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Nature on Prescription

A mixed method evaluation of the Nature on Prescription social prescribing programme

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HERA LAB

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Introduction

The Nature on Prescription (NoP) programme provided by Gloucestershire Wildlife Trust was established to support individuals in a cardiac care pathway in Gloucestershire, to support their health and wellbeing through their recovery. The programme aimed to address cardiovascular health condition recovery through engaging with nature and various activities using the natural environment as a setting. The programme was devised to provide a dual benefit for people and the natural environment by providing support and education about cardiac health, and the protection and enhancement of Gloucestershire's green spaces. The programme was developed to target specific areas within the county where cardiovascular health issues are both more common and more complex, thereby answering a health need of the population. The programme provided a variety of nature-based activities centring walks and wild outdoors programmes (including practical conservation), incorporating education regarding cardiac health. The infrastructure of these sessions was based on helping participants to develop confidence in the outdoors, increase their overall levels of healthy physical activity, and provided elements of self-regulatory activities such as mindfulness.

Objectives

The evaluation set out to answer two questions:

1. Are there changes in participants' levels of nature relatedness, anxiety, depression, and wellbeing after involvement in the programme?
2. What are participants' experiences and perceptions of the programme?

Method

The evaluation employed both quantitative and qualitative methods to address the objectives. Participant self-report data were used to address objective 1; comparing before and after scores on validated psychometric questionnaires utilised in parallel social prescribing modalities, and research into human/nature interactions. Focus groups and interviews were carried out at the end of the course to address objective 2.

Results

Quantitative assessments show mixed support for the programme depending on the outcome being utilised. The programme is associated with increased levels of nature relatedness (a concept of feeling close to, or part of, nature) and increased wellbeing. Measures for anxiety and depression, whilst improved following the programme, did not provide significant reductions. These latter findings may be attributed to the specific context of the patient-participant population, or the conclusion of the programme coinciding with the onset of the Covid-19 pandemic in the UK.

Qualitative findings provided a number of dominant themes that were identified under the headings 'outcomes' and 'barriers and facilitators to participation'. The dominant outcome themes for participants were all positive and were grouped into three themes; 'physically fitter', 'learning' and 'social interaction'. However, the one-to-one interviewees built on the feeling physically fitter theme by adding how they also felt 'psychologically fitter'. This may possibly be attributed to the more intimate nature of a one-to-one interview. The dominant themes for barriers and facilitators that were represented across the group were two-fold; grouped under 'initiation' and 'engagement'. For facilitator to participation, these were seen as grouped as 'enhancing initiation' (such as 'advertisement by meaningful other') and 'enhancing engagement' (such as 'social interaction'). Barriers to participation were grouped under 'limiting initiation' (such as 'fears of fitness') and 'limiting engagement' (such as 'differing priorities').

Conclusions

The programme, from the methods employed for its evaluation, shows support for it being an effective programme in promoting mental health and wellbeing in cardiac rehabilitation patient-participants.

Recommendations

Several recommendations are provided to increase data robustness to facilitate future evaluation. Recommendations regarding practice are also provided to both continue and enhance good practice.

Lay Executive Summary

What is the report about?

The Nature on Prescription (NoP) programme provided by Gloucestershire Wildlife Trust was established to support individuals in a cardiac care pathway in Gloucestershire, to support their health and wellbeing through their recovery. The programme aimed to address cardiovascular health condition recovery through engaging with nature and various activities using the natural environment as a setting. The programme was devised to provide a dual benefit for people and the natural environment by providing support and education about cardiac health, and the protection and enhancement of Gloucestershire's green spaces. The programme was developed to target specific areas within the county where cardiovascular health issues are both more common and more complex, thereby answering a health need of the population. The programme provided a variety of nature-based activities centring walks and wild outdoors programmes (including practical conservation), incorporating education regarding cardiac health. The infrastructure of these sessions was based on helping participants to develop confidence in the outdoors, increase their overall levels of healthy physical activity, and provided elements of self-regulatory activities such as mindfulness.

What did it aim to do?

The evaluation set out to answer two questions:

1. Are there changes in participants' levels of nature relatedness, anxiety, depression, and wellbeing after involvement in the programme?
2. What are participants' experiences and perceptions of the programme?

How did it do it?

The evaluation employed survey type data (using questionnaires completed by participants), and responses from participants during focus groups and interviews to address the objectives. Participant self-report questionnaire answers were used to answer the first question by comparing before and after scores. Interviews and focus group discussions were then carried out at the end of a course to answer the second question.

What did it find?

Questionnaire analyses show mixed support for the programme depending on what is being considered. Nature relatedness (how we feel about nature, and what we feel nature is for) as well as wellbeing are increased after taking part. Levels of anxiety and depression, whilst improved following the programme, did not pass the threshold for clinically meaningful change. This could be because anxiety and depression in this patient-participant population are very complicated and difficult to measure accurately, or because the programme concluded during the onset of the Covid-19 pandemic in the UK.

Analysis of focus groups and interviews identified some key themes which were for the most part positive. Under a grouping of 'outcomes', participants felt that they had become both physically and psychologically fitter because of participating in the NoP programme. They also reported that they had learnt a lot about nature and their own health due to conversations with both the programme facilitators and other participants. Under a heading of 'Facilitators and barriers to participation', many participants got involved initially because they had been recommended the programme by a healthcare professional, and because they enjoyed being outside and in nature. Some felt an element of trepidation in terms of concern for their fitness to participant in the walking element and some felt nervous about meeting new people. All the participants saw the value of social interaction between a group who had similar experiences, and many made new friends because of participating.

Conclusions

The programme, from the methods employed for its evaluation, shows support for it being an effective programme in promoting mental health and wellbeing in cardiac rehabilitation patient-participants.

What happens now?

Several recommendations are provided to increase data robustness to facilitate future evaluation. Recommendations regarding practice are also provided to both continue and enhance good practice.

Introduction

The Nature on Prescription intervention ("the programme") was commissioned by the Gloucestershire Clinical Commissioning Group and led by Gloucestershire Wildlife Trust (GWT). The programme aimed to provide nature-based activities to support the health and wellbeing of patients with cardiovascular health issues. The development of the programme was carried out by a co-production method between GWT and the Gloucestershire NHS Clinical Commissioning Group. Before starting the programme, GWT carried out detailed research into the prevalence and severity of cardiovascular health issues within the county to identify particular areas of the county were the programme would be put to best effect. This scoping exercise provided two specific locations in the County where such a programme would be best implemented, due to both the incidence of cardiac health issues, and the social complexities that may complicate the rehabilitation course of those recovering (such as socioeconomic deprivation, and rurality). The two areas identified were The Forest of Dean and Gloucester city. The programme was developed to provide an eight-week course of nature-based activities, undertaken outdoors on GWT premises (e.g. Crickley Hill, Robinswood Hill). The goal for the course was that participants would engage in at least five hours of activity outdoors in natural settings per week, and that this would equate to 40 hours over the duration of the course. The programme was undertaken with a dedicated facilitator that led the nature-based activities, and provided the educational aspects of cardiac rehabilitation and practical conservation. The activities and ethos of the programme were based on the five ways to wellbeing, and incorporated self-regulatory behaviours such as mindfulness. To cater to the broad needs of a cardiac rehabilitation cohort, the physical activity level was set to mild to moderate.

Evaluation Framework

The evaluation data have been collected by GWT staff during the delivery of the programme (quantitative data), and by the evaluation team (qualitative data). Participants were provided with the quantitative data collection materials before and after their participation in the programme. Qualitative data collection was conducted by the evaluation team after the conclusion of the programme. Due to the restrictions of the Covid-19 pandemic, interviews and focus groups were conducted using voice over internet protocol (VoIP) methods.

Objectives

To undertake a mixed methods process and outcome-focussed evaluation of the GWT Nature on Prescription intervention on participating individuals.

1. To understand the progression for participants involved in the intervention:
    - Motivations and aspirations for taking part
    - Barriers and facilitators to participation
    - Perceived benefits of taking part
    - Benefits to wellbeing (as measured by WEMWBS)
    - Benefits to mental health (as measured by anxiety (GAD-7) and depression (PHQ-9) scales)
    - Benefits to GWT conservation aims (as measured by Nature Relatedness Scale)
2. To understand the reach of the project:
    - Data on the demographic profiles of participants engaging with the project to evidence equality of opportunity and breadth of engagement.

3. To understand the process of development and implementation of the intervention:
    - Relevant stages of development
    - Barriers and facilitators to development
    - Lessons learned

Method

To address the above outline objectives, the proposed project will include both quantitative and qualitative methodologies.

Quantitative

To collate and enter the anonymised data (N=26) that has been collected by GWT during the intervention, and undertake analysis for change between pre and post, if sufficient data are available. Participants provided their sex, their age group, and completed questionnaires associated with nature relatedness (using the Nature Relatedness six-item questionnaire (NR-6): 1), levels of anxiety (using the Generalised Anxiety Disorder seven-item questionnaire (GAD-7): 2), levels of depression (using the Patient Health Questionnaire 9-item version (PHQ-9): 3), and levels of overall wellbeing (using the Short Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS): 4) both before (pre) and after (post) the programme. Participant pre and post scores were calculated and compared using paired-samples *t* tests (bootstrapped due to limited data and nonlinear distribution) to assess whether significant differences in score were present.

Qualitative

Focus group interviews were undertaken with the NoP intervention users (N=4 groups) as well as individual one-to-one interviews users of the intervention (N=12 participants). Data collected were analysed using a thematic analysis whereby themes were identified relevant to the research questions of the study; What are the outcomes of the NoP intervention? What are the facilitators to participation in the NoP intervention? What are the barriers to participation in the NoP intervention?

The focus groups were intended to provide a dynamic social space, akin to the intervention, where group discussion of the research topics could be fostered. Overall, there were four focus groups conducted, FG 1 consisted of four participants and lasted 59 minutes, whilst FG 2, FG 3 and FG 4 consisted of two participants each and lasted between 38-40 minutes.

Individual interviews provided an opportunity for participants to voice perceptions of the intervention that they perhaps did not feel comfortable sharing in a group. Overall, there were 12 individual interviews conducted lasting between 13 and 57 minutes in length (average 27 minutes).

Findings

Quantitative

Data were available for 26 participants in the NoP programme. Of these, 19 (73.1%) were male, and seven (26.9%) were female. This demographic distribution in a sample of social prescribing-type programmes not specifically designed for men is quite rare, but this is perhaps reflective of the higher diagnostic incidence of cardiovascular disease in men. Participants were distributed well across age groups, with ages from early 40s to beyond 80 years old. Seven individuals did not provide their age group. A table of the demographic profile of the sample can be found in Table 1.

Table 1 The Demographic make-up of the sample

Age	Whole group (N=26)		Men (N=19)		Women (N=7)	
	N	%	N	%	N	%
41-50	1	5.3	1	7.1		
51-60	5	26.3	5	35.7		
61-70	8	42.1	5	35.7	3	60.0
71-80	4	21.1	2	14.3	2	40.0
81+	1	5.3	1	7.1		

Nature Relatedness

The measure of nature relatedness (NR-6) before the programme indicate that this group of participants score above midway on average in this measure (3.91±0.88 out of a possible 5). Upon completion of the programme, participants' levels of nature relatedness had significantly increased (3.91±0.88 vs 4.31±0.62; t=2.85, df=17, p=.011). The NR-6 is a measure of how individuals feel about nature: how they feel themselves situated within nature, and what they feel nature is for (1). The measure itself is associated with pro-conservation attitudes and the commission of pro-environmental behaviours, and as such it is important to see that such programmes are associated with increased levels of this concept. To this end, it would seem that the programme was successful in increasing individuals' emotional and attitudinal connection to nature, and this may well be reflected in related concepts such as their attitudes and behaviours in conservation.

Anxiety

As a group, the participants reported very low levels of anxiety at the onset of the programme (mean values of 4.31±5.60), which is similar to those reported in populations of primary care patients (5). There was no significant difference between pre and post scores observed for anxiety (3.73±4.99 vs. 3.63±6.07, t=0.09, df=18, p=.923). Although levels in anxiety did decrease, they did not meet the threshold for minimal clinical important difference (MCID) for this scale (6). The GAD-7 allows the categorization of anxiety based on scores, with minimal (0 to 4), mild (5 to 9), moderate (10 to 14), and severe (15 to 21). Comparing the category membership between pre and post did indicate a significant difference (X^2 (9)=17.46, p=.042) indicating that whilst overall levels of anxiety had not significantly differed, some participants had changed which diagnostic category they

were placed in following completion of the course. Interestingly, it appears there was a reduction in "minimal" levels of anxiety after the course, but due to missing data (with seven cases missing) it is difficult to draw firm conclusions from this. We have seen in other social prescribing evaluations that anxiety is reported to increase at the end of the programme due to feelings of concern over having to go back to normal life without the support obtained through the programme, from both qualitative and quantitative evidence (7, 8). It must also be considered that for several participants, the end of the programme coincided with the onset of the Covid-19 pandemic, a period characterised by heightened anxiety for many, particularly those with clinical vulnerabilities. An overview of the categories can be found in Table 2.

Table 2. Anxiety categories before (pre) and after (post) the programme

	Pre		Post	
	N	%	N	%
Minimal anxiety	17	65.4	14	73.7
Mild anxiety	6	23.1	2	10.5
Moderate anxiety	1	3.8	1	5.3
Severe anxiety	2	7.7	2	10.5

Depression

The participants' levels of depression at the beginning of the programme (3.82±3.61) are classed as below the threshold for "mild", indicating a relatively normative level of depression. These levels are slightly higher than population norms reported elsewhere (9), but not substantially so. Comparison of pre and post levels showed that levels of depression were lower after the programme, but this was not significantly different (3.83±3.61 vs. 3.00±4.03, t=1.06, df=16, p=.302). The MCID threshold for change was also not met for depression (10). As with the GAD-7, the PHQ-9 can be stratified into meaningful levels of depression with: no significant symptoms (0 to 4), mild symptoms (5 to 9), moderate symptoms (10 to 14), moderately severe symptoms (15 to 19), and severe symptoms (20 to 24). Assessing whether category membership changed between the pre and post measurements of depression, there was no significant difference (X^2 (4)=7.96, p=.093). A summary of these can be found in Table 3.

Table 3. Depression categories before (pre) and after (post) the programme

	Pre		Post	
	N	%	N	%
No significant depressive symptoms	14	58.3	13	76.5
Mild symptoms	7	29.2	3	17.6
Moderate symptoms	2	8.3		
Moderately severe symptoms			1	5.9
Severe symptoms	1	4.2		

Wellbeing

The wellbeing of the participants in this programme at the beginning of the course (25.83±5.26) was marginally higher than those observed in population norms (11). The levels of wellbeing were observed to increase from pre to post assessments, and this difference was statistically significant (26.21±5.31 vs. 28.63±5.44, t=-3.75, df=18, p=.001).

Taken together, the quantitative findings provide evidence for enhanced nature relatedness and wellbeing following participation in the NoP programme. The analyses were based on small sample sizes, but were made more robust with bootstrapping, and so whilst findings should be interpreted with caution, it is perhaps indicated that such activities are beneficial for the wellbeing of cardiac patients, and that they are also associated with an increase in nature relatedness. This increase in nature relatedness is important, as this is (to our knowledge) the first time such a programme has been developed that has a duel impact of improving wellbeing, and improving metrics of psychological factors associated with the protection of our planet's natural resources.

The lack of significant findings for overall levels of depression and anxiety go against findings from other social prescribing modalities, such as arts on prescription (8). However, the sample sizes herein are relatively modest, and there are missing data that – in such small samples – will impact the overall findings. Moreover, the context of data collection is important to consider, with the onset of the global pandemic coinciding with the "post" measures, it is entirely possible that these specific factors may well have been impacted by factors extraneous to the NoP setting. The presence of anxiety and depression in patients that have experienced a cardiac event is as important as it is complicated. Both of these factors contribute to the aetiology of cardiovascular disease, and are important indicators of prognosis in themselves. The various psychobiological processes and mechanisms that underpin both cardiovascular disease and anxiety and depression are very similar, and require careful handling in the context of rehabilitation. Whilst the lack of statistically significant findings herein regarding anxiety and depression may well be a valid finding for the programme, with such a small amount of data it is difficult to draw adequate conclusions. Moreover, the measurement of these two issues within this context may also be hindered due to some of the similar symptoms between both mental health issues and the sometimes slow process of physical rehabilitation following a cardiac event. For example, questions such as "Feeling afraid, as if something awful might happen" (GAD-7), and "Trouble falling or staying asleep, or sleeping to much" (PHQ-9) are also symptoms of having experienced a cardiac event. It is in this context that the concept of wellbeing provides more support for the general benefit of such interventions, as the concepts covered within its assessment (e.g. "I've been feeling useful", "I've been thinking clearly") may be less prone to conflation with physical health issues. Overall, it is recommended that the quantitative findings be viewed with caution due to the modest sample size, although these findings do indeed appear to be encouraging and favourable for wellbeing.

Qualitative

Focus groups

Outcomes

Participants within the focus groups were able to identify a range of outcomes from their participation in the NoP programme (see Figure 1). These outcomes were all positive and were grouped into three main themes, 'physically fitter', 'learning' and 'social interaction'. Feeling physically fitter simply represents participant's perception of being fitter and more physically active as a result of the programme.

The way in which participants described their learning was two-fold. The first of which was the generation of an interest in the natural environment and conservation and wanting to volunteer in the future. The second was that some participants experienced a process of learning and acquiring new knowledge. This learning was seen as not only a personal achievement but also sometimes recognized in important others such as a family and friends. For example, participant B outlined how they were able to take their newfound knowledge and impress their family:

> *Went out for a walk last Friday with my family up in the woods and my wife was quite impressed with my new knowledge of plants and trees, although, as I say, we have a reasonable knowledge, but she noticed a difference and asked me stuff*

The social interaction that the NoP programme afforded was also clearly laid out by participants as an important outcome. Participants frequently cited that they had developed relationships with other NoP attendees and that these relationships afforded the receipt and exchange of social support for health and a sense of connectedness. The ability to talk to peers who have similar health experiences was vital amongst participants who felt socially isolated and vulnerable after their 'cardiac event'.

Overall, participants' expression of these outcomes is indicative of a successfully designed intervention. Indeed, being active, experiencing a sense of learning and connecting with others are understood to be fundamental to wellbeing (12).

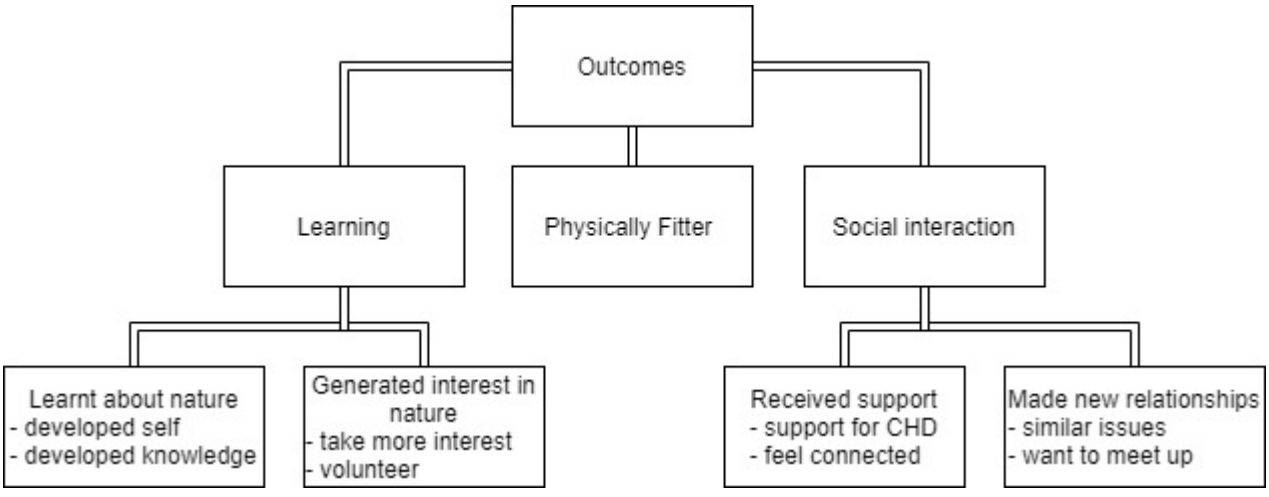

Figure 1; Thematic diagram illustrating focus group participants (n=8) perceived outcomes from the Nature on Prescription program.

Facilitators and barriers to participation

Participants identified a range of facilitators and barriers to participation in the NoP programme (see Figures 2 and 3). Both facilitators and barriers to participation could be organised into themes relevant to initiation and themes relevant to continued engagement. Initiation was highlighted as being facilitated by personal interest and previous experiences of nature. Furthermore, when the course was advertised by a healthcare professional who participants trusted and respected this was perceived positively. However, other aspects of the NoP advertisement were outlined as potential barriers to participation. Aspects such as leaflet design and low intervention visibility, for example participant D stated:

> *it was hard looking at a leaflet and trying to imagine when they tell you that's the first course, so you think the course people don't know what they're going to do either.*

Other barriers to initiation included personal fears and anxieties relevant to physical health as well as being able to participate on the program alongside other commitments such as work.

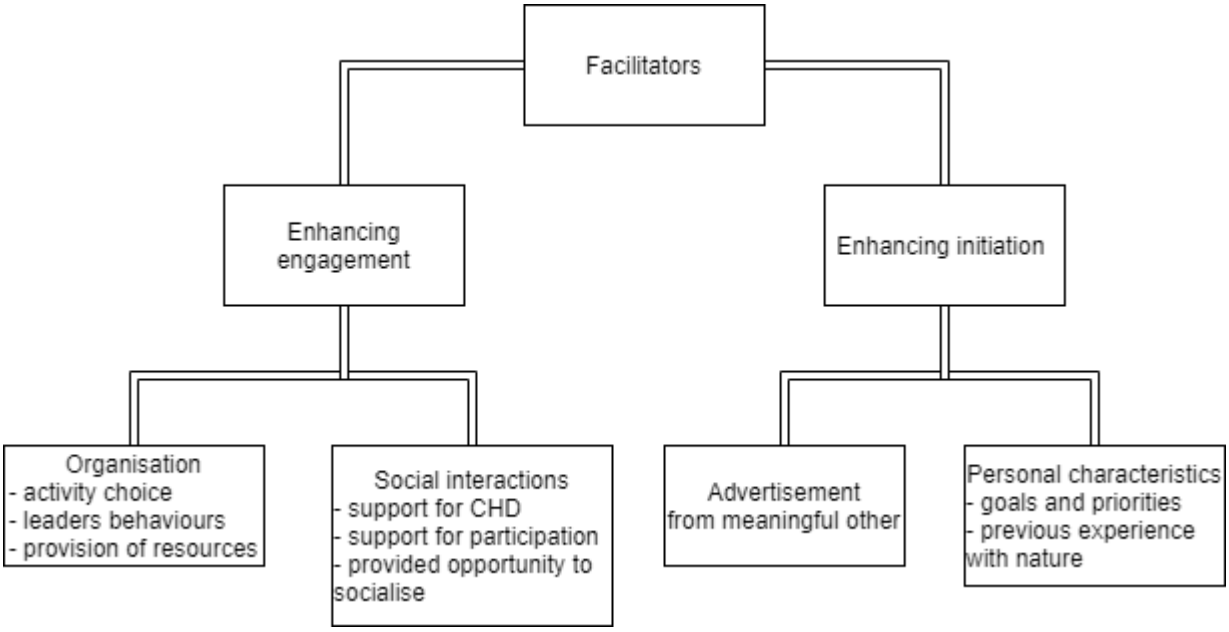

Figure 2; Thematic diagram illustrating focus group participants (n=8) perceived facilitator to participations in the Nature on Prescription program.

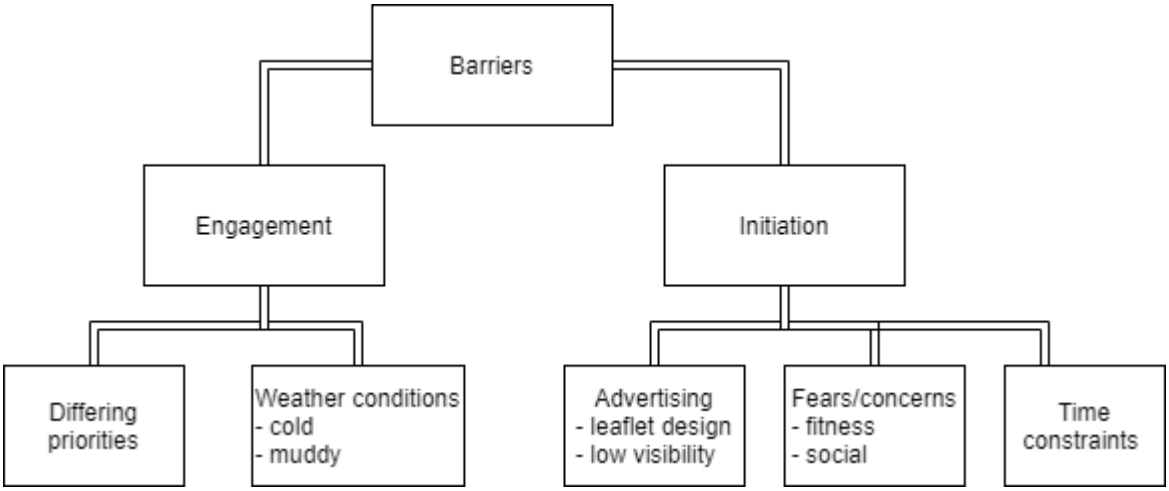

Figure 3; Thematic diagram illustrating focus group participants (n=8) perceived barriers to participation from the Nature on Prescription program.

Factors considered to be facilitators to continued engagement in the program were the organisation of the sessions and the social interactions participants experienced. Participants were very vocal in their praise for the session leaders and the choice of activities and highlighted how the resources provided in the session were supportive of learning. For example, participant W said;

> *the interest was driven by the guide who was, "Right, that tree there, do you know what it is?", "No. No idea", and then she gave us these leaflets where you could, here's a leaf, is it that shaped leaf, is it rough or smooth, and as you go through a flowchart then you can identify the tree and then after a few weeks we moved on to plants instead of trees, but I was still walking along going, "Oh, that's a so-and-so tree and that's a so-and-so tree" and she was like, "Yeah. Yeah", and then now and again I'd get one wrong*.

Equally apparent was the importance of the interactions between participants whilst on the course providing an opportunity to socialise and exchange social support for exercise and rehabilitation. Participant J compared NoP to an exercise-based rehabilitation programme they attend and described how their enjoyment of the sessions was enhanced by their ability to interact with others; *"the problem with that meeting is that you can't socialise in the same way as you could on a nature course, and make friends and share experiences much, much easier".* The importance of the social nature of the program was echoed in Participant O's description of the companionship that they experienced:

> *I like the comradeship, I like the chat and the company, as well as looking around and being together and taking on challenges, that's what I like and it's helped me enormously, especially mentally I think as well as physically.*

Barriers to engagement were predominantly factors that were beyond the control of the program organisers and revolved around differences in participant priorities whilst on the course and environmental conditions including mud and weather that were fundamental to the 'nature' experience.

One-to-one interviews

Outcomes

One-to-one interviewees also identified with the outcomes cited in Figure 1. However, and possibly due to the more intimate nature of a one-to-one interview, participants spoke of feeling 'physically fitter' in a more absolute way. For example, participant GA: *"I've done things I didn't think I was ever going to do"*, refers to the acknowledgement that they had been physically incapable of strenuous exercise to the point of feeling like a 'fool' putting themselves at risk and now found themselves confidently striding up a hill. In respect to feeling 'fitter' respondents also reported improved psychological fitness, such as a newfound confidence in themselves and their abilities to develop connections where previously they would not have reached out to others, as described by participant BL; "*…it gave you a bit of confidence…If I seen (sic) somebody now with walking canes I would say "Well, where you off to today, mate?"".*

The theme of 'learning' also had the most references. Here participants spoke of their appreciation of noticing nature more, and of learning more about places that had simply been a place to drive by before. Participant LE sums it up:

> *I'm sort of looking at leaves, I'm smiling, it's making me happy because it reminded me of being all these places I've never, ever gone to, or haven't been for years, I'm noticing things.*

The idea of savouring the nature they have seen, sharing with others and the joy of being reminded of a particular leaf or tree they had learnt about days after the walk highlights participants' growing connection to nature and correlates with quantitative data that reported nature relatedness increasing across the group during the period of the NoP programme. Participant LE explains: "*I was surprised, because I went for a walk and a leaf fell on the floor… and I just sort of smiled to myself, that's the one X picked up on Tuesday".*

One-to-one interviewees also shared how important the social interaction element of the NoP programme was to them. As with the focus groups acknowledgement of a 'health exchange', the majority brought up the importance of sharing their experiences. Some felt humbled by others' experiences and felt it put theirs into perspective, for example, participant LE remembered: "*I'm sat there whingeing about… the tablets I'm taking, which is six... and he turned around to me and he said, oh for God's sake…stop whingeing… I take 20".*

Some of the participants felt they had learnt more about their own health from conversations within the group. Participant GA said:

> *…the medication they're on, how they felt, what they experienced and all the rest of it. You couldn't get that, it's not written down, that level of knowledge I would never have gained in such a short period of time.*

Clearly participants felt connected enough to share and behave openly with one another. They talked of comradery which highlights a feeling of 'we're in this together'. The NoP programme is demonstrating itself as a social support network where the group is collectively accepted due to the fact they have experienced similar cardiac events and follows the theory that social support enables post-traumatic growth (13). Participant L sums this last point up: "*And because of those people, I'm getting there, yeah".*

Facilitators and barriers to participation

As with the focus group feedback outlined in Figures 2 and 3, the majority of the one-to-one interviewees noted a key facilitation to participation as being their love and interest of nature. Those who had also previously

participated in the exercise-based rehabilitation programme felt the element of 'being outside' would benefit them more. Participant BL spoke on behalf of themselves and the buddy they brought to the sessions: "*We like being outside, I grew up in the country, so we thought that was 100 per cent more exciting that doing exercises in a village hall."*

Participants appreciated being given a rehabilitation choice; participant GA summed it up for many; "*…this suggestion was like heaven for me. You'd taken the boxing gloves off and you can relax in an atmosphere you're really at ease with i.e. outside."*

And, like the focus groups one of the main themes for the one-to-one interviewees was social interaction as a facilitator to both initiate attendance; "*I also thought I might meet sort of people in a similar situation which I thought would be a good thing"* (participant DA) and to keep engaged; "*They´re a good crowd to be with. They´re all very friendly"* (participant GO). Although meeting people was also seen as a barrier, for example, participant LE struggled; "…*because I am a bit of a loner, I don't mix with people very well"*, with one participant sharing that they felt like an outsider for most of the programme.

Although beyond the control of the programme, the weather did have a detrimental impact on some of the participants with some citing that as a reason for failing to complete. Participant BU spoke candidly of their cardiac treatment, of how the biting wind was debilitating for them; "*They [the wind] produce a lot of chest pain and then you get nervous*." This was especially upsetting for this individual as they had put a lot of store into attending and left the programme feeling "demoralised". Participant BF did feel that there was some responsibility on the organiser's part:

> *I think being mindful of the time of the year and you know whether it's appropriate for people to do more or less walking, because that was…it really hit me… you're just getting colder and colder.*

This was further explored with some of the participants feeling that there was a lack of appreciation from the facilitators and volunteers in respect of working with people who had experienced CHD; participant PF spoke candidly:

> *I don't think they have a full appreciation of it, but then you wouldn't expect them to, because they're young aren't they so they haven't had heart attacks and all the rest of it.*

Many spoke of the provision of a space to be indoors when the weather was inclement as both a facilitator, if there had been one, and a barrier to participation as there was not one provided. An added frustration was that some of the participants felt the NoP programme had been advertised with a centre; participant GA said:

> *…a big centre and it wasn't open, they were hoping to use that… when the weather was bad. So they shot themselves in the foot, they advertised more saying this could be done but it wasn't done.*

As well as citing exceptional organisation as a key facilitator, the one-to-one interviewees were also very impressed with the knowledge of the programme leaders and genuine care they provided to the group. Participant BL felt the leaders were very inclusive: "*Yeah, the lady always made sure everybody was alright, we never went any faster than the slowest, which I thought was wonderful. You've all got to stay as a group."*

Collated Findings

Together, the findings from this evaluation underscore the benefit experienced by participants from the programme, both in terms of their enjoyment but also in the provision of a new perspective in their lives. The

finding of improvements to wellbeing and to feeling connected to nature are supported by both quantitative and qualitative data, with further specific elements of these concepts being drawn out through the analyses of interviews and focus groups. Despite the lack of support for associated improvements in mental health outcomes (anxiety and depression) via quantitative analyses, the participants very comfortably spoke of feeling more confident, more connected to others, and better prepared to meet their own health needs. Most importantly, the participants cited a great enjoyment and appreciation of the programme, and (often in comparison with previous standard cardiac rehabilitation) appear to find this programme enjoyable, engaging, and profoundly impactful to their physical and psychological health.

The two central aims of any social prescribing programme are to improve wellbeing and to increase and enhance social connection (14). The latter of these two factors is often less easy to evidence in parallel evaluations (most particularly in arts for health programmes), and is rarely specifically measured. Whilst not measured in the current quantitative aspect of the present evaluation, the contribution of social connection comes through incredibly strongly in qualitative analyses. Participants note feeling more connected to others in group conversations and in one-to-one interviews, which provided a robustness to this finding. The benefits of this enhanced connection appear to be multiple, and seem to be important and very personal "take home" messages from their participation in the programme. The ability to speak to others that have suffered similar health issues provided a level of informational and social support that was valued highly by the participants. Moreover, this social connection provided important points of social comparison that allowed some participants to feel more at ease with their health situation, and better able to cope with the challenges to come. The management of stress within cardiovascular disease is of paramount concern, as stress is both a consequence of poor heart health and a cause of worsened cardiovascular outcomes (15), so any programme that is able to provide participants with an enduring and salient means of buffering against stress will likely be of clinical importance. Further, social support and connectedness is extremely important for health and wellbeing, particularly within the context of cardiovascular disease (16, 17). To this end, the programme appears very much to have provided substantial and meaningful benefit to the participants.

> "Nature is the best healer, and the courses we've been on have proved it."

The way in which the programme was developed, being framed around the five ways to wellbeing, and having the attributes and behaviours associated with mindfulness being interwoven throughout appeared to resonate well with the participants, with the direct descriptions of now being able to take notice, to keep learning, to connect, to keep active, and to give back being directly evidenced in the qualitative data. This is an incredible success of this programme, as these attributes are very frequently used as bases for programme development, but less evidentiary in evaluation. The concept of learning is particularly important for the participants, and will

likely be further supportive of the conservation aims of the programme. This is further supported in the changes observed in nature relatedness reported by participants after completing the programme. Nature relatedness is an important measure for understanding an individual's likelihood to conserve and protect nature (18), and it would seem that the programme is associated with an enhancement to this. This is further supported by qualitative findings where participants cite newfound appreciation for incidental interactions with nature, and for wanting to share their love of nature with others. It is not clear at this stage of research in this new and emerging field as to whether this learning provided through such programmes may confer enduring and sustainable enhancements to nature relatedness, but it is a promising first glimpse. The ability for enhancements in nature relatedness has also been associated with overall happiness and wellbeing (19, 20), so the finding of nature relatedness being increased after participation may also be a mechanism of the reported increases in wellbeing.

Situating the present programme within the broader field of social prescribing, it appears to confer similar benefits to participants as those carried out in via other modalities (21-24). The findings of the social element of the programme being a facilitator to its initiation and continued engagement have been echoed elsewhere in the field, and would support this type of programme and its methodology as being able to provide similar benefits to previously well-established modalities (25). A small number of participants also cited the social element as a barrier to participation, echoing other related social prescribing evaluations, where the prospect of engaging with others in an unfamiliar setting and context can be daunting (7).

The marketing and general communication of the programme seems to have been beneficial in providing confidence to participants. There were comments regarding the signposting of the programme from healthcare professionals providing legitimacy and currency to its potential benefits. Alongside these comments were also comments that the benefits may have also been undersold to a certain extent during the advertisement of the programme. The participants that took part in the evaluation were clearly very engaged with the programme, but even they cited that their initial impressions of the programme were not as impressive as the reality, and this may have had an impact on programme uptake by other potential candidates in the target population.

The finding of the health-specific programme offer providing a benefit to participants has been reported in related work where arts activities have been prescribed to those living within and beyond cancer (26, 27). Similarly, participants have reported finding benefit in social support, as well as reframing their own situation through social comparison. However, it should also be noted that parallel work in general groups of social prescribing participants also cite benefit in what we have termed "medical anonymity" (28), whereby participants do not know each other's personal health needs, and can come to the programme as individuals, rather than as people within the context of their health condition or needs. Therefore, it is entirely possible that should such programmes be developed for more generalised groups of participants that there is no reason to suggest that they would not be as successful (albeit, perhaps, via a different mechanism).

> I felt a connection. I felt a connection with people, we're all in the same boat.

The role of the facilitator as being an important aspect to continued engagement within the programme is as important as it is insightful. In related work, we have noted the importance of the facilitator in providing a safe space in social prescribing programmes (29, 30), and it would appear that the facilitator with the NoP programme is equally as important and impactful. The facilitator in social prescribing modalities is very frequently an expert associated with the activity (e.g. an artist, or conservation expert), and is therefore very frequently not from a background that is associated with providing therapeutic spaces or supporting very specific health needs. Here, we find that the facilitator is of key importance to participants in their feelings of confidence in taking part, and their appraisal of risk in the programme's activities. Participants cited trepidation in taking part in nature-based activities where there may be a risk of injury or further negative impacts to their health due to the conditions in which they take part, and this trepidation appeared to be magnified by concerns about the capability of the facilitator in ensuring their safety. Nonetheless, it would seem that the facilitator for this programme has provided participants with the feelings of safety and confidence not just in their ability to connect with nature, but also to cope with the stresses and strains of their health, and to re-engage with physically demanding health behaviours such as outdoor walking. The balance of providing a facilitator that can do this is very hard to strike, but it appears that the NoP programme has done this particularly well.

Participants cited several factors specifically related to their health condition that are important to consider. Participants spoke of initial trepidation over the physical demands of partaking in the nature-based activities, and the various challenges that these may present to someone who is recovering from a significant cardiac event. It is not uncommon for cardiac patients to go through a period of re-evaluation of their own strengths and weaknesses, and to feel very unsure about their physical and psychological capacity (31, 32), and it would seem these concerns were important in their appraisal of the relative risks and benefits of taking part. There were also comments that related to some of the very particular issues encountered by this patient group in engaging in outdoors activities that are important to consider. The specific complications raised by significantly invasive surgery, and the worry of slipping or falling in the mud, were clearly very real and pertinent concerns by this specific group. The time of year in which this programme took place will have contributed to those concerns, however it is also clear that aspects such as high wind may be experienced at any time in higher altitudes, and walking during the summer period would have also comprised challenges due to the heat. It is clear that choice of location with specific relation to the season may be important in future endeavours for this type of nature-based programme.

Conclusions

The conclusion of the present evaluation is that the NoP programme has been successful in its ambitions to enhance the health and wellbeing of its participants. The ability to provide a programme that is appealing to many, and that provides sufficient enjoyment and participatory ease has allowed extended engagement by those that have taken part in this clinical cohort of patient-participants. Situated within the context of other social prescribing modalities, the programme appears to offer similar psychological and social benefits, whilst also adding in physical activity and the potential enhancement of environmental concern and care.

The findings of the present evaluation should be viewed with caution for two reasons. Firstly, the quantitative analyses were somewhat hampered by small sample sizes. Whilst efforts were made to ameliorate this by using more robust forms of analysis, further data collection would be of benefit before solid conclusions can be drawn with regard to more objective outcomes. Secondly, the compilation of qualitative data was for the most part possible through contacting those that had completed the programme, with only a small number of voices from those that took part but were unable to complete their programme (through whatever reason), and one respondent who was happy to feedback even though they did not attend the programme at all. Any social prescribing programme provided to patients from primary or secondary care should be evaluated not just on the basis of information from those whom have been able to complete it, but it is also important to consider the views of those that have been unable to complete. Some of this work is only really possible with substantial datasets accrued through several years of practice due to the difficulties of re-engaging those who have dis-engaged with the programme, so this is an indication for future work in the field.

Nature as a form of social prescription has been discussed in the literature as being both an important, and somewhat obvious, means of supporting health and wellbeing (33). Nature is known to be supportive of wellbeing through a variety of mechanisms, and provides support for mental and physical health in a variety of metrics. Whilst the amount of nature that can be provided is of debate in the literature currently (34), it is known that using nature as a context for the types of outcomes sought from this programme is undoubtedly of benefit. The appeal of being out in nature, and of being able to carry out health activities relevant to their specific health needs was cited by the participants, and would suggest that other health-specific programmes would be both attractive and suitable for patient populations in the future. The various benefits of being in nature in inspiring feelings of awe, being able to relax, of feeling a part of nature as a larger and more omnipresent concept will be as supportive to participants as it will be to itself, as it would also seem that participating in this programme is also associated with increases in concepts associated with care for the environment. As a dual benefit intended within the paradigm of this programme, that seems to be very well supported through the available data.

The co-production of the present programme between GWT and the Gloucestershire CCG has clearly been an important and valuable component of its success. One of the real challenges with social prescribing is the use of multidisciplinary teams to develop programmes that are effectively led by interest groups to provide benefit to specific clinical groups that is evidentiary in clinically meaningful outcomes. The ability for programmes to be developed in this way is a challenge, and effectively requires the development team to be able to communicate in a trans-disciplinary way. The responses from the participants suggest that the ability of the teams in combining their knowledge and expertise to produce this programme has been successful. We do note, however, that in future forms of intervention or programme development of this sort, that there may be a benefit to including a health-context specific voice within the co-production team. The comments from participants regarding feeling the wind cut through their surgical scars, and worrying greatly about their ability to maintain balance and traction on slippery or uneven ground may have been foreseeable had there been the

inclusion of a cardiac rehabilitation expert within the development team. This is a frequent issue within co-production of social prescribing programmes, however, and is needed across the sector if social prescribing developers are to provide truly tailor-made activities for participants.

The evaluation team can conclude that GWT has succeeded in its aims to implement its ambitious and novel programme for the benefit of these participants, and for the benefit of the green spaces in Gloucestershire. Further work should be carried out to produce more robust and detailed learning from such programmes, but as a preliminary and pilot programme for such activities, this programme appears to be beneficial to participants in a variety of ways. This is important work for the field in the areas of social prescribing, of encouraging pro-environmental behaviours, and of improving important outcomes in public health more generally.

Recommendations

Whilst the present evaluation is able to lend support for the programme, it is recommended that further evaluations take place in the future to provide more substantial support. The collated evidence indicates the following recommendations:

1. To consider different means of outcome assessment. The quantitative data collection for this programme includes measures that are important and meaningful for the specific patient group being invited to participate. However, some of the measures are perhaps not as accurate in a sample of cardiac care patients due to the complex interactions between cardiovascular health and the mental health measures being taken. Here, the use of an alternative measure for anxiety and depression, such as the Hospital Anxiety and Depression Scale (HADS: 35) may be of benefit to minimise some of the conflation. Alternatively, different measures of clinical importance for cardiovascular patient groups that may not be complicated by similar psychobiological processes may be more physical measures of fitness, such as sit-to-stand tests, waist-to-hip ratio, or six-minute walk distance.
2. To potentially include other measures that cover participants' ability to manage stress, as this appears to be something that participants cite as being an important outcome from the programme. The management of stress is particularly helpful with cardiac rehabilitation cohorts, and so measures that examine self-efficacy, resilience, or self-regulation may be of interest in future programme evaluations.
3. To collate more information regarding participant attrition where possible, so that a more detailed understanding of where the programme may not be working (or for whom it may not be working) can be ascertained.
4. To sell the benefits of the programme further in initial advertisement. Participants cited very different impressions of the programme after taking part, and perhaps the potential benefits and appealing factors of taking part might have been undersold or indeed oversold, in the marketing of the programme.
5. To provide a pre-programme discussion with potential participants. This will allow participants the opportunity to discuss concerns regarding safety or competence, and provide a point of reassurance and the opportunity for the facilitators to plan ahead for specific participants' concerns. As participants have cited this as being a point of trepidation, it is likely that others that did not complete the programme (and were therefore not part of the evaluation) may have had similar concerns that potentially could have been addressed.
6. To consider (where possible) the combined practical issues posed by terrain and seasonality in devising the walk schedules and routes. Given the concerns cited by the participants, programme activities for this specific cohort may be best oriented around late Spring for the UK, providing more clement weather conditions without the challenging heat of high Summer.
7. To incorporate treatment specialists within future co-production teams for programme development. There were specific issues encountered by participants here that may have been countered or otherwise mitigated with the inclusion of a cardiac rehabilitation specialist that is aware of the specific needs of this patient group.
8. To consider opening up this programme to more diverse participant groups. Extant evidence in social prescribing works suggests that whilst health condition-specific programmes are cited as being highly beneficial for empathic support and social comparison, generic programmes that may be attended by any candidate for social prescribing are equally beneficial but via different mechanisms.

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