



## **Exploring the Health and Wellbeing Benefits of Nature-based activities**

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### **Introduction**

In today's modern world it is easy to lose touch with nature and the great outdoors. Busy lifestyles which increasingly revolve around technology, sedentary routines and convenience foods are contributing to an array of largely preventable health conditions such as obesity, high blood pressure, cardiovascular disease, Type 2 diabetes, and in some cases, cancer.<sup>i ii iii iv v</sup> This, combined with an ageing population, is putting increasing pressure on health services and less well recognised issues associated with the elderly, including osteoporosis, loneliness and isolation, are important to consider too.<sup>vi vii viii ix</sup>

The sheer scale of the health conditions alluded to is enormous, making finding ways to address and prevent them paramount. Coronary heart disease is currently the UK's biggest killer<sup>x</sup> and the report Statistics on Obesity, Physical Activity and Diet England: 2018 revealed 26% of adults are obese.<sup>xi</sup> Cancer affects 1 in 2 people according to Cancer Research UK<sup>xii</sup> and some cancer types are contributed to by lifestyle factors such as physical activity.<sup>xiii</sup> In addition, in 2015 3.9 million people were living with diabetes, of whom most had Type 2 which is more often seen in those who are overweight or obese<sup>xiv</sup> and more than 3 million people are believed to be living with osteoporosis<sup>xv</sup> which sedentary lifestyles can predispose.

Nature-based activities such as walking, gardening or conservation projects can play a role in addressing and preventing these health problems. After all, physical activity, even something as simple as walking, can help reduce the risk of all the physical conditions mentioned above and walking can also be beneficial to mood and mental health; when done as part of a group feelings such as social isolation and loneliness may also be reduced.<sup>xvi</sup> In recent years literature has begun to emerge reflecting the benefits of nature-based activities. The study "Effects of Horticultural Therapy on Asian Older Adults: A Randomized Controlled Trial" showed after being involved with activities such as indoor gardening, maintaining, growing and harvesting vegetables and herbs and guided walks participants reported increased positive relations with others ( $p < 0.001$ )<sup>xvii</sup> and the study "Is there evidence that walking groups have health benefits? A Systematic Review and meta-analysis" showed statistically significant reductions in blood pressure, BMI, body fat and cholesterol and improved physical functioning was noted. Reductions in depression were also seen<sup>xviii</sup>. The Cochrane Database systematic review Participation in environmental enhancement and conservation activities for health and wellbeing in adults: a review of quantitative and qualitative evidence found that although there is still an overall lack of qualitative data suggesting either positive or negative health and wellbeing benefits of environmental enhancement and conservation activities the qualitative research shows high levels of perceived benefits amongst participants and thematic analysis showed positive experiences of participants were identified in at least one good quality study relating to the following themes: personal/social identity, physical activity, developing knowledge, spirituality, benefits of place, personal achievement, psychological benefits and social contact<sup>xix</sup>

In view of the benefits reported thus far of nature-based activities on health and being and the scale of health problems faced by society today to which lifestyle may contribute, it was felt by the Public Health Community Fellowship Wessex that it would be useful to conduct further research into this area. Consequently, we became involved with Natural Choices, a Dorset programme led by the Dorset Local Nature Partnership which seeks to maximise the benefits of Dorset's natural environment for people, wildlife and the economy. It aims to enable and support people in improving both their physical health and mental wellbeing through various activities within the natural environment. Natural Choices welcomes everyone but it is ideal for those who would like to become more active who may have been leading otherwise sedentary lifestyles and/or have been recognised as having low risk physical health or mental health problems such as low mood, mild anxiety or stress. As a programme, Natural Choices can also provide health care professionals, for example GPs or Practice Nurses, with a straightforward way of directing people to a variety of providers organising activities based in the natural environment<sup>xx</sup> (people can either self-refer or be referred by referral bodies such as LiveWell Dorset, Steps2Wellbeing or carer support services which can direct people towards Natural Choices activities which will meet their health needs). Activities offered by Natural Choices are wide-ranging but include gardening, health walks, conservation activities, park yoga and mindfulness. We began our research and analysis by visiting two groups which form part of the Natural Choices programme, the Dorchester Strollers (walking group) and Hardy Hands (woodland conservation group) and conducting a survey of participants. The survey we used research was subsequently circulated to other Natural Choices activities. Natural Choices may continue further circulation of this survey in future to further their own data collection.

## **Aims and Objectives**

The primary aim of this project was to assess the benefits of nature-based activities offered by Natural Choices. As mentioned in the introduction, nature- and green space-based activities have a growing evidence base for the gains they offer. In this project we looked to investigate the benefits offered by these types of activities, separated into the three domains of benefits to: physical health, emotional/mental wellbeing, and social interaction.

Our secondary objective was to assess barriers that potential service users for nature-based activities may face in accessing and/or availing of available activities offered by Natural Choices. Further to this, consideration was given to potential solutions for improving access to activities. We also included a number of free text questions in our questionnaire to elicit other insights and identify emergent themes from service use feedback.

## **Methods**

Primary data for this project was gathered using a paper based questionnaire. These questionnaires were distributed to service users of a range of nature-based activities with which Natural Choices is involved across Dorset. Users were surveyed from activities surveyed ranging from walking groups in Dorchester to nature conservation work in Thorncombe woods, to gardening groups in Portland.

A web-based data capture platform was then utilised to gather and agglomerate data from the questionnaires. Results from the filled paper questionnaires were manually inputted into the web platform for agglomeration. However, provision for surveys to be filled directly on the web platform (via a URL link) was also maintained. This allowed maximisation of data capture from questionnaire data input from multiple locations and via multiple mediums, whether it was paper or through the Internet.

Upon the completion of this project, the web platform will continue to be able to be used for ongoing data collection. This could be used to gather a larger dataset for this project, for longitudinal analysis with this project or for use data gathering for other projects.

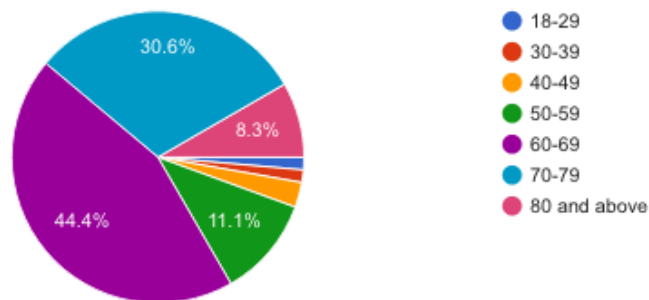
## Results

### DEMOGRAPHICS

Participants in our questionnaire were primarily 60-79 years old (75.0%) [13.9% aged 40-59, 8.3% aged 80+, and 2.8% aged 18-39]. We had an equal gender distribution, 51.0% female and 49.0% male, and 98.6% of participants were of white ethnicity. Majority were heterosexual, 89.6% [1.5% Gay/lesbian, 0.7% Bisexual], and were Christian (50.0%) or not religious (36.8%). Just over half of participants were married, 58.8%, with the rest single (16.2%), widowed (15.5%) or divorced (9.5%). Also 80.1% were retired [14.4% were employed, and 5.5% unemployed].

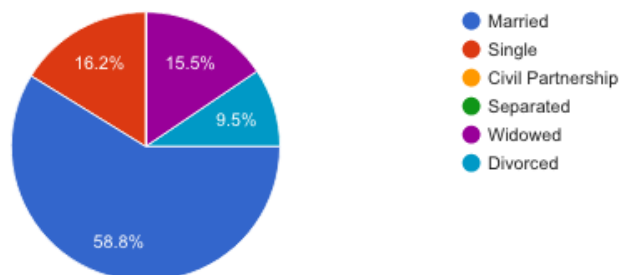
#### Your age:

144 responses



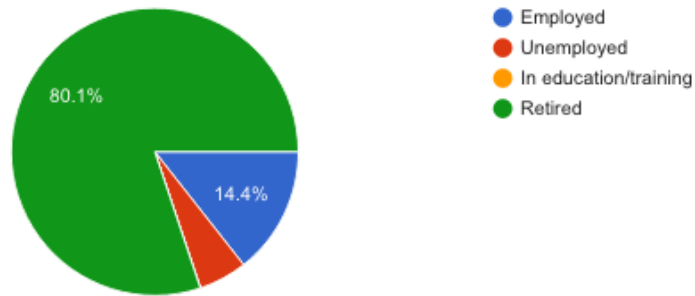
#### Marital status:

148 responses



## Occupation:

146 responses

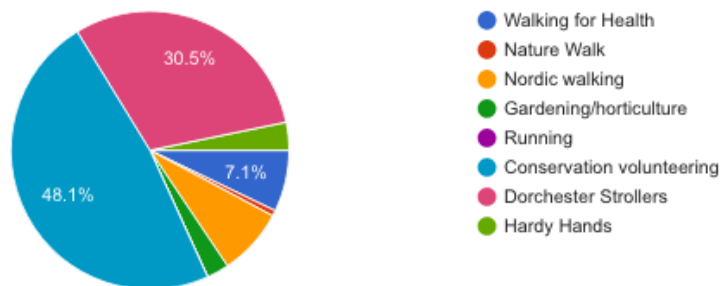


## ACTIVITIES

The types of nature-based activities attended by our participants were walking (46.0%), conservation (48.1%), and gardening/horticulture (5.8%).

### Type of activity attended:

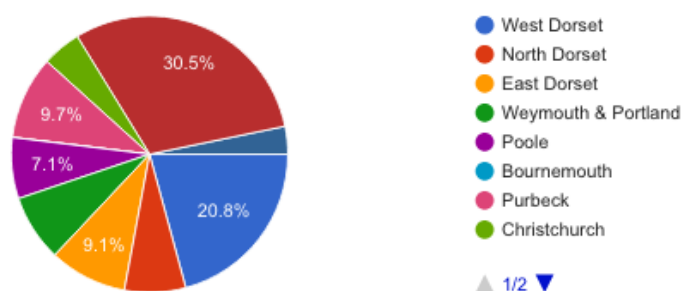
154 responses



Their locations were mainly in West Dorset incl Dorchester (54.5%), then in Purbeck (9.7%), East Dorset (9.1%), Weymouth & Portland (7.8%), North Dorset (7.1%), Poole (7.1%) and Christchurch (4.5%).

### Location of activity:

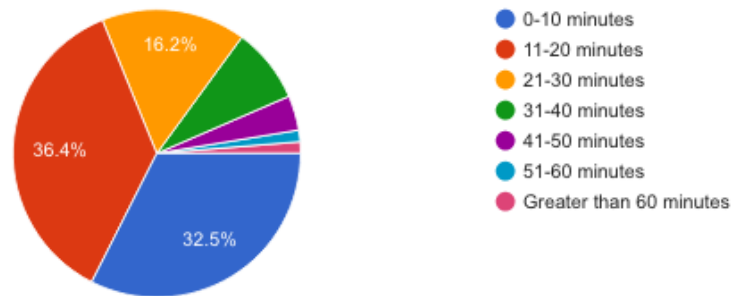
154 responses



To travel to their activities, 42.9% were by car, 31.8% walked or cycled, 13.6% through car share or volunteer driver, and 11.7% used public transport. For just over a third of participants it took 11-20mins (36.4%) to get to their activity, and it took up to 10 minutes for 32.5% to get to their activity [16.2% took 21-30mins, 8.4% took 31-40mins, 3.9% took 41-50mins, and 1.3% took just under 1 hour and 1.3% took over 1 hour to get to their activity].

### How long did your journey to attend the activity take?

154 responses

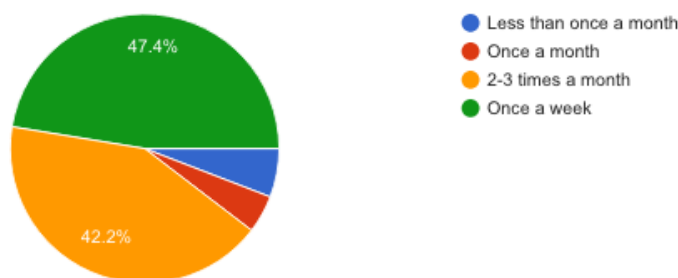


Overall, 63.6% found it very easy to get to their activity and 35.1% found it easy. For those who found it difficult to get to their activity (n=13) the main reasons were distance from home (53.8%), financial cost (15.4%), available transport (15.4%), timing/day of activity (15.4%), and physical limitations (7.7%).

Participants found out about the activity attended through word of mouth (42.2%), internet/social media (12.3%), local newspaper/magazine/newsletter (12.3%), GP/healthcare provider (6.8%), and tourist information/local noticeboard/poster (5.6%), and others. Just under half of participants were attending their activity once a week (47.4%), whilst 42.2% were attending 2-3 times a month.

### How many times have you attended in the last 6 months?

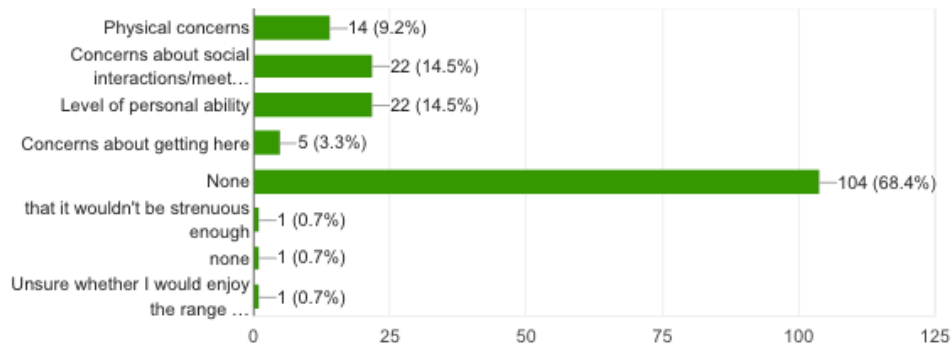
154 responses



The main reasons for attending their activity were because of an interest in the activity, N=87, and for physical health benefits, N=81. Then, it was for social interaction, N=61, and emotional wellbeing and mental health, N=30. Most participants did not have any uncertainties/worries about attending their session, however if they did it was for concerns about social interactions/meeting new people, 14.5% (N=22), their level of personal ability, 14.5% (N=22), and physical concerns, 9.2% (N=14). A few had concerns about getting to the activity or whether they would enjoy it.

## Did you have any uncertainties/worries about attending the first time you joined the session? (select all that apply)

152 responses

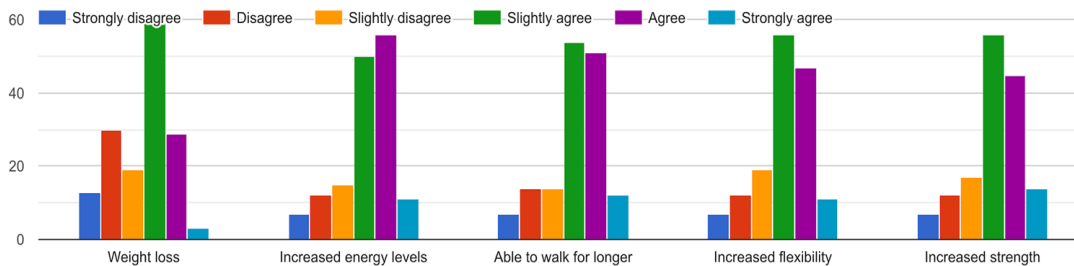


For 70.9% of participants, their attended activity was an established interest as opposed to a new interest.

Overall enjoyment of attending their activity were very high (48.7%) and high (40.1%), and a minority average (11.2%). Almost all participants said they planned to continue attending their activity (99.3%), and 68.4% reported that it had encouraged them to attend other similar activities in the community.

## PHYSICAL WELLBEING

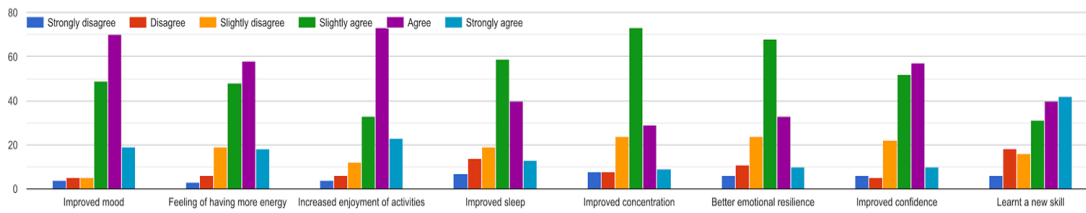
Have you noticed any of the following physical health benefits since attending these sessions?



Most participants agreed with noticing physical health benefits since attending their activity. This included weight loss [2% strongly agree, 19% agree, 38.5% slightly agree, 12.4% slightly disagree, 19.6% disagree and 8.5% strongly disagree], increased energy levels [7.3% strongly agree, 37.1% agree, 33.1% slightly agree, 9.9% slightly disagree, 7.9% disagree and 4.6% strongly disagree], increased walking stamina [7.9% strongly agree, 33.6% agree, 35.5% slightly agree, 9.2% slightly disagree, 9.2% disagree and 4.6% strongly disagree], increased flexibility [7.2% strongly agree, 30.9% agree, 36.8% slightly agree, 12.5% slightly disagree, 7.9% disagree and 4.6% strongly disagree], and increased strength [9.3% strongly agree, 29.8% agree, 38.5% slightly agree, 12.4% slightly disagree, 19.6% disagree and 8.5% strongly disagree]. Other comments people made were that they felt fitter, good aerobic capacity, better breathing and lower blood pressure, improved cardiac health, improved muscle tone, helps with arthritis, better diabetic control, and helped overall fitness.

## EMOTIONAL/MENTAL WELLBEING

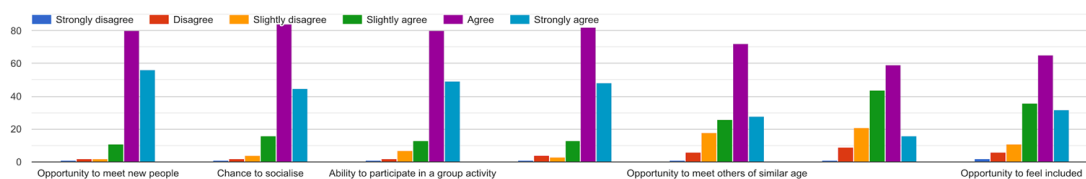
With regard to your emotional well-being/mental health, have you noticed any of the following since attending these sessions?



There was notable agreement by participants for noticing emotional and mental wellbeing benefits since attending their activity. This included improved mood [12.5% strongly agree, 46.1% agree, 32.2% slightly agree, 3.3% slightly disagree, 3.3% disagree and 2.6% strongly disagree], the feeling of having more energy [11.8% strongly agree, 38.2% agree, 31.6% slightly agree, 12.5% slightly disagree, 3.9% disagree and 2.0% strongly disagree], increased enjoyment of activities [15.2% strongly agree, 48.3% agree, 21.9% slightly agree, 7.9% slightly disagree, 4.0% disagree and 2.6% strongly disagree], improved sleep [8.6% strongly agree, 26.3% agree, 38.8% slightly agree, 12.5% slightly disagree, 9.2% disagree and 4.6% strongly disagree], improved concentration [6.0% strongly agree, 19.2% agree, 48.3% slightly agree, 15.9% slightly disagree, 5.3% disagree and 5.3% strongly disagree], better emotional resilience [6.6% strongly agree, 21.7% agree, 44.7% slightly agree, 15.8% slightly disagree, 7.2% disagree and 3.9% strongly disagree], improve confidence [6.6% strongly agree, 37.5% agree, 34.2% slightly agree, 14.5% slightly disagree, 3.3% disagree and 3.9% strongly disagree], and learnt a new skill [27.5% strongly agree, 26.1% agree, 20.3% slightly agree, 10.5% slightly disagree, 11.8% disagree and 3.9% strongly disagree]. Some of the comments people made about the emotional/mental health benefits of attending their activity were, feeling less tense, feeling a sense of achievement, higher level of mindfulness, satisfaction, an energizing start to the week, and reduced stress.

## SOCIAL WELLBEING

With regard to social interaction, do you feel participating in this activity has offered any of the following:



The most significant agreement by participants was in noticing the benefits of social interaction from participating in their activity. This included the opportunity to meet new people [36.8% strongly agree, 52.6% agree, 7.2% slightly agree, 1.3% slightly disagree, 1.3% disagree and 0.7% strongly disagree], chance to socialize [29.6% strongly agree, 55.3% agree, 10.5% slightly agree, 2.6% slightly disagree, 1.3% disagree and 0.7% strongly disagree], ability to participate in a group activity [32.2% strongly agree, 52.6% agree, 8.6% slightly agree, 4.6% slightly disagree, 1.3% disagree and 0.7% strongly disagree], opportunity to meet like minded individuals [31.8% strongly agree, 54.3% agree, 8.6% slightly agree, 2% slightly disagree, 2.6% disagree and 0.7% strongly disagree], opportunity to meet others of similar age [18.5% strongly agree, 47.7% agree, 17.2% slightly agree, 11.9% slightly disagree, 4.0% disagree and 0.7% strongly disagree], improvement in social confidence [10.7% strongly agree, 39.3% agree, 29.3% slightly agree, 14.0% slightly disagree, 6.0% disagree and 0.7% strongly disagree], and opportunity to feel included [21.1% strongly agree, 42.8% agree, 23.7% slightly agree, 7.2% slightly disagree, 3.9% disagree and 1.3% strongly disagree]. Some additional comments from participants about social wellbeing benefits include, good to chat

about random subjects, meeting others of different ages, social backgrounds and abilities, and support and respect between each other.

## **Discussion**

Our results showed an overwhelming amount of agreement for the benefits of nature-based activities in Dorset on physical, emotional and mental, and social wellbeing. From our questionnaire, free text input and meeting participants, we found that overall our cohort had enthusiasm for and enjoyment of their nature-based activity, resulting in building and/or sustaining a long term hobby or interest within conservation, walking and gardening (see Appendix 1). Most people stated they initially attended their activity for interest or physical health benefits, yet it was pleasing to see that they did identify physical, mental/emotional and social wellbeing benefits as a result of attending even if it hadn't been a consideration initially. It's a positive message to give out that these activities can give such a wide variety of benefits by attending them. It was fascinating for us to see the almost universal agreement in social wellbeing by attending, which in our majority participant attendance by 60-79y/o is a big find for developing ways of preventing social isolation, particularly in the elderly, but may also translate to mental health, new or single mothers, the unemployed and for those newly resident in an area.

It also interested us to find that participants felt they were achieving something by attending their activity, and it seemed that in some cases it was an opportunity for participants to see they can do things that they didn't think they could, and therefore it opens their eyes to reevaluating their individual abilities and limitations. There is always discussion about the benefits of disease prevention over disease treatment for both individual health wellbeing and reducing pressures on healthcare professionals. Therefore, if activities that bring physical, mental and social wellbeing benefits are available, this may provide and help to empower people to take control of their own health and wellbeing for the better.

Participants were incredibly positive towards being in a group and meeting new people. Just under a half of our participants were single, widowed or divorced and so attending these activities gives them a chance to meet and build new relationships. In particular, people with diversity in backgrounds and interests are meeting and broadening their social interactions, which they may not have done without these activities. Additionally, participating in a group activity, feedback showed that it is a motivating and encouraging environment to be in, and a relaxed, safe space for spending their time in because of it. This is a brilliant environment to engage and support participants in order to bring out the multitude of beneficial outcomes. It also links in with getting people involved in the local community – by having and attending activities within or near people's homes it is bringing local communities together.

An unexpected but important outcome from our study was that participants found that by regularly attending their nature-based activity, it was bringing structure and routine into their lives. Three-quarters of our participants were retired and just under half of participants were attending activities on a weekly basis. It is fantastic that having these activities brings structure and focus into these people's lives in a positive way, which they were perhaps missing through retirement or being less active generally with increasing age.

## **Recommendations/Action Plan**

Currently, nature based activities are largely independently funded with little additional support from local authorities, health services and other official bodies (there is some assistance provided by Public Health Dorset to Dorset Local Nature Partnership to help facilitate Natural Choices). This means they largely rely on fundraising schemes or need to charge a small attendance fee to ensure their continuation. If the sustainability of nature based activities is to be guaranteed, it is important that reliable funding sources are secured and this is where local authorities and health services could play a crucial role by actively engaging in providing regular financial assistance.



In some ways connected to the issue of funds is that of physical access to and travel to activities. Some service users reported that a barrier to regular attendance was transport. In some cases participants struggled to pay costs such as bus fares and in others a lack of a straight forward public transport route was problematic; rural bus services could be infrequent or absent and taxis were too expensive. One group we surveyed reported they had until recently used a mini bus to transport service users to the activity, however, this was no longer possible as the body providing the mini-bus withdrew its support. Consequently, some attendees were forced to stop the activity.

Another barrier to attending nature based activities for some people was the timings of sessions. Many activities were run during working hours. For a large proportion of service users who were of retirement age and no longer in regular employment this was not an issue. However, our findings did show that there is also some demand for nature based activities amongst the working aged population who would prefer the option of attending outside working hours so further consideration of timings of sessions should be considered. It should be noted this was another instance where the groups organising the activities cited lack of funding as a key limiting factor.

The significant benefits suggested by our study of nature based activities would indicate that they warrant greater promotion. An increase of awareness of nature based activities amongst GPs and other health professionals would provide an ideal platform for signposting towards appropriate session, either directly or via referral bodies or schemes. LiveWell Dorset, for example, is an organisation promoting healthy lifestyles which health professionals can refer people to which can then direct people to Natural Choices activities. LiveWell Dorset includes all the Natural Choices activities on their Activity Finder.

Additionally, promotion initiatives such as the designation of May 2019 as 'Naturally Healthy Month' by Natural Choices, spanning a public-facing social media awareness campaign, and a professional-facing conference, will help to raise awareness of the existence and benefits of nature-based activities. These should help towards increasing uptake and utilisation of nature-based activities.

It appears that in addition to improving the funding and promotion of nature based activities, a recommendation emerging from benefits identified by this project would be to further explore the scope for the application of nature based activities tackling the increasingly important issue of social isolation amongst the elderly and in encouraging healthier active ageing.

#### *Study limitations and follow-up*

With regard to the limitations of this study, there are a number inherent to questionnaire based studies. Firstly, honesty in answers – given the authors' position as doctors, a well-respected professional group, and with the large majority of the questionnaire recipients being elderly citizens whom hold medical professionals in high regard, there is not insignificant scope for social desirability bias and not fully honest questionnaire responses. Additionally some respondents may feel giving less positive feedback may be detrimental to the activity they participate in. We worked to alleviate this by assuring participants of the anonymisation of responses and making clear the value of honest responses for service improvement.

Differences in understanding and interpretation of the questions and response options were another potential limitation, again more so in light of the prevalent elderly demographic of participants. We worked to address this trying to ensure there was someone present during questionnaire filling by participants, either the authors or a person affiliated with Natural Choices or the activity, who would be available to answer questions to ameliorate lack of understanding of the questionnaire questions.

Another point of discussion is that this study is aimed at investigation of the positives of nature-based activities, without explicit exploration of the negatives. However, we tried to ensure options for expression of non-positive sentiments, by having a wide range on our Likert scales in questions about perceived benefits, including clear 'strong disagreement' options. Additionally, we included a number of open-ended white-space questions to elicit free-text feedback, with scope for negative feedback. Repeating the survey with questions with additional questions specifically on potential

drawbacks of nature-based activities may be an possibility for future investigation, which may be able to provide insights to help improve nature-based activities and their provision.

Lastly, repeating the survey in the future would also allow for longitudinal analysis of changes in activity participation uptake, and participant-derived outcomes of nature-based activities, as well as enable the effect of promotion initiatives on these endpoint measures.

## **Conclusion**

In conclusion, our project exploring the health and wellbeing benefits of nature based activities supports that they provide clear physical, mental and social benefits to participants. However, barriers still exist in accessing and promoting uptake of these services. Therefore, greater recognition and support is needed for the sustainability and growth of nature-based activities within local communities.

## **Appendix 1:**

### POSITIVE COMMENTS

"Give it a go."

"Great way to keep fit & meet new friends."

"Just do it."

"Friendly, sociable and good exercise at your own pace."

"Chance to make new friends."

"Get fit and laugh."

"Very friendly, informal, social."

"Enjoy being outdoors more."

"It feels good when you have finished."

"Makes exercising easy and getting out in the fresh air is great for mood."

"If you're recently retired it gives a bit of structure to your week."

"It is good exercise for the whole body whilst walking in beautiful surroundings with like minded people. Walking with a group encourages me to go out every week, all year round regardless of the weather!"

"It is lovely to walk and talk in the Dorset County"

"Good for body and soul"

"It will open you horizons"

"Enjoy the outdoors and enjoy the company, learn new activities and re-assess your capabilities"

"It gives you a feeling of fulfilment and the opportunity to get close to nature."

"It's good for head and heart."

"Makes exercising easy and getting out in the fresh air is great for mood."

"It lifts your spirits."

### FEEDBACK/SUGGESTIONS FOR IMPROVEMENTS

"Could have younger people - young parents? Otherwise - just need to carry on as it is!"

"Improved scheduling of events by activity organiser."

"To provide more different levels of walking ability."

"Plan programme further in advance to enable me to plan ahead better."

"Unfortunately I can only volunteer during school holidays as I work every morning - would like the occasional afternoon session!"

### GENERAL FEEDBACK

"Could have more referrals for health, or social isolation."

"More referrals from GP practices for patients who would benefit from this activity."

"It is a very interesting, free, social activity which is beneficial to people's health." "Some people may not do these activities if they were not in a group, so this makes it very useful."

"I now walk wherever possible and generally take more exercise."

"Have found an activity that I have enjoyed and benefited from for nine years despite years of limited exercise previously."

"I have severe lumbar spinal stenosis and Nordic walking has helped me continue an activity (walking) with the support of the poles which I love and being outside in all weathers is so good for the soul!"

"Feel good factor in doing something rewarding and positive for the community."

"I don't suffer any mental health problems but I still feel better for being outdoors and active. I have seen people who do benefit hugely from the activities and many really enjoy the sense of inclusion."

"Being recently retired from full time school work it has restored some structure to my week, led to new friends and occupations beyond the actual volunteer days and given me great satisfaction from the nature conservation work we do."

"Positive on many levels: health and social benefits as well as making a difference to the environment and feeling appreciated."

“Lovely group, only limited by my other work commitments, but know I can do more if I have more spare time.”

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<sup>i</sup> National Statistics (2018). Statistics on Obesity, Physical activity and Diet England 2018. [PowerPoint presentation] Available at: <http://diabetestimes.co.uk/wp-content/uploads/2018/04/obes-phys-acti-diet-eng-2018-rep.pdf> (Accessed 30<sup>th</sup> January 2019)

<sup>ii</sup> Padwal RS, Hemmelgarn BR, Khan NA, et al. The 2008 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 1 - blood pressure measurement, diagnosis and assessment of risk. *Can J Cardiol.* 2008;24(6):455-63.

<sup>iii</sup> NICE (2019) Cardiovascular disease risk assessment and prevention. Available at: <https://bnf.nice.org.uk/treatment-summary/cardiovascular-disease-risk-assessment-and-prevention.html> . (Accessed 30<sup>th</sup> January 2019)

<sup>iv</sup> Tuomilehto J, Lindström J, Eriksson JG et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med.* 2001 May 3;344(18):1343-50.

<sup>v</sup> Brown KF, Runggay H, Dunlop C et al. The fraction of cancer attributable to modifiable risk factors in England, Wales, Scotland, Northern Ireland, and the United Kingdom in 2015. *Br J Cancer.* 2018 Apr;118(8):1130-1141. doi: 10.1038/s41416-018-0029-6. Epub 2018 Mar 23.

<sup>vi</sup> Age UK. 2015. Evidence review: loneliness in later life. Available at: [https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/health--wellbeing/rb\\_june15\\_lonelines\\_in\\_later\\_life\\_evidence\\_review.pdf](https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/health--wellbeing/rb_june15_lonelines_in_later_life_evidence_review.pdf) . (Accessed 30<sup>th</sup> January 2019)

<sup>vii</sup> National Osteoporosis Society (2019) Osteoporosis. Available at: <https://nos.org.uk/about-osteoporosis/what-is-osteoporosis/>. (Accessed 30<sup>th</sup> January 2019).

<sup>viii</sup> NHS England . (2017) The NHS in 2017. Available at: <https://www.england.nhs.uk/five-year-forward-view/next-steps-on-the-nhs-five-year-forward-view/the-nhs-in-2017/>. (Accessed 30<sup>th</sup> January 2019)

<sup>ix</sup> Office for Budgetary Responsibility (2016) Fiscal sustainability and public spending on health. Chart 2.3 Available at : [http://obr.uk/docs/dlm\\_uploads/Health-FSAP.pdf](http://obr.uk/docs/dlm_uploads/Health-FSAP.pdf). (Accessed 30<sup>th</sup> January 2019)

<sup>x</sup> Public Health England (2016) Heart Age Tool updated with new interventions and advice [Press Release]. 29<sup>th</sup> September. Available at: <https://www.gov.uk/government/news/heart-age-tool-updated-with-new-interventions-and-advice> (Accessed 27<sup>th</sup> January 2019).

<sup>xi</sup> National Statistics (2018). Statistics on Obesity, Physical activity and Diet England 2018. [PowerPoint presentation] Available at: <http://diabetestimes.co.uk/wp-content/uploads/2018/04/obes-phys-acti-diet-eng-2018-rep.pdf> (Accessed: 27<sup>th</sup> January 2019)

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