulate your emotions?	How does it feel to do good for nature?