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"It's opened my eyes to what's out there": How do nature-based interventions influence access to and perceptions of the natural environment?

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ABSTRACT

The health and wellbeing benefits of engagement with the natural environment are well documented. Nature-based interventions (NBIs) can widen access, but little is known about how they affect independent use and perception of greenspace. This mixed methods study examines the longer-term influence of one NBI on woodland visits. 120 adults took part in a longitudinal questionnaire survey, and 20 participated in focus groups. An increase in independent woodland visits was found to continue to rise beyond the programme endpoint suggesting that NBIs can act as a turning point for engagement with nature, breaking down psychological, emotional and socio-cultural barriers.

1. Introduction

The positive impacts of spending time in nature on human health and wellbeing are increasingly well established (Bratman et al., 2019; Capaldi et al., 2015). This was recently illustrated in the UK, as elsewhere, during the coronavirus pandemic with recorded increases in outdoor exercise for the general population and a renewed appreciation of the benefits this can provide (ONS, 2021). However, engagement is often unequal across the social demographic (Boyd *et al.*, 2018) with certain groups under-represented and *"especially disconnected"* in visitor figures for natural landscapes, a persistent pattern over time (Department for Environment, Food and Rural Affairs, 2019:68). For example, low income, ethnic minority and older age groups are all less likely to visit frequently (Natural England, 2019). There is some evidence that these inequalities may have been exacerbated by the pandemic (Armstrong et al., 2021; Lee et al., 2022).

Understanding barriers to access is important, because if access to the natural environment is unequal, so is realisation of the potential wellbeing benefits it can offer. Much of the literature on woodland access focuses on physical barriers, but Morris *et al.*, (2011) identify the '*deep-seated psychological, emotional and socio-cultural nature*' of some of the barriers (375). A better understanding of what prevents the use of greenspace, particularly amongst less frequent users is needed. Additionally, studies have shown that lower status socio-economic groups stand to benefit disproportionately from access to nature (Wheeler *et al.*, 2015), and that this access has the potential to moderate socio-economically generated health inequalities (De Vries *et al.*, 2003; Hordyk *et al.*, 2015; Mitchell and Popham, 2008; Wheeler *et al.*, 2015). Thus, addressing this inequity offers a vital opportunity to capitalise on the health and wellbeing benefits offered by access to nature.

Nature-based interventions (NBIs) offer structured or guided activities with the direct aim of using the natural environment to improve health and wellbeing. As they often pair conservation organisations with health and social care groups, they can act as a 'bridge' for excluded groups, thus providing a partial solution to the outlined challenges. Indeed the World Health Organisation has acknowledged that few public health interventions can offer quite such a range of benefits as those in greenspace (WHO, 2017). However, whilst there is good evidence for their health and wellbeing benefits (Bragg and Atkins, 2016; Shanahan *et al.*, 2019), less is known about whether they are a catalyst to independent activity in the natural environment and if or how they impact subsequent use. Indeed, a lack of longer-term research is a commonly occurring critique of the field (Hartig *et al.*, 2014; Thompson-Coon *et al.*, 2011). The aim of this mixed methods study was, therefore, to develop an improved understanding of personal and perceived barriers to sustainable outdoor activity. The short and

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longer-term impacts of NBIs on access to and perceptions of greenspace, specifically woodlands were explored using the woodland activity programme Actif Woods Wales as a case study.

2. Methods

2.1. Actif Woods Wales

The Actif Woods Wales (AW) programme, run by Small Woods/Coed Lleol, a charity with more than a decade of experience in this arena, offers a range of activities including bushcraft, woodland walks and gym, conservation, campfire cooking, foraging and mindfulness. The duration of each programme is between four and twelve weeks with individual sessions lasting between two and four hours. On certain programmes, participants were offered continued support, for example monthly open drop in sessions. County level project officers target economically disadvantaged areas and work with a wide range of health and social care services (addressing, for example, mental health, recovery from addiction, or domestic violence projects) in order to recruit adults with a wide range of health conditions and support needs. Eligibility for this study included all adults participating in AW who were over 18 and who project staff assessed as having the mental capacity to understand and provide consent.

2.2. Study design

An interdisciplinary approach combined methodological and theoretical insights from the fields of health psychology and social geography and used questionnaires and focus groups to "*explore diverse perspectives and uncover relationships that exist between the intricate layers of our multifaceted research questions*" (Shorten and Smith, 2017: 74). We undertook longitudinal research collecting data at three points in time: a pre-NBI baseline (T1); the end of the NBI (T2); and approximately three months after the NBI had finished (T3). A time gap of three months was deemed to be appropriate to the aims of the research, that is, to provide enough time for any immediate impacts of the course to have subsided in the day to day or week to week lives of participants so that the degree to which any impacts had endured could be ascertained. Ethical approval was provided by the University of Bangor School of Psychology ethics committee (2017-16105). The influence on personal wellbeing was also investigated and is reported elsewhere (Author *et al.*, in review).

2.3. Questionnaires

AW staff introduced the study to attendees and where possible the researcher (HG) attended week one of each programme to administer data collection. At T1, questionnaires collected demographic data (gender, age, ethnicity, employment and education status) and invited participants to list any current health conditions/concerns. At each time point participants recorded the frequency with which they visited woods (ranging from never (1) to weekly (5)). Barriers to independent woodland access were identified through endorsement of any of 16 potential reasons presented. These were predominantly drawn from the Public Opinion of Forestry surveys (Forestry Commission, 2017) to allow comparison of the Actif Woods cohort to national data. Based on a review of the existing evidence, additional psychosocial factors suspected to be important to the study area were added (bad weather; no-one to go with; lack confidence; prefer other areas). Participants were asked to indicate whether each was major (2), minor (1), or not a reason (0), with a maximum score of 32.

IBM SPSS Statistics Version 24 was used for analysis. Change between T1 to T2 in frequency of woodland use was investigated using paired-samples t-tests and change in woodland use frequency across all three time points was assessed using a one-way repeated measures ANOVA test. Change scores were then computed for T1 to T2 and T2 to T3. The influence of gender on mean change in frequency of woodland use was examined by t-test, and other demographic influences were examined by ANOVA. Programme attendance was calculated as a % (of available sessions) and correlated with change in woodland use (Pearson *r)*. Any impact of programme length on change in woodland use was tested by ANOVA after splitting programmes into four groups based on their length. The barriers to woodland use were put into rank order at each time point to identify the salience of each one. In order to get an indication of barrier 'strength', the number of barriers per person was calculated. The total number of barriers per person was then compared to the previous stage using paired-samples t-tests and correlated with frequency of woodland use using Pearson *r*.

2.4. Focus groups

Focus groups were conducted with participants from a sub-set of programmes recruited for the survey in order to achieve an understanding of how woodland use was influenced by attendance at the NBI programme. They took place in parallel with T2 and T3 data collection and as part of an AW session. Where possible project and support staff were asked not to be present. A topic guide included prompt questions about frequency of woodland use and any perceived barriers or facilitating factors. Sessions were recorded and transcribed verbatim and analysis was done using Microsoft Word for data management using Braun and Clark's (2013) reflexive approach to thematic analysis, which is inductive and 'data-driven'. This involved coding transcripts into small segments of textual data with distinct meaning or importance and then aggregating these into themes. A sub-sample of this coding was corroborated by another member of the research team so as to validate their meaningful attribution to themes. The inductively generated themes from T2 were used deductively to purposively search for the presence or absence of change at T3.

3. Results

20 different cohorts were included, namely 17 multi-activity, one 'coppice products' and two 'mindfulness in the woods' programmes. The multi-activity programme included a range of the activities outlined in the methods section, adapted to suit the group and according to leader availability. The 'coppice products' programme involved learning how to coppice and making small items from coppiced wood and the 'mindfulness in the woods' programme loosely followed a standard mindfulness-based stress reduction programme (Kabat-Zinn, 2013) that had been shortened and adapted to the woodland environment.

The study took place between May 2017 and April 2019 and programme length ranged from 4 – 14 weeks. 120 adults were recruited to the questionnaire study at T1, of whom 74 completed questionnaires at T2 and 57 at T3 (Table 1). Across the cohort, there were slightly more women than men. Participants were spread across the age categories, with a slight underrepresentation of those aged over 65. Reflecting the demographic make-up of those using the service at the time, participants were predominantly White British. When divided into those with no disclosed health issues, physical or mental health issues only, or both physical and mental health issues there was a relatively even spread. Attrition analysis showed that there were no significant differences in the demographic composition of those who left and those who continued with the study. However, those who had visited the woods more at T1 before starting the programme were more likely to continue with the study. It is likely that those who continued with the study also continued with the AW programme, but this was not necessarily the case for each individual.

20 participants took part in T2 focus groups (Table 2), 15 of whom were also in the questionnaire study and five who had joined the programme since T1. 13 participants took part at T3, nine of whom had participated in the first round. One multiactivity group (G2) was lost to T3 follow-up due to a range of extenuating circumstances such as an extreme weather event and staffing changes. At both stages, focus group size ranged from three to five participants.

Table 1
Demographic data of questionnaire samples.

	Baseline (T1)		End of prog. (T2)		Follow-up (T3)	
Gender	**(*n* = 120)**	%	**(*n* = 74)**	%	**(*n* = 57)**	%
Male	54	45	32	43	24	42
Female	66	55	42	57	33	58
Age	**(*n* = 120)**		**(*n* = 74)**		**(*n* = 57)**	
18 – 44	49	41	28	38	22	39
45 – 64	51	43	32	43	24	42
65+	20	17	14	19	11	19
Ethnicity	**(*n* = 120)**		**(*n* = 71)**		**(*n* = 55)**	
White British	112	96	69	97	54	98
White other	3	3	1	1	1	2
Other ethnic group	2	2	1	1	0	0
Education	**(*n* = 117)**		**(*n* = 73)**		**(*n* = 56)**	
Sec. school (ss) to 16	39	34	21	29	17	30
Between (ss) and uni	30 26		20	27	16	29
University or higher	39	34	29	40	22	39
Other	8	7	3	4	1	2
Employment	**(*n* = 94)**		(*n* = 53)		**(*n* = 42)**	
Not stated	20	22	9	17	4	10
Employed	14	15	11	21	8	19
Unemployed	48	52	26	49	23	55
Retired	11	12	7	13	7	17
Type of health condition	**(*n* = 120)**		**(*n* = 74)**		**(*n* = 57)**	
None disclosed	27	23	20	27	13	23
Both	33	27	17	23	13	23
Mental health	32	26	18	24	15	26
Physical health	28	23	19	26	16	28

Table 2
Focus groups.

Group code	Programme type	Length	Referral route
G1	Coppice products	8 wks	Mental Health services
G2	Multi-activity*	12 wks	Mixed - mental health, self-referral
G3	Mindfulness	6 wks	Mixed - mostly self-referral
G4	Multi-activity	13 wks	Mixed - mental health and domestic violence services
G5	Multi-activity	12 wks	Mixed - mostly addiction recovery, also youth homelessness

Note: *End of programme only.

In analysing the focus group data, three main themes were identified. These were namely 'personal change', 'social processes' and 'held by nature'. 'Held by nature' had three sub-themes, 'nature as balm', 'rain can stop play' and 'accessibility'. As the focus of this paper is on woodland use and continuance post intervention, the themes 'rain can stop play' and 'accessibility' are explored here. The other themes inform the aforementioned, separate paper on wellbeing impact.

3.1. Overcoming barriers

Overall, the data revealed that the influence of the AW intervention at T2 was to reduce perceived barriers to woodland use, and for some, to conquer personal fears about woods. At T1, there was a significant negative association between the number of personal perceived barriers and individual frequency of visits to woods scores ($r = -.274$, $n = 112$, p .004), whereby a higher number of barriers was associated with a lower frequency of visits. A statistically significant decrease was found in the number of barriers reported per person from T1 ($M = 7.24$, SD = 6.75, $n = 63$) to T2 ($M = 5.56$, SD = 5.78), $t\,(62) = 2.07$, $p = .043$ (two tailed), with a moderate effect size (Eta squared = .06).

As Fig. 1 shows, the overall top-ranking barriers to woodland visits at T1 were 'no-one to go with', 'not having a car' and 'health reasons'. These remained the same at T2, however emphasis on what constituted major barriers had decreased. This was true of all the barriers except for two physical ones, 'lack of facilities' which had stayed the same and 'no public transport' which had increased slightly. In addition to 'difficulty moving around', 'no-one to go with' and 'health reasons' were where the biggest decreases were seen.

At T2, barriers to independent woodland use were not widely discussed or expanded upon within the focus groups, however, the theme labelled as 'rain can stop play' collated participants' diverse views on this matter. A prompt question about what might stop visits was initially met with a clear 'nothing' across all groups and the only factor that was raised by all the groups was the weather, presented as influencing *when* visits would take place, rather than if. Views were split into safety concerns like when the weather is more extreme, for example, *"It's not a good place to be (in a storm)"* (Sue, G3). Conversely, others felt that rain did not stop play, like *"it's good to be out, even with the weather not being good"* (Sarah, G5) or *"I like the rain"* (Marian, G1).

Predominantly, barriers raised were psychological, with participants expressing a clear sense of their own control over them. As Jim (1a) explained, "*the only thing that would stop me is myself. Other than that I do, I go to the woods every day*". A feeling of unease in relation to being alone in the woods was mentioned by Dafydd (G3). He explained that whilst it did not stop him, he sometimes felt a little uneasy: "*It can make you feel a bit isolated maybe sometimes*". Other reported concerns involved being scared about getting lost, *"because…the paths look similar"* and a *"lack of…navigational skills"* meaning that *"I'd have to have somebody with me to show me a few times"* (Diana, G4). Participants also reported overcoming some personal barriers such as fear or a lack of confidence, for

Fig. 1. Barriers to visiting woods at T1 and T2.

example *"I used to find them really scary, but…there's nothing to be afraid of is there?"* (Angie, G4).

Woodland management as a barrier was mentioned by Gemma (G2), a participant with specific physical needs. She identified a need to clear fallen trees in her local woods which limited her access, but physical access was not mentioned otherwise. This related to a similar point made by Derek (G3) about how a lack of active management made his nearby woods unappealing, *"I walked through it once…not impressed. Not*

with that one, no. It's just, I don't know, it just looks uncared for that one, you know, a bit, rubbishy". This is something he attributed to location, *"Yeah, well, it's right in the middle of a huge housing estate isn't it really…and school"*, suggesting a preference for a more remote environment. The type of woods made a difference in one group, with conifer plantations being dismissed as "*just crops"* (Derek, G3) and considered markedly less appealing. They were referred to as having a different 'feel', for example, *"but like plantations are different aren't they, totally different"* (Derek, G3) or *"I wouldn't go to a pine wood with my partner because he would do nothing but complain (laughs) and then it would never be a joy because he hates pine trees"* (Jane, G3).

3.2. Changing use of woodlands

Almost half of the study sample at T1 were not regular woodland visitors (47%). The proportion of people who reported 'never' going to the woods other than as a part of AW initially decreased from 17% at T1 ($n = 112$) to 8% at T2 ($n = 51$), with a slight increase to 12% by T3 ($n = 43$). At T2, following the various interventions, there was an increase in woodland visit frequency with a moderate effect size of 0.07. (T1 M =3.65, SD = 1.31, T2 M = 4, SD = 1.32, $n = 48$, t= -1.85, $p = 0.071$^). No significant effects on gender, age, educational or type of health condition were seen in terms of these changes. Findings indicated that programme attendance (%) had no significant association with frequency of woods visits although there was a trend indicating that longer programmes were associated with more visits.

3.3. Accessibility

Whilst the increased frequency of woodland use manifests itself in relatively modest statistical trends, focus group data suggests more marked changes in perceptions and usage of woodland. These views were collated under the theme titled 'accessibility'. In particular, coding revealed shifts in perceived access to woods, especially the different ways that woods or nature had come on to (or back on to) participants' 'radars'. By this we mean that AW participants spoke of how the intervention raised their awareness of the possibilities of accessing woodlands. First there were those who were essentially introduced to woodlands through the programme, for example, "*certainly it's opened my eyes to what's out there"* (Marian, G1). Surprise at the *"realisation that it makes you feel good"* (Anna, G2) was often expressed, showing a new awareness that woodlands could offer spaces for improving wellbeing. This often involved a shift in perception of it as a 'space for me', coupled with a new-found comfort and a sense of feeling at home there. Dave (G5), for example, who became a regular conservation volunteer following study participation noted *"It's given me a lot more confidence in an environment that I wasn't confident in before"*.

A second grouping were those for whom nature had *come back* onto their 'radar' through the programme, often due to a *re*membering or reconnecting with earlier positive experiences. For one group (G3) this was more often about how the programme had enabled them to prioritise something which they knew 'worked' for them as a coping strategy. For example, *"you can just forget how much pleasure and support you get from an environment that suits you"* (Sue). In Dylan's case (G4), it was not 'busyness' that had stopped him accessing woods, but his poor mental health, explaining that he *"always used to be out in the fresh air, running and that in the woods…and coming back to the woods has helped me with me confidence and it's helped me with my depression and anxiety"*. The third grouping related to the less widespread views of those who participated because they loved the woods and were already active visitors such as Arthur (G5) who said that at first, "*I wasn't sure about AW, I just wanted to do something outside, I love being outside"*.

The 'accessibility' theme also included the transformation of intentions into actions for the majority of those in the focus groups, specifically independent woodland use. Such behaviour changes had led to regular visits for some, like Derek (G3) who described himself as having stopped moving prior to the programme but now goes to the woods on his doorstep daily, "*round the block in the morning just to get going*". This was also the case for Jane (G3), cycling through the woods on her way to work, and for Sue (G3), "*Oh I go every other day, to the woods near my house*", newly prioritising this in her busy life. Actions such as buying a bivvy bag for sleeping out in the woods (Sue, G3) or a 'silky saw' for conservation tasks (Jim, 1a) were declared with some excitement at the new possibilities they offered.

It was apparent that changes had also occurred in the *way* that time was spent in the woods following the programme. Participants on the mindfulness programme described more deliberately savouring the experience and finding it easier to practice mindfulness outdoors than indoors. This was also the case in other groups, for example Jim (G1) talked about *"making more of it now"*, saying that he *"…will actually stop now and just sit in the woods while the dogs go, and just let them…just sit there in the woods, doesn't matter how dirty you get"*. This was met with emphatic agreement from the rest of the group who attributed this to gaining a deeper understanding of the woodland habitat, such as *"all the knowledge that we've gained from being here"* (Marian, G1) or "*being able to recognise your trees and your leaves…"* (Janet, G1). Having one eye out for what practical conservation work was needed was also widely discussed.

3.4. Maintaining change

At T3 (three months after end of programme), the rank order of the top three barriers remained the same as at T2, however the predominant trend was a continued, albeit smaller decrease. There was a small, non-significant increase in the mean number of barriers per person (T2 M = 5.23, SD = 5.03, T3 M = 5.89, SD = 4.68), $t(45) = -1.15$, $p = .256$ (two tailed). With respect to the 'rain can stop play' theme, the general attitude to barriers in the T3 focus groups was very similar to T2, whereby a guide question about anything that would discourage woodland use was initially met with a resounding 'no' by all groups. It was clear that shifts in perspective on psychological barriers had held and supported the maintenance of new access behaviours. One example is Fiona (G5) who explained how the outdoors looked different to her now:

> *"…like in my eyes you know, it looked scary before I started all this, you know scary people…but now I'm just like, yeah, I can do it now. Yeah. It doesn't look scary…It looks nice"*

As at T2, the influence of fluctuating mental health was again highlighted at T3, such as Cath (G4) who spoke about how this stopped her at times, "*Well, no, nothing would put me off, it's just that with mental health problems, you have really bad days…and some days you can't go out*". Echoing earlier findings at T2, how being with other people could be protective against this was reported: *"being known, being with friends makes a difference*". A fear of getting lost was re-iterated, but again, company was described as mitigating this barrier: *"if I had somebody to go with me who know the way I'd be happy to go"* (Diana, G4).

Forty participants had answered the question on woodland use at all three time points and so were trackable across the period of the study. The indication was that at T3 the trend for increased woodland use observed at T2 had been maintained and continued to rise (Fig. 2).

Focus group data collated under the 'accessibility theme' at T3 reinforced this finding with many examples of regular woodland use becoming embedded. This varied between a re-visiting of 'old haunts' to regular use of the woods where the programmes had taken place, for example Derek (G3) reporting on a maintained routine of a daily walk: "*I'm making an effort to get out more into nature*". It was evident that 'making more' of going to the woods had held for all the groups, for example feeling more connected through enhanced sensory engagement, *"You know it's the touching and…taking it all in…rather than just going for a walk…it's got a bit more meaningfulness in it, well for me anyway"* (Dafydd, G3). This had resulted in a shift in the value attached to woodland: *"So you can sometimes get a bit complacent with things around you can't you when you're out like that, but you think you've got that little*

Fig. 2. Descriptive statistic scores from repeat measure ANOVA for frequency of woodland use (n= 40).

reminder of just stopping for a minute… and just taking it all in" (Jane, G3). It seemed evident that this different use and view of the woods enhanced enjoyment of them:

> *"It's changed my kind of perspective on how to walk through the woods… and appreciate the woodland a little bit more, rather than just seeing it as something that's in the way, and it's, you know it can actually be a destination not just be a place to get through"* Dave (G5).

4. Discussion

Access or perceived access to woodland spaces is vital if the widely evidenced health and wellbeing benefits of nature are to be realised fairly across society. Responding to a key gap in the literature, this study showed how attitudes affecting independent engagement with woodlands could change following participation in an NBI. The positive trend in increased woodland visits shown here echoes research on the 'Active Forest' programme (see O'Brien and Forster 2017) which found an accelerating upward trend through time for sporting activity amongst less active individuals. Previous studies have usefully highlighted the *potential* of NBIs to act as a springboard for returning to nature independently (Goodenough, 2015; Morris and O'Brien, 2011; Maund *et al.*, 2019). However, whether intentions expressed resulted in actual visits has been largely unknown, which is why long-term studies such as those reported here are needed to ascertain the impact of interventions over time.

4.1. Diminished barriers

Our findings build on evidence that structured interventions can be useful tools for breaking down barriers to independent woodland access (O'Brien and Morris, 2014), adding evidence of maintained change. The decrease in the number and strength of perceived barriers was corroborated by personal stories that developed and extended understanding - providing insight into these perspective shifts.

The list of potential reasons not to visit woods used here was based on, but not identical to, the Public Opinion of Forestry surveys (POFS). However, a barrier that was added for the study ('no-one to go with') emerged as key. As such, a recommendation is that the addition of this to future POF surveys would be worthwhile. Focus group data helped to understand participants' reasoning behind this, such as how having someone to go with would allay their fears about getting lost and support them when 'having a bad day'. Previous research has also highlighted how company matters, for example a large-scale review showed that "*…people's enjoyment of the outdoors is enhanced when they are spending time with family and friends, and in particular with partners*" (What Works Wellbeing, 2018:4). Similarly, a qualitative study of low income, multi-ethnic families reported on the importance of social support for reducing fears around using these green spaces (Cronin-de-Chavez et al., 2019). This insight into the need to focus on social as well as physical factors is vital. If land management stakeholders are serious about widening access then greater efforts are needed to provide social opportunities such as NBIs in nature, particularly ones which may enhance feelings of relaxation and bonding. Indeed, such initiatives have been recommended by Public Health England to improve access to greenspace for those who do not use it (Ridgley *et al*, 2020).

Results showed how an NBI can implicitly address all three key issues identified by a rapid evidence review on public access to woods and forests (Morris *et al.*, 2011), that is the knowledge and awareness of where and how to use them, the motivation and enthusiasm to do so and feeling welcome. This is not to be underestimated given the considerable challenge of addressing these psychological barriers, referred to as 'mental accessibility' by O'Brien, *et al.*, (2017). There has been a rise in popular literature on the health and wellbeing benefits of nature (Hardman, 2020; Mitchell, 2021), however, as our findings show, for many, nature might initially be associated with fear or discomfort. Indeed, it is wise to be wary of culturally specific assumptions or romantic notions of nature, and these kinds of assumptions and their problematic nature have been commented on by Dickinson (2013). She points out that they negate cultural complexities around accessibility, such as how finance or resources may be barriers for low-income families, arguing that they purport a sentimental 'when we were young' discourse about children and the countryside that is culturally specific to the writers' idealised childhood experiences. As such, new NBIs need to be aware of potentially differing pre-conceptions of nature alongside practical issues such as new visitors not having appropriate clothing.

4.2. A greenspace turning point

An effect of prior woodland use on continuation with the study was apparent in the attrition analysis. Nonetheless, although the sample included those who were already regular users, for many, woodland use either came onto or back 'onto their radar' through their participation in the programme. This was particularly evident in the focus group data. The term 'nature-acculturation' (Bell *et al.*, 2014) highlights the importance of prior visits, such as the way that childhood memories (where they have taken place and assuming that they are positive ones) can enhance the value of a place. Similarly, the role of childhood experiences for predicting adult visiting behaviour has been shown (Thompson and Montarzino, 2008). Nonetheless, focus group data reported here (such as newly feeling that the natural environment was a welcome place and feeling comfortable in an unfamiliar habitat) gave good insight into how a *lack* of prior familiarity could be addressed by NBI participation, with the potential for it to act as a turnaround experience for those adults. Bell (2014) refers to this kind of experience as a 'greenspace turning point' and Cleary *et al.*, (2020) report that whilst childhood experiences are important, current nature experiences can still lead to high levels of nature connection.

The survey findings showed that longer programmes were associated with more subsequent woodland visits, suggesting that a growing sense of ease over time was needed for this process to occur. It is likely that the opportunity for repeated exposure or re-exposure to nature over the course of such programmes can in some way provide a substitute for the regular visits in a cohesive group that childhood family visits might have had. The aforementioned social support to access woodlands through structured interventions has potential to create a space where participants feel safe and emotionally secure. This can then lead to a process of acculturation, whereby the greenspace becomes less scary and being there becomes normalised. Knowledge about the habitat, being attentive to the wildlife, understanding it better and caring for it all support this shift. These results resonate with those reported by a study on supported programmes at Westonbirt Arboretum which highlighted the importance of repeat visits for enabling familiarity, especially for vulnerable participants (O'Brien, 2018). Reflecting on why, the study found that the intensive and immersive nature of programmes with small numbers of participants could support an emotional affinity with nature.

For new users, findings illustrated how very often the seed of an idea must be planted (or re-planted) regarding the benefits that woods can offer. Addressing those who lack this awareness is crucial as without this there is no starting point. Likewise, in a qualitative study on office workers, Hitchings (2013) identified that many people had simply lost touch with the 'very idea' of spending time outdoors. It was also apparent that the NBI could reverse interruption, providing a 'green-space *re*-turning point' for those who had become disconnected due to busy lives, stress and poor mental health, re-connecting participants with positive childhood memories, and often, happier times.

It is useful to think of changing access behaviour in two stages. Firstly, getting underrepresented groups there in the first place, and then facilitating it to becoming routine or habit so that nature (and the associated health and wellbeing benefits) becomes part of everyday life. This progression can be explained by the Prochaska and DiClemente 'Stages of Change' model (1993), whereby behaviour change requires a move firstly from pre-contemplation to contemplation. To do that a person has to see the benefit of the behaviour in question, such as becoming aware of or reconnecting with the positive impact of spending time in nature on their health and wellbeing. This precedes a move from contemplation to preparation and ultimately action, for which there is a need to be supported in addressing or removing perceived (and actual) barriers to the behaviour. Finally, (albeit with the ever-present possibility of relapse), the maintenance stage refers to changes becoming embedded. The aforementioned social interactions can help in supporting intentions to turn into actions. It was evident that each stage was addressed by the NBI which had led to repeated actions being set down as new habits and lasting behaviour changes for some participants in this study.

As the demographic data shows, AW successfully engages with some of those social groups under-represented in visiting figures, particularly lower socio-economic status groups. This is important given that approximately a fifth of the UK population are not accessing greenspace yet doing so can moderate health inequalities (De Vries *et al.*, 2003; Mitchell and Popham, 2008; Wheeler *et al.*, 2015). These results may be transferrable to other under-represented groups not prevalent in this sample, such as those from ethnic minorities, however further targeted research would be needed to investigate this. It is worth noting that the demographic composition of the sample reflects the local population of Wales where the study took place (Welsh Government, 2022).

4.3. What is access and does this matter?

Spending two hours a week in nature has been associated with being more likely to report good health and higher psychological wellbeing (White et al., 2019). However, it is worthwhile reflecting on what access means and different conceptualisations of greenspace use. Keniger *et al.*, (2013) propose three categories of exposure which furthered understanding. They identified that whilst there are many benefits associated with 'intentional interactions' or deliberate visits, 'indirect interactions' such as seeing nature, and 'incidental interactions' which occur whilst engaging in other activities such as commuting are also beneficial. It was clear from the qualitative data collated under the 'accessibility' theme that longer term, some had become 'incidental' users, whilst for others, visiting woods and exercising had become part of daily routines i.e., new habits were laid down. Therapeutic landscape work shows us that it is not just about being physically present in a place, but about complex interactions around how meanings are given to places and attachments formed (Bell *et al.*, 2015). Indeed, the results showed how meanings given to the woodland space by participants changed as they gained knowledge and a deeper sense that it was 'for them', breaking down access barriers and strengthening feelings of nature connection. Without these kinds of shifts, woodlands would no doubt lack the kind of associations that are needed for 'therapeutic encounter' (Muirhead, 2012:141).

We know from early work by Kaplan and Kaplan (1989), that a 'dose' of nature does not have to be total immersion, having demonstrated that even having a green view is beneficial. However, the focus group data showed how the programmes offered a conduit to people spending time differently in the woods, such as being more mindful there. This changed behaviour could be aligned with a Japanese forest therapy style approach (Park *et al.*, 2010), taking in the woods through the senses and seeing them as a place to linger. It is helpful to question to what extent this matters. Studies have associated higher levels of nature connection with both enhanced wellbeing (Pritchard et al., 2020) and pro-environmental behaviour (Whitburn *et al.*, 2020). Whilst nature connection was not measured in this study, the narrative accounts demonstrated positive change here which had altered perceptions such as valuing nature more. Results demonstrated the importance of providing opportunities in natural areas that are not just 'cardio' (e.g., mountain biking), like the value of quiet time in nature. Research to further explore the difference in impacts between 'doing' time and 'being' time in nature would be useful. On a practical level, this could involve investigating potential for the provision of Japanese Forest Therapy type centres or wider use of mindfulness in nature activities. This could be in line with provision of broader activity programmes like Actif Woods.

5. Conclusion

To our knowledge, this is the first mixed methods study on maintained change in independent access to nature following a nature-based intervention. On a practical level, collecting enough follow-up data from participants once programmes had ended was challenging and one reason for the gap in the evidence base for longitudinal research. Ideally research with further cohorts would be followed up for longer so that issues around maintenance of any change could be more fully addressed. Specific follow-up sessions that offered an activity in tandem with the data collection were helpful. Naturally there is a potential positivity bias of those who elect to participate in focus groups or come back for follow-up sessions. However, all participants were invited and those taking part were encouraged to answer and speak honestly.

As stated at the outset, nature has proven benefits for wellbeing, but access is not equal. The groups under-represented in visitor figures often have worse health and yet greenspace can be disproportionately beneficial for them. This study shows that NBIs can widen access by attracting atypical users to the natural environment, breaking down potentially deeply entrenched psychological, emotional and socio-cultural barriers and increasing the value placed on it by them. It was also evident that programmes can act as an adult greenspace *re*-turning point for those who have lost the habit of accessing nature regularly. Crucially, the study shows how NBIs can initiate independent woodland use beyond the life of programmes, furthering understanding of how altered perceptions and use of nature are maintained. Findings hold implications regarding a need for wider use of NBIs by the health service in order to broaden access to the wellbeing benefits that nature can offer. This requires sustainable funding and support to embed the role that they can play. They also give a clear indication to land management stakeholders looking to proactively diversify their visitor base about the potential of such programmes to achieve this.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Armstrong, A., Brockett, B., Eustice, T., Lorentzon, A., O'Brien, L., Williams, S., 2021. Why Society Needs Nature Lessons From Research During Covid-19. Forest Research. https://www.forestresearch.gov.uk/news/why-society-needs-nature.

Author et al., in review (details removed for peer review).

Bell, S.L., Phoenix, C., Lovell, R., Wheeler, B.W., 2014. Green space, health and wellbeing: Making space for individual agency. Health & Place 30, 287–292. https://doi.org/10.1016/j.healthplace.2014.10.005.
Bell, S.L., Phoenix, C., Lovell, R., Wheeler, B.W., 2015. Seeking everyday wellbeing: The coast as a therapeutic landscape. Social Science & Medicine 142, 56–67. https://doi.org/10.1016/j.socscimed.2015.08.011.
Boyd, F., White, M.P., Bell, S.L., Burt, J., 2018. Who doesn't visit natural environments for recreation and why: A population representative analysis of spatial, individual and temporal factors among adults in England. Landscape and Urban Planning 175, 102–113. https://doi.org/10.1016/j.landurbplan.2018.03.016.
Bragg, R., Atkins, G.J.N.E.C.R., 2016. A review of nature-based interventions for mental health care. Natural England Commissioned Reports 204.
Bratman, G.N., Anderson, C.B., Berman, M.G., Cochran, B., De Vries, S., Flanders, J., Folke, C., Frumkin, H., Gross, J.J., Hartig, T., Kahn Jr, P.H., 2019. Nature and mental health: An ecosystem service perspective. Science advances 5 (7), p.eaax0903. https://doi.org/10.1126/sciadv.aax0903.
Braun, V., Clarke, V., 2013. Successful qualitative research: A practical guide for beginners. Sage Publications Ltd.
Capaldi, C.A., Passmore, H.A., Nisbet, E.K., Zelenski, J.M., Dopko, R.L., 2015. Flourishing in nature: A review of the benefits of connecting with nature and its application as a wellbeing intervention. International Journal of Wellbeing 5 (4). https://doi.org/10.5502/ijw.v5i4.449.
Cleary, A., Fielding, K.S., Murray, Z., Roiko, A., 2020. Predictors of nature connection among urban residents: Assessing the role of childhood and adult nature experiences. Environment and Behavior 52 (6), 579–610. https://doi.org/10.1177/0013916518811431.
Cronin-de-Chavez, A., Islam, S., McEachan, R.R., 2019. Not a level playing field: A qualitative study exploring structural, community and individual determinants of greenspace use amongst low-income multi-ethnic families. Health & place 56, 118–126. https://doi.org/10.1016/j.healthplace.2019.01.018.
Department for Environment, Food and Rural Affairs, 2019. Landscapes review: final report.
De Vries, S., Verheij, R.A., Groenewegen, P.P., Spreeuwenberg, P., 2003. Natural environments—healthy environments? An exploratory analysis of the relationship between greenspace and health. Environment and planning A 35 (10), 1717–1731. https://doi.org/10.1068/a35111.
Dickinson, E., 2013. The misdiagnosis: Rethinking "nature-deficit disorder. Environmental Communication: A Journal of Nature and Culture 7 (3), 315–335. https://doi.org/10.1080/17524032.2013.802704.
Forestry Commission, 2017. *Public Opinion of Forestry 2017, UK and England*. 13 July 2017.
Goodenough, A., Waite, S., Bartlett, J., 2015. Families in the forest: Guilt trips, bonding moments and potential springboards. Annals of Leisure Research 18 (3), 377–396. https://doi.org/10.1080/11745398.2015.1059769.
Hardman, I., 2020. The Natural Health Service: What the Great Outdoors Can Do for Your Mind. Atlantic Books, Limited, United Kingdom.
Hartig, T., Mitchell, R., De Vries, S., Frumkin, H., 2014. Nature and health. Annual review of public health 35, 207–228. https://doi.org/10.1146/annurev-publhealth-032013-182443.
Hitchings, R., 2013. Studying the preoccupations that prevent people from going into green space. Landscape and Urban Planning 118, 98–102. https://doi.org/10.1016/j.landurbplan.2012.09.006.
Hordyk, S.R., Hanley, J., Richard, É., 2015. Nature is there; its free": Urban greenspace and the social determinants of health of immigrant families. Health & place 34, 74–82. https://doi.org/10.1016/j.healthplace.2015.03.016.
Kabat-Zinn, J., 2013. Full catastrophe living, revised edition: how to cope with stress, pain and illness using mindfulness meditation. Hachette, UK.
Kaplan, R., Kaplan, S., 1989. The experience of nature: A psychological perspective. Cambridge university press.
Keniger, L.E., Gaston, K.J., Irvine, K.N., Fuller, R.A., 2013. What are the benefits of interacting with nature? International journal of environmental research and public health 10 (3), 913–935. https://doi.org/10.3390/ijerph10030913.
Lee, S., Lee, C., Xu, M., Li, W., Ory, M., 2022. People living in disadvantaged areas faced greater challenges in staying active and using recreational facilities during the COVID-19 pandemic. Health & Place 75, 102805. https://doi.org/10.1016/j.healthplace.2022.102805.
Maund, P.R., Irvine, K.N., Reeves, J., Strong, E., Cromie, R., Dallimer, M., Davies, Z.G., 2019. Wetlands for wellbeing: Piloting a nature-based health intervention for the management of anxiety and depression. International journal of environmental research and public health 16 (22), 4413. https://doi.org/10.3390/ijerph16224413.
Mitchell, Emma., 2021. The Wild Remedy: How Nature Mends Us - A Diary. United Kingdom: Michael O'Mara, London.
Mitchell, R., Popham, F., 2008. Effect of exposure to natural environment on health inequalities: an observational population study. The lancet 372 (9650), 1655–1660. https://doi.org/10.1016/S0140-6736(08)61689-X.
Morris, J., O'Brien, E., Ambrose-Oji, B., Lawrence, A., Carter, C., Peace, A., 2011. Access for all? Barriers to accessing woodlands and forests in Britain. Local Environment 16 (4), 375–396.
Muirhead, S., 2012. Exploring embodied and emotional experiences within the landscapes of conservation volunteering. In: Atkinson, S.J., Fuller, S., Painter, J. (Eds.), Wellbeing and place. Ashgate, pp. 141–153.
Natural England, 2019. People's engagement with nature. Reflecting on ten years of the Natural England MENE survey. Natural England. https://naturalengland-defra.opendata.arcgis.com/apps/Defra::peoples-engagement-with-nature-/explore.
O'Brien, L., 2018. Engaging with and shaping nature: A nature-based intervention for those with mental health and behavioural problems at the Westonbirt arboretum in England. International Journal of Environmental Research and Public Health 15 (10), 2214. https://doi.org/10.3390/ijerph15102214.
O'Brien, L., De Vreese, R., Atmiş, E., Olafsson, A.S., Sievänen, T., Brennan, M., Sánchez, M., Panagopoulos, T., Vries, S.D., Kern, M., Gentin, S., 2017. Social and environmental justice: diversity in access to and benefits from urban green infrastructure–examples from Europe. The urban forest. Springer, Cham, pp. 153–190. https://doi.org/10.1007/978-3-319-50280-9_15.
O'Brien, L., Forster, J., 2017. Fun and Fitness in the Forest: Monitoring and Evaluation of the Three Year Active Forests Pilot Programme. Forest Research, Farnham, UK.
O'Brien, L., Morris, J., 2014. Well-being for all? The social distribution of benefits gained from woodlands and forests in Britain. Local Environment 19 (4), 356–383. https://doi.org/10.1080/13549839.2013.790354.
Office for National Statistics. 2021. How has lockdown changed our relationship with nature? Article dated 26 April 2021. Accessed 27.7.21.
Park, B.J., Tsunetsugu, Y., Kasetani, T., Kagawa, T., Miyazaki, Y., 2010. The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan. Environmental health and preventive medicine 15 (1), 18–26. https://doi.org/10.1007/s12199-009-0086-9.
Pritchard, A., Richardson, M., Sheffield, D., McEwan, K., 2020. The relationship between nature connectedness and eudaimonic well-being: A meta-analysis. Journal of Happiness Studies 21 (3), 1145–1167. https://doi.org/10.1007/s10902-019-00118-6.
Prochaska, J.O., DiClemente, C.C., Norcross, J.C., 1993. In search of how people change: Applications to addictive behaviors. Addictions Nursing Network 5 (1), 2–16.
Ridgley, H., Hands, A., Lovell, R., Petrokofsky, C., Stimpson, A., Feeley, A., Bedford, A., Fenech, B., Leeman, D., Skykes, E., Price, G., 2020. Improving access to greenspace A new review for 2020. Public Health England.
Shanahan, D.F., Astell–Burt, T., Barber, E.A., Brymer, E., Cox, D.T., Dean, J., Depledge, M., Fuller, R.A., Hartig, T., Irvine, K.N., Jones, A., 2019. Nature–based interventions for improving health and wellbeing: The purpose, the people and the outcomes. Sports 7 (6), 141. https://doi.org/10.3390/sports7060141.
Shorten, A., Smith, J., 2017. Mixed methods research: expanding the evidence base. Evidence-based nursing 20 (3), 74–75. https://doi.org/10.1136/eb-2017-102699.
Thompson, C.W., Aspinall, P., Montarzino, A., 2008. The childhood factor: Adult visits to green places and the significance of childhood experience. Environment and behavior 40 (1), 111–143. https://doi.org/10.1177/0013916507300119.
Thompson Coon, J., Boddy, K., Stein, K., Whear, R., Barton, J., Depledge, M.H., 2011. Does participating in physical activity in outdoor natural environments have a greater effect on physical and mental wellbeing than physical activity indoors? A systematic review. Environmental science & technology 45 (5), 1761–1772. https://doi.org/10.1021/es102947t.
Welsh Government. 2022. StatsWales. Ethnicity by area and ethnic group, Last updated April 2022. Accessed 30.05.22. https://statswales.gov.wales/Catalogue/Equality-and-Diversity/Ethnicity/ethnicity-by-area-ethnicgroup.
What Works Wellbeing., 2018. Family and outdoor recreation: Does spending time taking part in activities outdoors with family improve wellbeing? Briefing. www.whatworkswellbeing.org.
Wheeler, B.W., Lovell, R., Higgins, S.L., White, M.P., Alcock, I., Osborne, N.J., Husk, K., Sabel, C.E., Depledge, M.H., 2015. Beyond greenspace: an ecological study of population general health and indicators of natural environment type and quality. International journal of health geographics 14 (1), 1–17. https://doi.org/10.1186/s12942-015-0009-5.
Whitburn, J., Linklater, W., Abrahamse, W., 2020. Meta-analysis of human connection to nature and pro-environmental behavior. Conservation Biology 34 (1), 180–193. https://doi.org/10.1111/cobi.13381.
White, M.P., Alcock, I., Grellier, J., Wheeler, B.W., Hartig, T., Warber, S.L., Bone, A., Depledge, M.H., Fleming, L.E., 2019. Spending at least 120 minutes a week in nature is associated with good health and wellbeing. Scientific reports 9 (1), 1–11. https://doi.org/10.1038/s41598-019-44097-3.
World Health Organization, 2017. Urban Green Space Interventions and Health: A review of impacts and effectiveness. http://www.euro.who.int/_data/assets/pdf_file/0010/337690/FULL-REPORT-for-LLP.pdf?ua=1.