Therapeutic Nature: Nature-based social prescribing for diagnosed mental health conditions in the UK.

Final Report for Defra

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This report reports on work conducted at the University of Exeter to understand what works for whom in what circumstances, and how to support, provision of nature-based therapeutic interventions for people with an identifiable mental illness. To reflect this goal the project has adopted the name 'Therapeutic Nature' for the purposes of eliciting input, developing networks and publicizing a Call for Evidence. This work is a partnership led by The European Centre for Environment and Human Health (ECEHH) at the University of Exeter Medical School, NIHR ARC South West Peninsula (PenARC), the Bradford Institute for Health Research (BIHR), Bradford Teaching Hospitals NHS Foundation Trust and eftec, economics for the environment consultancy ltd.

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List of abbreviations

AAA	Animal Assisted Activities
AAT	Animal Assisted Therapy
ACQ-NOW	Alcohol Craving Questionnaire
ADHD	Attention deficit hyperactivity disorder
ADL	Activities of Daily Living
AFI	Attentional Function Index
ANGST	Accessible Natural Greenspace Standard
ANOVA	Analysis of Variance
AONB	Area of Outstanding Natural Beauty
ART	Attention Restoration Theory
ASIS	Autism Identity Spectrum Scale
BDI	Beck Depression Index
BDS	Backward Digit Span
BIHR	Bradford Institute for Health Research
BME	Black and Minority Ethnic
CBA	Cost-benefit analysis
CBT	Cognitive Behavioural Therapy
CCG	Clinical Commissioning Group (NHS)
CEA	Cost-effectiveness analysis
CES Depression	Center for Epidemiologic Studies Depression Scale
CIC	Community Interest Company
CORE-OM	Clinical Outcomes in Routine Evaluation – Outcome Measure
CPD	Continuing Professional Development
CSEI	Coopersmith Self-Esteem Inventory
CTRS	Certified Therapeutic Recreation Specialist
CYP	Children and Young People
DASS	Depression Anxiety Stress scale
DASS	Depression Anxiety Stress Scale
DCLG	The Ministry of Housing, Communities and Local Government's (formerly the Department for Communities and Local Government)
Defra	The Department for Environment, Food and Rural Affairs
DHSC	Department of Health and Social Care
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders
ECEHH	European Centre for Environment and Human Health
ELM	Environmental Land Management Scheme
ENCA	Enabling a Natural Capital Approach
EQ-VAS	EuroQol Visual Analogue Scale
ES	Emotional Sensitivity

FCE	Forestry Commission England
FFMS	Five Facet Mindfulness scale
FT	Full Time
FU	Follow Up
GAF	Global Assessment of Functioning
GHQ-8	General Health Questionnaire v8
GP	General Practitioner
GSE	General perceived Self-efficacy Scale
GWBS	General Well-Being Scale
HADS	Hospital Anxiety & Depression scale
HEPE	University of Exeter Medical School's Health and Environment Public Engagement Group
HRA	Health Research Authority
HT	Horticulture Therapy
HWBB	Health and Wellbeing Board
ICD-10	International Classification of Diseases 10th Revision
InPt	In-patient
LAS-SF	Life Attitudes Schedule – Short Form
LCP	Lifestyle Change Program
LEQ	Life effectiveness Questionnaire
LFC	Lifestyle Change Program
LNP	Local Nature Partnership
LTFU	Lost to Follow Up
LW	(Social prescribing) Link Worker
MACI	The Millon Adolescent Clinical Inventory
MANOVA	Multivariate Analysis of Variance
MFTE	Medicine for the Earth
MH	Mental Health
MM	Mixed Method
MRC	Medical Research Council
NA	Not Applicable
NASP	National Academy for Social Prescribing
NBSP	Nature Based Social Prescribing
NBT	Nature-Based Therapy
NCA	National Character Area
NE	Natural England
NGO	Non-Governmental Organisation
NHSE	NHS England
NICE	The National Institute for Health and Care Excellence
(n)RCT	(non)Randomised Controlled Trial

OBH	Outdoor Behavioural Healthcare
OLS	Ordinary Least Squares
ONS	Office for National Statistics
OSA-F	Occupational self assessment function
OT	Occupational Therapist
OutPt	Out-patient
Oval-PD	Occupational Value Assessment with Predefined Items
PANAS	The Positive and Negative Affect Schedule
PCLC	Post traumatic Stress Disorder Chcecklist Civilian Version
PCN	Primary Care Network (GP Practice Networks)
PenARC	National Institute of Health Applied Research Collaboration South West Peninsula
PET	Psycho-evolutionary Theory
PGWB	Psychological General Well-Being Index
PHC	Primary Health Care
PHE	Public Health England
PLQ	Personal Life circumstances
PMS	Premenstrual syndrome
POMS	Profile of Mood States
PRS	Perceived Restorative Scale
PSF	Personal and Social Functioning Instrument
PSS	The Perceived Stress Scale
PTSD	Post-traumatic stress disorder
QA	Qualitative Analysis
Q-LES-Q-SF	Quality of Life Enjoyment and Satisfaction Questionnaire
QOF	The Quality and Outcomes Framework
QoL	Quality of Life
RAS	Recover Assessment Scale
RMANCOVA	Repeated Measures Analysis of Covariance
RQ	Resilience Questionnaire
RSE	Rosenberg Self-Esteem Scale
SAS	Statistical Analysis Software
SCI-13/93	Stress and Crisis Inventory
SD	Standard Deviation
SF36	The Short Form (36) Health Survey
SMBQ	Shirom–Melamed Burnout Questionnaire
SMR	Standardised morbidity/mortality ratio
SNOMED	Systematized Nomenclature of Medicine Clinical Terms (GP Coding tool)
SOC	Sense of Coherence Scale
SPA	Special Protection Area

SRH	Self-rated Health
SSTICS	Subjective Scale to Investigate Cognition in Schizophrenia
STAI-SS	The State-Trait Anxiety Inventory
STH	Social and Therapeutic Horticulture
STP	Sustainability and Transformation Partnership (NHS)
SWB	Social Wellbeing Module
SWLS	Satisfaction with Life scale
TCQ	Irvine Spiritual wellbeing scale & transmutation change questionnaire
TIDieR	Template for Intervention Description and Replication
uBA	Uncontrolled Before and After Study
UEMS	University of Exeter Medical School
VCSE	Voluntary, Community and Social Enterprise
WAT	Wilderness Adventure Therapy
WBA	Work Behavior Assessment
WEMWBS	The Warwick-Edinburgh Mental Wellbeing Scale
WHO	World Health Organisation
WT	Wilderness Therapy
Y-OQ-SR	Y-OQ-SR

Therapeutic nature: Summary of key findings

Introduction

Common mental health conditions, such as depression, anxiety, and stress affect up to 15% of the population at any one time, and one in four people will experience a mental health problem at some point in their lives (Department of Health, 2017, Mental Health Taskforce, 2016). Depression is the third most common reason for consultation in general practice in the UK and is the single greatest cause of workplace absenteeism. People suffering from poor mental health are at risk of dying 15-20 years earlier than people with good mental health (Mental Health Taskforce, 2016). The burden of poor mental health falls disproportionality on the most socio-economically deprived and marginalised groups. The costs of mental health problems to the economy are estimated to be approximately £105 billion every year (Department of Health., 2011).

Community focused approaches are enjoying a renaissance in public health. Having been pivotal to the 2017 Alma Ata Declaration on Primary Health Care (PHC) (Department of Health, 2017) there is renewed recognition that social and other non-medical factors strongly influence health. One key community-based approach is 'social prescribing'. Social prescribing consists of a process of linking individuals to social or community-based activities or resources which have the potential to improve health and wellbeing. Referral may come from primary care and other services, both public and 3rd sector, as well as direct self-referral. These pathways expand the options available to individuals who have complex social as well as clinical needs, by connecting people to community resources, information and social activities. In recent years there has been a significant expansion in the development and delivery of nature-based therapeutic interventions, through social prescribing, for mental health.

The overall aim of this project was to describe current provision and to clarify what works, for whom and under what existing processes, in the delivery of nature-based therapeutic programmes for diagnosed mental health conditions.

Three key data collection activities were undertaken to explore this. For Work Streams 1 and 3, we focused on four case study sites, in England: Devon, Newcastle, Bradford and West Yorkshire. These locations were agreed in consultation with Defra and the project steering group, and selected in order to align with the Personalised Care Demonstrator Sites. Work Stream 1 reviewed and mapped nature based interventions aimed at people with mental ill health in the case study sites; Work Stream 2 undertook a mixed methods review of research investigating their impact, and Work Stream 3 used qualitative interviews to understand the factors that influence successful providing, prescribing and commissioning nature-based interventions for mental ill health. Work Stream 4 brought together insights from these data collection activities to generate a series of logic models illustrating how different factors may lead to successful outcomes for nature on prescription. Work Stream 5 builds on these findings to generate recommendations for policy and practice.

Work Stream 1: Provision of nature-based interventions in 4 case studies

Aim: to review and map current provision of nature-based interventions aiming to support people with mental ill-health in the four case study areas in England.

Methods: We used a combination of methods to identify existing nature-based interventions and activities aimed at supporting people with mental ill health. These methods included search strategies in published and grey literature to identify evaluations undertaken for these activities, investigations

through existing social prescribing and nature-based provider activity networks, calls for information through social media, and snowballing. For each nature-based activity identified we sought information about: the targeted population; location, intervention type and aim, funding, green spaces used and their access, relationship with health services and referral pathways. These details are stored in a searchable Excel database.

Results:

- The amount of available nature-based activities targeting mental health needs varies widely by area. Rural areas such as Devon appear to have better provision, perhaps due to access to a wide range of green space, but also aided by the LNP network providing ongoing support and coordination.

- Regional/local networks exist in some areas, which can bring together local providers, referrers and academics in order to co-ordinate and evaluate effectiveness.

- Sources of provision have been broad including: mental health NGOs, NGOs focused on environmental issues with a social prescribing aspect and vice versa, social enterprises, community interest companies (CICs), local councils, NHS trusts, private therapists. Projects may be collaborative between multiple organizations.

- Most available activities are targeted at adults, and are broad in terms of the mental health challenges that participants may be experiencing.

- Types of activity are varied, including whether other therapeutic aspects, such as formal counselling or therapy – or other intervention components, such as skills learning or creative activities, are also included.

- The provision of specific interventions, and the involvement of specific organisations, is a moving target. Given the project based nature of much of the funding available, and shifting priorities, we will be able to only capture a snapshot of provision. Understanding these pressures and the factors that can lead to sustainability is explored in Work Stream 3.

- In addition to these normal shifts of provision, we appear to be in a transitional period where a number of even large and well known projects are finishing or have completed their pilots and initial funding and are seeking more sustainable options.

- Some voluntary/ NGOs have struggled in the current austerity climate, and this has led to closures.

- Recently increased interest in social prescribing may also have led to “research fatigue” in some quarters.

Work Stream 2: Evidence review

Aim: to understand the impact of nature-based interventions aimed at supporting people with mental ill-health.

Methods: We systematically reviewed the relevant quantitative and qualitative research evidence from both published and grey literature. Quantitative evidence was synthesised narratively, and we used framework and thematic approaches to synthesise the qualitative research.

Results: We included 37 quantitative and 30 qualitative studies in the review from 57 papers (10 were mixed methods studies that reported both quantitative and qualitative studies of the same intervention) and one systematic review.

The studies varied widely in terms of population (age, type of mental health condition and whether the sample was drawn from general populations, or people referred from health services, or in residential MH units), interventions (type, duration and intensity) and type of greenspace used (forests, farms, mountains, gardens, parks, the sea). Most evidence was about therapeutic gardening, wilderness therapy and care farms, although there were also studies about walking, mountaineering, surfing, scuba diving, forest activities, and a nature-based retreat. A wide range of outcomes were also measured assessing wellbeing, quality of life, various psychological and behavioral outcomes, physiological and return to work.

Despite a large amount of research effort in this area, there is little robust evidence of effectiveness, with few high-quality, reliable RCTs available. Only four RCTs were identified and these are generally small in size. A further seven used some kind of control or comparison group. Much of the quantitative evidence, therefore, comes from uncontrolled before and after studies which are subject to a range of potential biases. Although studies reported impact across a range of wellbeing, quality of life, psychological, behavioral and occupational measures, the lack of a control group makes it difficult to attribute such change to the intervention. There is some evidence from the trials that nature-based activities may positively impact on depression, anxiety, mood and feelings of hope.

The qualitative evidence synthesis showed broad and wide-reaching perceived impacts on wellbeing, mood and functioning from participants. They also reported appreciating increased knowledge and a sense of achievement from what they were doing, enjoying being physically active, and even being tired-out by taking part. The groups they took part in were important, generating a sense of belonging and support. Nature itself provided quietness and calm, away from their usual day-to-day living environments. Participants also found solace in nature as a "patient receiver" of their needs and symbolically in the rhythms of the seasons, growth and renewal. Participants weaved these understandings of nature into their own narratives of recovery. Moments of pleasure and beauty in nature could resonate strongly and provide nurturing memories.

There may be differences in experience, depending on the type of intervention undertaken. While calm and restoration were highlighted in engagement in nature through activities like gardening and walking, some activities were more exhilarating – including surfing, scuba diving and activities in Wilderness Therapy interventions – and people might also focus on overcoming challenges and managing risk. These tended to be with younger people and the interventions contained more men (including veterans). It is not clear if this reflects different need, or relates to activities believed to be more appropriate for these groups.

This apparent difference between the quantitative and qualitative research findings may be the result of several features. Good quality trials of complex interventions like nature-based activities are difficult and expensive to do well. Less robust designs may be fit for purpose if an organisation mainly wants to evaluate their activity to understand how they are doing, or to inform potential funders. In addition, impacts may be more holistic, with small changes across a range of domains creating a positive experience overall that is more difficult to pick up with specific quantitative measures.

Work Stream 3: Key informant interviews

Aim: to understand the factors that influence successful providing, prescribing and commissioning nature-based interventions for mental ill health.

Methods: We used qualitative semi-structured telephone interviews (n=32) for data collection to explore how providing, prescribing and commissioning nature-based interventions work from the perspectives of a range of stakeholders, including: (i) service commissioners; (ii) mental health service professionals; (iii) primary health care services; (iv) social prescribing link workers; and (v) service providers. The interviews were recorded and transcribed verbatim and data was managed using NVivo. Findings were analysed using as a framework the key themes in the logic model of success factors in the nature-based social prescribing for mental health system (see Work Stream 4: Bringing insights together p. 16). The model was developed iteratively with, and informed by, the interviews.

Key Learning from Informant Interviews:

Theme: the person being referred

Who is being referred and why?

Key populations in particular need of social prescribing, according to GPs we spoke to, include the socially isolated and people experiencing loneliness and anxiety. These groups take up a lot of GP time with social rather than medical needs. Despite this, link workers report that they will take referrals for people with any need. The link workers we spoke to reported that many referrals had levels of complex need. The providers of nature-based social prescribing were more focused on providing services for people with mental health challenges and to address general wellbeing. The level of need however was problematic. In one practice it was clear that the GPs referred so many patients to the Link Worker that she was overwhelmed with referrals.

The role of the referee; are they active participants in the process?

The individual (in some cases the patient) is at the heart of the social prescribing system and can access the social prescribing activity by means of a referral from a health professional such as a GP to a Link Worker (or Community Connector), by self-referral to the Link Worker, or self-refer directly to the community provider. Despite the variety of pathways, we heard, from both link workers and the providers, that the time has to be right for the individual and, for the referral to be accepted and successful, they must have agency and be engaged with the process. The presentation of the referral is also considered to be important; one GP discussed how he avoided using the word 'prescription' and stressed the importance of working with the individual and understanding their needs.

Theme: GPs, primary care

The attitudes of GPs to social prescribing

The GPs interviewed were positive about social prescribing. However, we were told that this is not universal and some GPs do not see the value of social prescribing, don't think it's the right approach and don't want to refer it to their patients. GPs recognised that what makes a difference to people's quality of life and their health outcomes is their social situation and their mental health, which in turn helps them manage their condition and keep themselves healthy.

Health services knowledge of local community offer

GPs indicated that they can't keep up with the range and flux of local social prescribing offers in the community. They also struggled with how to access local groups. We heard that providers of nature-

based social prescribing wrongly target GPs. GPs delegated the receipt and collation of information on nature-based social prescribing to link workers.

Link workers also reported that they were challenged by the fluidity and amount of nature-based social prescribing, as well as other forms of social prescribing, offers in the community and that it is difficult to keep on top of. An important part of working with the voluntary sector and community organisations was organising and collating information on local assets. In one social prescribing service, the manager explained that they had a person working in a community development role connecting with community organisations and mapping what was available. In one area the social prescribing services went further and had funds to help support community development activities.

Theme: Dynamic between GPs and LWs

The importance of the link worker and GP dynamic

Where link workers are situated – some are based in surgeries, some are on split sites, others are in the community – appeared to influence the functioning of the social prescribing system. On the one hand being based in a surgery meant greater accessibility to the GP and the referred individual, and in some cases (not all) access to health records. In other cases, being based in the community was beneficial and enhanced the likelihood of the individual coming directly to the link worker. Wherever they are based, accessibility of the link worker for the referred individual was emphasised to be key.

The rapid roll out of social prescribing and the number of different roles and organisational stakeholders appears to confuse relationships in some areas. For instance, one GP was unclear as to how many Link Workers actually worked at his practices because of how the situation had changed since the introduction of the Primary Care Networks (PCNs). However, in general the GPs described the referral process for social prescribing as being quite simple in practice with the completion of a referral form which was then sent electronically to the Link Worker or centrally to the social prescribing service "and then they will make sure they divvy them out to the correct Link Worker" (GP 3).

Theme: Therapeutic Nature Providers

What are the skills and capacity for designing and promoting the nature-based social prescribing offer in nature-based provider organisations?

We found varied levels of formal training to support mental health issues. Some of the training was nature-based and examples included that offered by the Association of Nature and Forest Therapy Guides or eco-psychology training. Other training mentioned was counselling or Mental Health First Aid Training. Some of the providers were professionals – teachers and psychotherapists – with many years of experience of working with specific groups of people. However, in terms of mental health expertise, some were keen to point out that their expertise did not extend to dealing with severe mental health issues.

There was a wide variation in social prescribing knowledge among those providing nature-based activities, from little or no awareness of what it was to being part of a social prescribing system. There were also those who were aware but were not connected to Link Workers or Community Connectors and felt that they did not need it. A number of providers described how they had attempted to contact GPs directly to promote their nature-based projects and felt that they had little success. Even for those confident to engage with the social prescribing system it was "…easy to understand the links and where it all joins up" in one part of the county, it may not be the same for another area.

What is the capacity to help people?

Many of the providers were small organisations with one or two people delivering the programmes which could also mean that they could not provide the appropriate levels of support for some people. The capacity to deliver an 'individual kind of intervention' was discussed by one of the leaders at a community garden, who with two other colleagues, could be working with between 12 and 20 volunteers at the garden on one day. Thus there was little possibility of running smaller, even one-to-one sessions, and they often relied on other longer-term volunteers to help support others.

The value of nature in social prescribing offers

Some of the providers we spoke to had strong personal beliefs in the value of nature promoting wellbeing and improving mental health, and spoke about it from their own experiences. Some of the providers were convinced that nature and the outdoor environment provided something unique for enhancing wellbeing for those with mental ill health. Nature was considered to be a safe space, talking space, different space. However, in some situations the role of 'nature' was minimised; one nature-based activity provider reported that the agency referring young people did not support nature-based therapies and therefore, his offer was based upon a therapeutic approach and 'nature's not the feature'.

All of the community providers had access to the natural environment and these included a diverse range of green spaces from public parks, allotments, farms, forest/woodlands and community gardens.

Approach to mental ill health and knowledge of people's health

Some providers offered projects that were specifically targeted at mental ill health which could be explicit in the name such as 'Mental Health Improvement Project', and was advertised to organisations that worked and engaged with mental ill health. The majority of providers preferred not to be explicit that their offer was about improving mental ill health and did not highlight it during the activities. Language was important to many of the providers and they were keen to avoid 'labels' of mental ill health as "it might put people off".

Different nature-based providers had different approaches to the delivery of their programmes and interventions. Some providers emphasised the need to be flexible and relaxed when working with people with mental ill health.

Theme: Funding

The funding of nature-based social prescribing

Applying for funding was reported to be onerous and time consuming for small providers. We heard about some providers who, daunted by the paperwork, provided some services without funding. Whilst some providers had long term funding others were reliant on short term funding which impacted sustainability. When a nature-based activity provider could not sustain a particular project because of funding this could then impact on the mental health of the participants.

Theme: Benefit

What is the perceived benefit of nature-based social prescribing?

All of those interviewed believed that the social prescribing of nature-based projects benefited those with mental ill health. How each thought about 'benefit' depended on their perspectives. A number of the interview participants discussed the attempts to measure the beneficial outcomes of social prescribing. In particular, commissioners were concerned about demonstrating benefit. One commissioner noted that in evaluating the social prescribing service there were challenges in linking the

outcomes data to primary care data and hospital admissions. Providers were concerned about the burden of evaluation and suggested that it may take some considerable time before providers see evidence of progression.

Work Stream 4: Bringing insights together

What is effective nature-based social prescribing practice?

Nature- based interventions are complex interventions operating within a complex social prescribing system, both are made up of arrays of interconnected and interdependent actors, processes and events, each element may have an effect on a) a successful process of referral and b) on mental health. We identified key factors likely to contribute to effective NBSP processes and outcomes (all of which we try to represent in the model at end of document):

- Coordination of social prescribing and NBSP within wider systems of health, care and social provision; where funding or commissioning meets wider system needs; NBSP is additional and complementary to other services; and NBSP helps reduce and address wider system pressures.
- Positive and receptive context, institutionally and societally, with a supportive and functional health, care and social context and patient recognition of the option.
- Appropriate referral from GP to LW and onwards to nature-based social prescribing, with the referee supported throughout the process.
- Clarity in aim and process of the nature-based social prescribing, of the beneficiary groups, and of ways in which they may benefit and how, with adequate information sharing between stakeholders.
- NBSP activities are evidence based and theoretically driven, with a clear understanding and integration of active elements, risks anticipated and mitigated, and robust and resilient to sporadic uptake and potentially flexible delivery.
- Programmes may incorporate therapeutic elements such as CBT, talking therapies, resilience building elements, skills development, development of self-efficacy and self-awareness.
- Provider organisations have adequate skills and capacity to design and deliver a suitable NBSP offer.
- Process of improving NBSP activity informed by suitable monitoring and evaluation. Demonstration of value for money of NBSP through suitable methodologies such as cost-effectiveness analysis or cost-benefit analysis allowing comparison to other uses of public funding.
- Flexible and sustainable funding options for NBSP activities.
- Adequate and functioning wider infrastructure enables access to nature-based social prescribing.

We identified the following key factors which are likely to contribute to failure in NBSP processes and outcomes:

- Dysfunctional demand and supply system leads to over/under supply of specific offers. Funding is inadequate, short term, insufficient, difficult to access and NBSP providers exploited.
- Social prescribing and NBSP not recognised as legitimate offer by stakeholders.
- Social prescribing adds to service burden, disrupts and/or duplicates provision or existing systems.
- Dysfunctional communication between referral bodies and NBSP providers, inadequate information on NBSP available in area, poor information on activity to inform referral.
- Poorly designed nature-based social prescribing, risks not anticipated or mitigated.
- Unanticipated users, delivery organisations lack capacity to deliver, short term offer, low flexibility for activity entry, cliff edge end of provision, provision is under-utilised or sporadic uptake.

NBSP is not without risk – to the participants and the delivery bodies, as well as in terms of poor value for money and societally. Understanding and acting on potential risks is crucial. Potential risks include:

- Harm to the individual going through the NBSP process, including alienation from the health system to injury or other risk to health (e.g. zoonotic disease) resulting from taking part in activity. Inappropriate NBSP activity components, or group dynamics exacerbates or worsens mental health conditions
- Increased burden on the health, social or care system, disruption of existing effective systems of care provision, reducing provision for other categories of service users
- Increased burden on particular natural environments, damage to sites, increased crowding, exclusion of users
- Pressure on NBSP providers affects provider's mental health. Poorly equipped and little support systems to help them deal with what they are exposed to
- Exacerbates inequalities in health through unequal provision, availability of resources (e.g. sites), processes of uptake and adherence.

Drawing on information gleaned across the Work Streams, and other associated work by the team (e.g. MRC project,[1] realist review (Husk et al. 2019), a series of conceptual models were produced through collaborative discussion of the team, illustrating how nature-based social prescribing systems can operate successfully, and where they may fail.

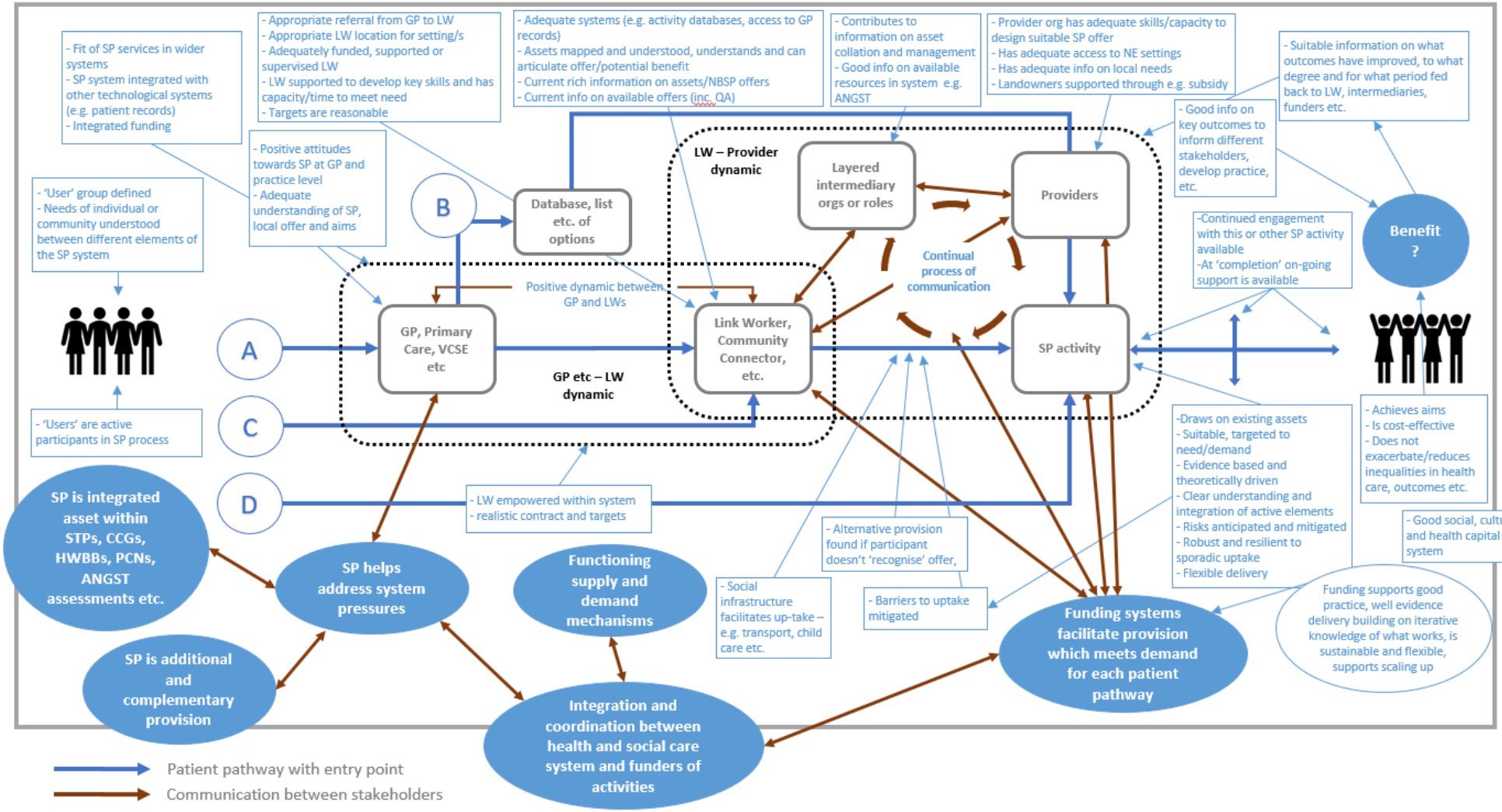
The logic model (in blue) shows success factors identified through this present research in the nature-based social prescribing for mental health system. The logic model illustrates the factors which contribute to successful outcomes. The blue boxes and ellipses describe key factors and their implications.

The dys-logic model (in red) shows failures in the system for nature-based social prescribing for mental health. A dys-logic model illustrates factors which prevent a system from functioning effectively. The red boxes, star and ellipses describe key factors and their implications. The greyed-out figures represent key points in the system where users could drop out. The breaks in the blue pathway arrows indicate where the flow of the system could break down.

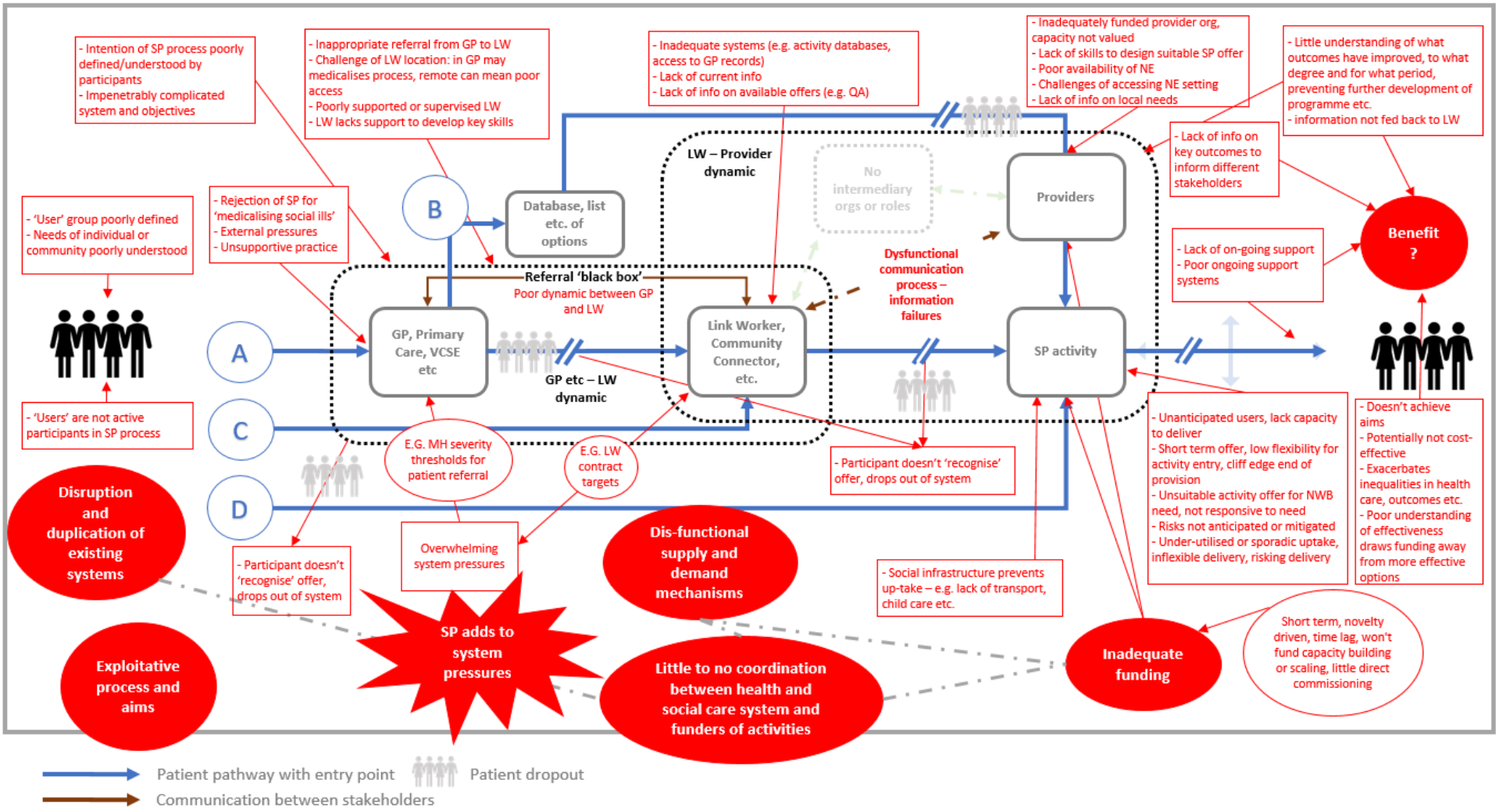
In both models, the letters show different pathways through which a person may arrive at the socially prescribed activity. Pathway A shows where primary care (or another service) refers an individual to a link worker who works with the individual to identify a suitable community-based resource to which they are referred. In Pathway B, primary care (or another service) refers an individual to a directory of social prescribing opportunities available, which they access and gain referral. In Pathway C, the individual accesses the social prescribing system through direct contact with a link worker, bypassing the health referral. In Pathway D the individual accesses the community-based resource directly with no direct referral through the health system or via a link worker community connector or similar role.

[1] Through evidence review, interviews and stakeholder engagement this ongoing project aims to develop an intervention manual to support those delivering nature-based interventions aimed at those at risk of mental ill-health

The logic model of (success factors in) nature based social prescribing for mental health system



The dys-logic model of (failures in) nature based social prescribing for mental health system



Work Stream 5: Summary table of recommendations

Recommendation	Key actors					Level of difficulty	Progress	Key actions
	National government	Local government	3rd sector	Private sector	Other			
1: *Advocacy for nature-based social prescribing*	Defra, Department of Health and Social Care, DCLG	Public health teams; education and families;	Provider organisations; VCSE coordinating organisations	For-profit providers; app/tech support for SP	Individual health and environment professionals with reach	Achievable (if buy in gained)	Ad hoc progress	• Clarify/unify terminology on nature-based social prescribing. • At a national/regional level identify key networks, decision making points/systems – key representatives to join/participate. • Participate in existing networks: for instance, the national Social Prescribing Network has special interest groups; the National Academy for Social Prescribing, which has an advisory board; or NHS England's Personalised Care Team, which has a board too. All of which need representation. • Marketing/promotional campaign targeted to key audiences within the system including medical professionals, link workers and the public.
2: Identifying mechanisms to facilitate coordination of supply and demand in nature-based social prescribing	Defra and its agencies; Department of Health and Social Care; Funders of activity	CCGs; Primary care networks; local public health; referral organisations; Funders of activity	Provider organisations; VCSE coordinating organisations; referral organisations; Funders	For-profit providers		Challenging	Ad hoc progress locally, little coordinated action	• Identify whether similar systems exist for other forms of SP or non-medical referral • Clarify at what scale more coherent systems of supply and demand is needed. • Work with key actors, including VCSEs, Primary Care Networks, Clinical Commissioning Groups, and Sustainability and Transformation Partnerships, to develop system.
3: Enhance knowledge sharing and peer support through a network for nature-based social prescribing	Funders;		Funders; Providers - VCSE	For-profit providers; app/tech support for SP	Researchers	Achievable	Ad hoc progress locally, little coordinated action	• Identify whether there is a network in development, or one which could be used to host this resource/activity. • Outline key job roles/titles in a single glossary of terms. • Work with the community of nature-based social prescribing stakeholders to identify what is needed and in what formats. • Provide resources to initiate/adapt the network.
4: Enhance capacity of local coordinating bodies	Natural England		Providers – VCSE; Network and umbrella organisations such as LNPs;		Landowners	Achievable	Ad hoc progress locally, little coordinated action	• Support existing local coordinating bodies and help replicate in areas where there currently is no local coordination. • Identify key actors with capacity to take on role. • Work with the stakeholders to identify what is needed in each area. • Make access to the natural environment through activities designed to deliver health benefits in general, and social-prescribing in particular, an explicit objective of 25 year environment plan implementation. Also make explicit the ability for ELM to fund (at least in part) the provision of such facilities on farmland/ other qualifying land uses. • Encourage funding of maintenance of the locations used by nature-based social prescribing activities from different sources.
5: Improve the funding system	Defra and its agencies; Department of Health and Social Care; Funders of activity	CCGs; Primary care networks; local public health; referral organisations; Funders of activity	Provider organisations; VCSE coordinating organisations; referral organisations; Funders	For-profit providers		Challenging	Some small-scale initiatives to reform system	• Work with a range of different types of funders to understand their funding priorities. • Work with delivery bodies to further identify funding needs and challenges. • Work with researchers to further clarify outcomes suitable to be used in results-based commissioning models. • Look at developing joint-funding models where pots can be created to meet all aims in conjunction, with nature-based social prescribing/SP bidding into these pots.

Recommendation	Key actors					Level of difficulty	Progress	Key actions
	National government	**Local government**	**3rd sector**	**Private sector**	**Other**			
6: Support the development of skills in nature-based social prescribing	Education sector;	referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations; funders	Universities and educational bodies;		Achievable	Some progress locally but nothing at scale	• Identify whether CPD accreditation etc. would enhance perceived reliability of nature-based social prescribing amongst link workers, health professionals etc. • Work with a range of different types of delivery bodies to understand their training needs. • Work with training delivery bodies to further identify capacity to provide training, costs etc. • Work with researchers to identify mechanisms through which new knowledge of what works can be integrated into training and CPD.
7: Enhance the usability of information on nature-based social prescribing		CCGs; Primary care networks; local public health; referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations;	For-profit providers		Achievable	Unknown	• A framework should be developed for appropriate/possible information needed to inform suitable referral options. • Regular discussions about appropriate outcomes, measuring impact across the system and to what purpose (i.e. taking action where data show it would be useful).
8: Improve understanding of what works, how and for whom	Defra and its agencies; Department of Health and Social Care; Research funders	CCGs; Primary care networks; local public health; referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations;	Universities and research organisations		Achievable	Some progress	• Work with funders, for example UKRI, the larger charitable funders and others to identify opportunities to fund research into the mechanisms of different forms of nature-based social prescribing. • Work with coordinating bodies and others to disseminate evidence of what works to key stakeholders.
The impact of COVID-19[2]	*All*	*All*	*All*	*All*	*Particularly l/w roles are affected*	*Complex and wide ranging*	*Limited but growing significantly with time*	*Modify l/w roles and interactions through technology;* *Protect staff and patients through new social distancing and isolation;* *Etc.*

[2] We are not in position to make firm recommendations about COVID-19 and the impact on social prescribing due to lack of current data; however as an emerging and significant situation affecting SP delivery we note it here for further discussion.

1. Background

Common mental health conditions, such as depression, anxiety, and stress affect up to 15% of the population at any one time, and one in four people will experience a mental health problem at some point in their lives (Department of Health, 2017, Mental Health Taskforce, 2016). Depression is the third most common reason for consultation in general practice in the UK and is the single greatest cause of workplace absenteeism. Poor mental health is associated with poor physical health. People suffering from poor mental health are at risk of dying 15-20 years earlier than people with good mental health (Mental Health Taskforce, 2016). The burden of poor mental health falls disproportionality on the most socio-economically deprived and marginalised groups.

A rapid shift towards greater understanding of mental health conditions, partly due to campaigns such as 'Time to Change', have led to an increase in self-reporting of common mental health problems over time (Spiers et al., 2016). However, even with the decade on decade doubling in the prescribing of antidepressants (Exasol, 2017) and an increase in those receiving psychological therapies (Clark, 2011, McManus S et al., 2016), people given psychiatric diagnoses continue to have poor outcomes (Jobe and Harrow, 2005, Prins et al., 2011).

Effect sizes for psychotropic medicines, psychological therapies and other interventions tend to be small and of a similar order. Adherence is also relatively low. Development of other, more inclusive approaches to management is therefore important. NICE guidance recommends a step-up care approach to common mental health conditions, with the least intrusive options being offered first (National Institute for Health and Care Excellence, 2016). In addition to antidepressants or Cognitive Behaviour Therapy (CBT), step one recommends behavioural activation, self-help groups and befriending while those with mild to moderate depression may be offered options such as group physical activity as initial treatment options. There can also be benefits from peer support and self-help delivered without professional support (National Institute for Health and Care Excellence, 2016).

The costs of mental health problems to the economy are estimated to be approximately £105 billion every year. The costs of poor perinatal mental health alone have been estimated at £8.1 billion per year birth cohort (£10,000 per birth) (Mental Health Taskforce, 2016). Poor mental health results in a significant burden on health services; in 2014-15 approximately two million adults made use of specialist mental health services. Consequently, addressing poor mental health is a priority for Government.

The community approach to mental wellbeing

Community focused approaches are enjoying a renaissance in public health discourse. Having been pivotal to the Alma Ata Declaration on Primary Health Care (PHC) (Department of Health, 2017), there is renewed recognition that social and other non-medical factors influence health. Given this surge, we need to understand how best to support and sustain local assets in contributing to health. Within the UK, this community approach has been embraced within policy and guidance, with Public Health England and NHS England publishing a guide to community centred approaches for health and wellbeing in 2015 (Public Health England, 2015); revised National Institute for Health and Care Excellence (NICE) guidance around community engagement published in 2016 (National Institute for Health and Care Excellence, 2016); NICE quality standards around community engagement in 2017 (National Institute for Health and Care Excellence, 2017), with renewed calls for action in 2018 (Public Health England, 2018a).

Social prescribing

Non-medical, community or social activities are increasingly being "prescribed" to help people manage and prevent illness and improve their health and well-being (Loftus et al., 2017, Pilkington et al., 2017)). These 'social prescribing' approaches can range from financial advice to walking groups and enable healthcare providers to respond to a broad range of patient needs, and aim to support patient wellbeing and reduce social isolation, as well as potentially reducing GP and emergency department service demand (Kimberlee et al., 2017). The current UK Secretary of State for Health and Social Care, Matt Hancock, has stated that social prescribing is a priority (Husk et al., 2019).

The linking of individuals to interventions outside of healthcare is the current zeitgeist in health policy (Department for Digital Culture Media & Sport, 2018, NHS England, 2016, NHS England, 2018) yet social prescribing practice is disparate, variable and complex, and involves a facilitated process of accessing activities run by local government, third sector or community agencies (see Figure 1). These activities might include a range of non-medical interventions including, for example, gardening programmes, books on prescription, exercise on referral and referral for debt, housing and crisis avoidance. Social prescribing expands the options available to GPs and other community-based practitioners whose patients have complex social needs.

Social prescribing is defined by the Social Prescribing Network as a

> *means of enabling GPs and other frontline healthcare professionals to refer patients to a link worker - to provide them with a face to face conversation during which they can learn about the possibilities and design their own personalised solutions, i.e. 'co-produce' their 'social prescription'- so that people with social, emotional or practical needs are empowered to find solutions which will improve their health and wellbeing, often using services provided by the voluntary and community sector. (The Social Prescribing Network., 2019)*

In reality, pathways through which people access community services may vary, and may also include professionals outside of the healthcare service (including education, third sector, and return to work services for example) and, moreover, organisations providing services may not be aware from where they receive referrals, and people may self-refer to the activities This is particularly the case currently where preexisting links and referrals were developed prior to the current focus on the link worker model, and may continue to operate alongside it.

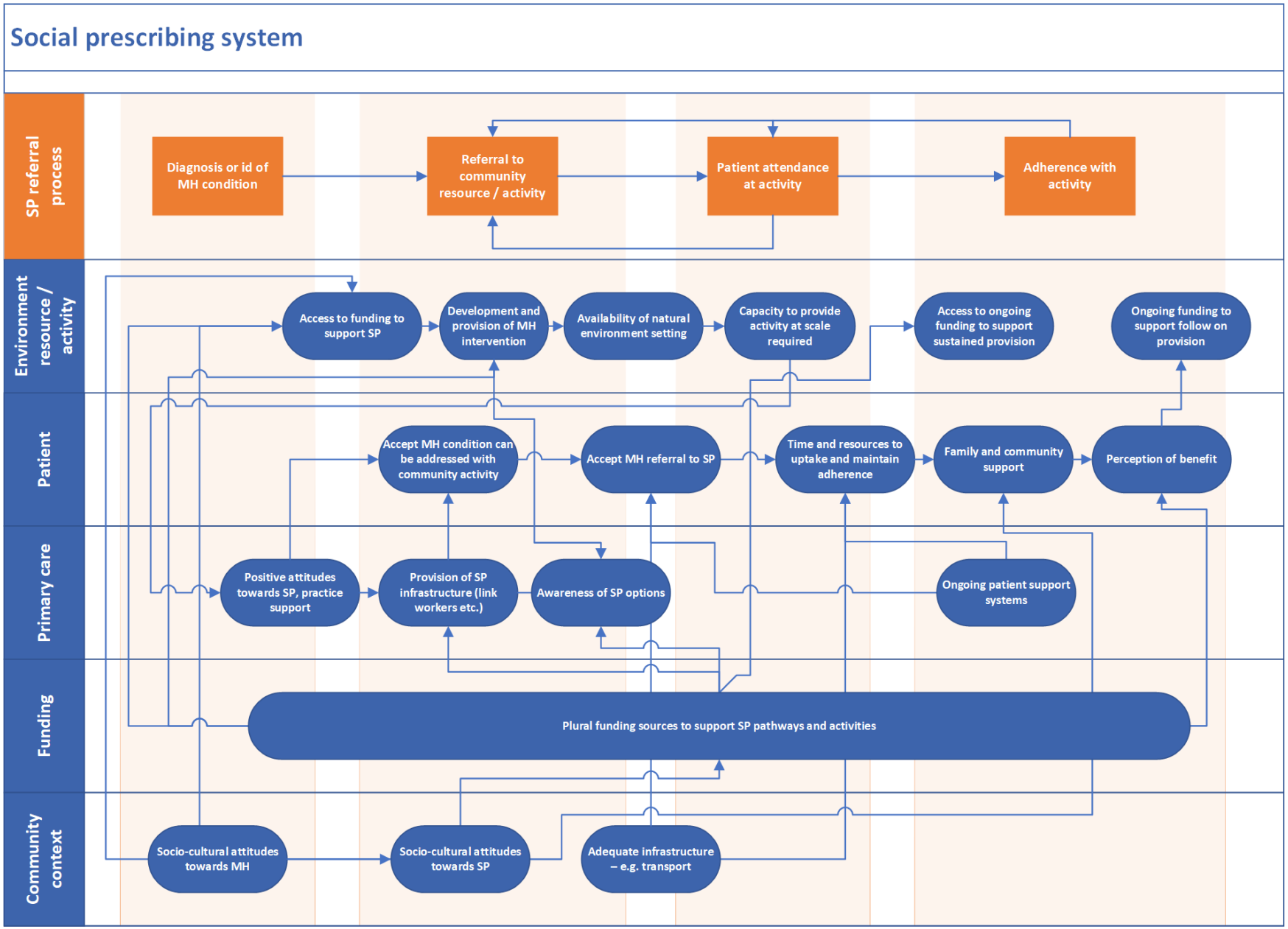


Figure 1: Social prescribing system

In addition to people self-referring to community resources and activities having heard about them through advertising or word of mouth, a variety of referral models currently exist. These range from simple signposting by primary care practitioners through to iterative activity choices, facilitated by link workers who can meet at length with patients and collate available activities to suit need and lifestyle, as well as provide a point of ongoing contact (see Figure 2). Models in different localities vary, and the social prescribing system is currently in flux as there is now a financial commitment for every GP practice to have access to a social prescribing link-worker by 2023. As of early 2020, 1,000 more social prescribing staff are being recruited. It remains unclear how the new focus on Link Workers may support or disrupt these existing social prescribing pathways.

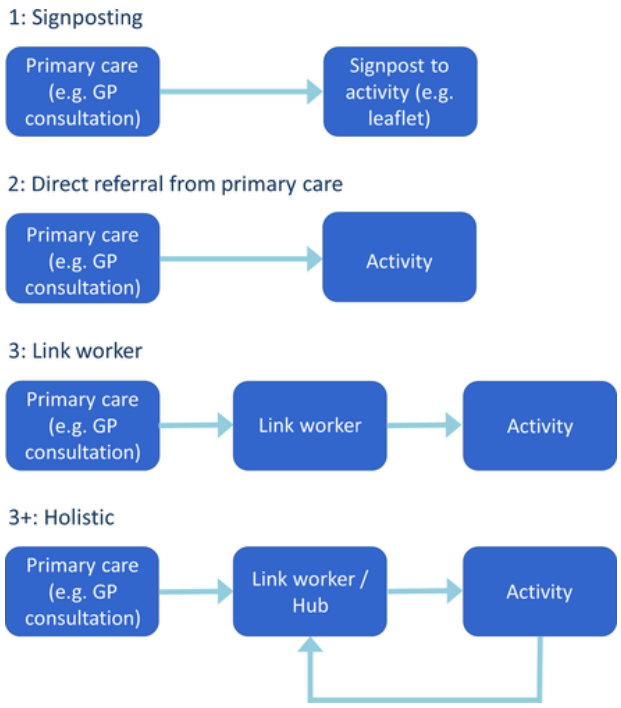


Figure 2: Four key social prescribing models (Husk et al. 2020)

There is a financial commitment for every GP practice to have access to a social prescribing Link Worker by 2023 and there are to be 1,000 more social prescribing staff (NHS England, 2018). Importantly, there are multiple approaches; we adopt a broad definition and include direct referrals to community activities, self-referrals where an individual recognises a community asset may benefit their mental health, and link-worker (or health-trainer) approaches. Social prescribing is based on the presumption that many problems presenting to the health service require social and community intervention. The underlying assumptions are that, by directing individuals to social interventions, or initiatives targeting e.g. income support, greater progress will be made in addressing the social determinants of health. Community-based assets play a pivotal role, both in providing social interventions and in fostering volunteering (Willer R, 2009), which has benefits for health (Bogonovi, 2008, Morrow-Howell et al., 2003, Thoits and Hewitt, 2001).

Tensions arise between the legitimate goal of harnessing community assets for health and the reality of capturing and sustaining community involvement in practice. 'Assets' here are organisations, individuals, components of organisations and the systems that support activities offered as part of social prescribing. As we have argued elsewhere, generating robust evidence for deploying community assets for health is problematic (Husk et al., 2019). Specifically, little is understood about how community organisations work together to deliver social prescribing and how they interact with the health service. There is little work examining the capacity of the community sector to offer activities, the impacts new demands will have, or the ways in which groups might have to change to adapt.

In a previous realist review about what works, for whom, in what circumstances, in social prescribing, we focused on understanding how people can best be supported in the initial steps of this complex process – getting appropriate people referred to an appropriate activity (enrollment), ensuring they get to the community activity (engagement) and ensuring that they continue with that activity (adherence) (Husk et al 2019). Our rationale for this focus was that, regardless of the potential effectiveness of the activity to which people are referred, including nature-based activities, social prescribing could not succeed without these steps working. This review concluded that social prescribing is not a single intervention, but a pathway and series of relationships, all of which need to function to meet patient need. The role of the link worker was identified as key. Multiple interacting factors at the three key stages contribute to pathway 'success.'

There are few robust evaluations of social prescribing effectiveness generally, and none that we are aware of that consider the full pathway for nature-on-prescription specifically – ie from the referral point rather than from when people participate in the nature-based activity. In addition, with social prescribing in flux and rapidly developing, there are a number of models existing through which people with mental ill health may arrive at a nature-based therapeutic activity. This has influenced the focus of the different Work Streams in this project. For Work Stream 1 and 2 (mapping of provision and evidence review), we have focused on the nature-based activities, and noted where information is available if and how people were referred into these. For the qualitative interviews in Work Stream 3, we have tried to better understand nature-based interventions in the context of social prescribing across our four case study areas and from the perspective of various stakeholders.

For the purposes of this report we suggest that:

> *Social prescribing consists of a pathway linking individuals (often from primary care, but also from mental health services, education, welfare and voluntary groups, and through self- referral) to social activities which have the potential to improve health and wellbeing. This pathway expands the options available to individuals who have complex social needs as well as medical, by connecting people to community resources, information and social activities, as well as linking people to a range of statutory and non-statutory agencies.*

Given social prescribing requires multiple organisations, and its implementation is dependent on local contexts and systems, placing firm boundaries around the components is often unhelpful. Terminology is mixed, roles are titled differently and the whole landscape is rapidly expanding and developing. As such, we use the definition above to capture what would be considered social prescribing in most instances, and we define our terms below for clarity.

Pathway – the network of relationships that form the experience of the individual as they go through services, from initial conversations through to whatever activity they undertake.

Activity – the 'intervention', 'organisation activity', or simply the 'thing' that is prescribed; this could be debt advice, art therapy, exercise, or for this project nature-based activities.

Social Prescribing – this term is widely used, and different groups and organisations differentially use it refer to either, or both of the things above. In this report we use it to mean both the pathway and activity.

Referrer – often a GP, but can also be other health professional, VCSE representative, or sometimes the individual themselves (self-referral).

Link worker – These roles 'link' people from the referrer to activity, and have different names but we use link worker for any role that performs that function (i.e. not necessarily the PCN-funded posts).

Further, social prescribing is rapidly expanding and involves cooperation and coordination of multiple sectors and organisations. As such, any analysis is dealing with a moving target; with policy, practice and research struggling to keep pace with developments as they progress. We have highlighted some of the key areas which we are aware are rapidly evolving:

- Covid-19: clearly, in the short-term the global pandemic is having profound impacts across all health-services and social prescribing is no different. For link-workers there are rapid developments in the ways in which they interact with individuals, and NHSE is in the process of developing guidelines. For providers, there is likely to be less coherent guidance and groups will have to take action/modify their approach at a more local level.

- social prescribing for children and young people (CYP): social prescribing delivered as part of the Primary Care Networks is an all-age offer, however for the majority this is aimed at the adult population. However clearly the increasing rates of mental ill health amongst young people and children (<24) could benefit from increased social prescriptions. Working with CYP introduces additional layers of complexity, particularly around consent to participate, working with families and carers, and other statutory bodies. There are again NHSE guidelines being developed which will be published to all PCNs very soon.

- Primary Care Networks (PCNs): all PCNs should now be formed, however these are clearly organisations in their infancy; and so, their operation in delivering the NHSE link-workers, and how they operate within and between PCNs are still emerging. There is different practice within and between areas, which is changing rapidly over time. Particular areas of disagreement are around local data sharing and access agreements, fit to existing programmes and links to alternative funding streams.

- National Academy for Social Prescribing: there is now a National Academy for Social Prescribing (NASP), however it is still very much in 'set-up' mode. The intention is that this group will provide a forum for sharing best practice, generating robust evidence and communicating centrally with policy and government where appropriate. There is to be a funding stream to local initiatives which is to open from NASP imminently.

- Land management: Following Brexit, the UK is working to revise its land management policy and funding mechanisms. Changes will likely result in new subsidy schemes which focus on payments to farmers, foresters and other land managers for the delivery of public goods. The 'public estate' of

accessible land of all types (such as parks) is also undergoing change, with reductions of budgets at the local authority level and shifts in how such spaces are used and supported (e.g. the rise of mass events such as Park Run and interest in alternative funding models such as endowments).

Nature-based therapeutic interventions

The majority of mental health policy recognises the role of the environment, whether social or physical, in determining health. Importantly there is awareness that the environment, and specifically the natural environment, is not just a source of threats to health (e.g. air pollution or biological hazards) but that it has the ability to promote *good* health. In recent years there has been a significant expansion in the development and delivery of nature-based therapeutic interventions for mental health and now many organisations, from health, social care and environmental sectors offer nature-based activities. The range of types of activities is considerable (see Figure 3)

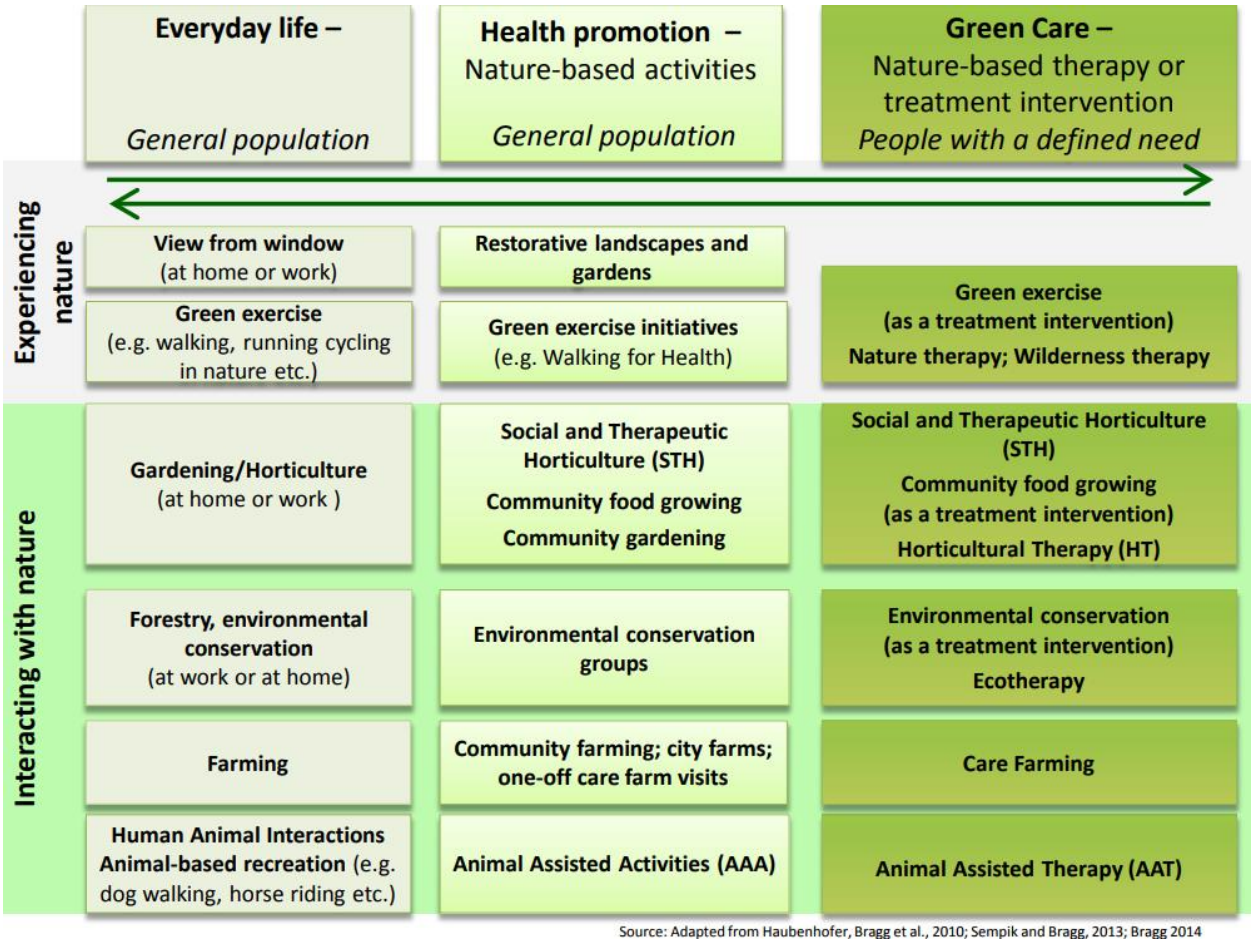


Figure 3: The Green Care model

Nature-based therapeutic interventions vary considerably, with significant heterogeneity (and overlap) in terms of aim, approach, and setting or context. Most nature-based therapeutic interventions have been developed *ad hoc*, taking advantage of locally available knowledge, settings and funding streams. However, there is uncertainty as to how, when and where natural environments could be best used to

improve mental health outcomes. Social prescribing offers an excellent opportunity to link individuals at risk of, or experiencing, mental ill-health with nature-based therapeutic interventions to improve mental wellbeing. While little high quality, robust evidence of social prescribing effectiveness has been identified (Clark, 2011, NHS England, 2018), research does indicate clear potential pathways for benefit for some elements of such interventions. For example, health gains may be derived from physical activity, learning new skills, the restorative qualities of nature and reduced social isolation (Lovell et al., 2015).

The aims and approaches of nature-based therapeutic interventions varies between targeted, therapeutic and incidental. Targeted activities are specifically designed to address a specific mental health outcome or engage a specific community (e.g. according to a health condition or demographics - older people, children's etc.). Therapeutic activities are provided to improve mental health status, or to prevent, or manage a specific mental health problem. Incidental activities have the potential to result in positive impacts to mental health but are not specifically designed or promoted as such. For this report we have focused on interventions that target populations with mental ill health, and interpreted this broadly. Interventions aimed at the general population, but which those with mental ill health may attend incidentally, have not been included. Outcomes of interest include mental health and wellbeing, quality of life, service use and costs.

Some nature-based therapeutic interventions operate on what are described as indirect factors. Indirect factors are those which contribute to mental health status, such as meaningful occupation, social contact or physical activity. Others are more direct and might aim to directly improve the mental health of the participants by integrating talking or cognitive behavioral therapies.

The role of the setting or context of the nature-based therapeutic intervention also varies (see Figure 3). In some cases the natural environment is 'remote' and natural elements of the environment are present or visible but the individual is not 'in' the natural environment. In other cases it can be described as 'incidental', this is where activities take place in natural environments but the activity is not specifically focused on the natural environment. Finally, and in the majority of cases, the setting or context is central and intentional. This is where the natural environment is more than just a setting but is fundamental to the activity. It is precisely some of these complexities that we hope to elucidate in this project in order to understand key ingredients of interventions and associated resource implications.

There is strong evidence suggesting that the greater knowledge and confidence a person has in managing their own health, the better the health outcomes and experience of care. The role that the voluntary and community sector (VCSE) can play in patient activation is less well understood, particularly as assets that are deployed in social prescribing include small, informal groups rather than formally constituted organisations. With respect to formally constituted VSCEs, studies identify distinct characteristics, including being 'mission-driven' (Baines et al., 2010) rather than profit-driven (Alcock, 2010), having governance structures with user representation, relying on volunteers, (Hall and Reed, 1998) having distinctive patterns of innovation, and having close ties to particular localities or care groups. VCSEs also have distinctive resource dependencies and distinct ways of combining non-profit and for-profit activities. The potential positive consequences of the NHS commissioning VCSEs include responsiveness; innovation; advocacy; complementarity; 'social enabling'.

However, there are also risks in commissioning VCSEs. Resource dependency theory (Guo and Acar, 2005) implies that heavy dependence on NHS income risks making VCSE providers become more like

NHS providers because: 'innovations' impel VCSEs to accumulate profits to finance them (Fox, 2015); contractual obligations compel VCSEs to use paid labour (Sheaff R, 2002); VCSEs become more accountable to commissioners (Baines et al., 2010), focus on cost-savings results in VCSEs receiving less income. At worst, unsuitable modes of commissioning undermine the very characteristics making VCSEs valuable to the NHS in the first place (Carmel and Harlock, 2008).

There is currently little evidence about how nature-based activity effectiveness may vary across different contexts and in different populations. We don't know, for example, which delivery modes or activities are most valued by participants, whether it is better for activity groups to comprise only those with particular needs or conditions, or whether these should be mixed, or how best to harness the group-effects for positive interaction. This approach is predicated on an understanding of the community assets and existing models that could support this approach, as well as on the identification of suitable financing models, all of which is in its infancy. In addition, referral of people with mental health conditions to such interventions is largely on an *ad hoc* basis, based on local connections between enthusiastic general practices or individuals and local third sector groups.

As previously noted, despite the increasing interest in the use of social prescribing, and more specifically the potential for nature-based therapeutic interventions to support mental health, the evidence base is limited (Husk et al., 2020). The review by Bragg and Atkins found limited evidence of the extent of nature-based mental health provision and that effort is needed to provide a 'comprehensive picture of the scale and nature of green care for mental healthcare in the UK' (Bragg R and Atkins G, 2016). There is a risk of social prescribing services being developed without evidence about what should be offered or the processes that are required to support them, with a disconnect between health and other services resulting in patients not getting a social prescription appropriate to their needs. All actors (stakeholders) in the chain from promotion, to referral, to delivery and development of sustainable, fundable operations require a better understanding of current state of nature-based solutions.

2. Aims of the project

In order to address some of the outlined uncertainties, the aim of this project is to explore what works, for whom and under what existing processes, in the delivery of nature-based social prescribing programmes for diagnosed mental health conditions. The process for this is outlined below.

Work Stream 1: to undertake a review and mapping exercise of the current provision of nature-based therapeutic interventions to support people with a mental ill-health in four areas of England: Devon, Newcastle, Bradford and West Yorkshire. These locations were agreed in consultation with Defra and the project steering group, and chosen in order to align with the Personalised Care Demonstrator Sites. Key definitions of the types of interventions to be included and the focus on participants with diagnosed mental health conditions were also agreed with Defra and the project steering group. In order to gain the most comprehensive view of existing provision, programmes of any size and scale have been included, both commissioned and not, and we first identified available programmes and then tried to identify referral process through which they received participants, including self-referral.

In addition to this report, we have also produced a searchable Excel database of core information about provision of nature-based therapeutic interventions across these four case study settings in England that illustrate a range of socio-economic, socio-cultural and geographic locations.

Work Stream 2: to review the current available quantitative and qualitative research evidence, and to describe and update existing reviews, in order to understand:

- What are the impacts of therapeutic nature for people with diagnosed mental health conditions?

The qualitative evidence synthesis also aimed to explore:

- How are these impacts thought to be achieved?
- What participant and intervention factors might affect the impact of therapeutic nature for diagnosed mental health conditions?

The review focused nature-based interventions to establish their potential for people with diagnosed mental health conditions and draw out mechanisms that are likely to lead to benefits. This evidence review may then support their consideration as appropriate within the social prescribing system. There has been little evaluation to date of social prescribing generally, and none we are aware of looking at nature-based interventions explicitly in this context (Husk et al., 2019). We have noted where available information that shows from where participants have been referred, but note that the research focuses on those who have participated in the project, and not on those from the point of referral.

In addition to the final report, key outputs of work stream 2 are a key learning document aimed at policy and practitioner audiences, and managers in the natural environment, voluntary, and health sector, and an academic publication on the review about what nature-based interventions work, for whom, and why for people with common mental health conditions.

Work Stream 3: In order to understand the place of nature-based therapeutic interventions within existing social prescribing systems, WS3 aimed to gather insights from service commissioners, mental health service professionals, primary health care services, environmental voluntary organisations,

community-based providers and other intermediaries in our four key locations: Devon, Newcastle, Bradford and West Yorkshire.

The overarching aim of the interview study is to understand the factors that influence successful providing, prescribing and commissioning nature-based interventions for mental ill health. Telephone interviews, stratified across stakeholders so as to cover a range of relevant insights, were used to focus in on the factors that influence uptake and referral within the health sector; provision and promotion of suitable services by voluntary and community providers; funding mechanisms; the nature of "successful" nature-based social prescribing; information about successful and potential mechanisms for referral and the potential to improve and up-scale nature-based interventions.

In addition to this report, an output of work stream 3 will be a key learning document aimed at policy and practitioner audiences, and managers in the natural environment, voluntary, and health sectors which summarises these challenges and their proposed solutions. We also plan to produce an academic publication reporting on the barriers to, and facilitators of, successfully providing, prescribing and commissioning nature-based interventions for mental ill health.

Work Stream 4: this brings together insights from the mapping, evidence review and qualitative insight work. We have used established methods of evidence synthesis to bring together information from these various sources, including producing detailed conceptual frameworks, descriptive texts and illustrative case cases. We focus on understanding and explaining the factors that affect successful provision of nature-based therapeutic interventions for people with mental ill health and how these may be mitigated against. We also identify opportunities to build on existing provision, as identified in the mapping exercise (Work Stream 1) together with understandings of what works, for whom, in what circumstances developed through Work Stream 2. In addition, we provide conclusions on economic factors, as an input to both policy design and design of interventions.

Key outputs of Work Stream 4 are the models presented in Section 6, detailing the ways in which nature-based social prescribing is thought to operate, the contexts and mechanisms driving success, and how these processes might be disrupted. We anticipate these being highly useful and citable outputs from this project.

Work stream 5: We developed recommended actions to inform and support future provision and implementation of nature-based therapeutic interventions to support people with their mental health. Drawing on information developed from all project streams, we have considered how these could be planned, funded, delivered and embedded to achieve the most significant impact. We identify specific actions across the system including Government, the voluntary and health sectors. This links to ongoing developments in environmental and health funding approaches, including the Place-based trust model being implemented in Newcastle, and other innovative approaches to funding natural capital as a health asset.

Work Stream 6: Aims to provide high quality outputs to communicate findings and share successful strategies to the intended audiences, including policy, practitioner and funder audiences and managers in the natural environment, voluntary, and health sectors, including innovative approaches where appropriate and resources and tools to support, share and spread continued learning. These are in progress and will be finalised once this report has been peer reviewed, signed off by Defra and published.

3. Work Stream 1: Mapping the current provision

In our proposal to Defra, we anticipated that two of the selected case study sites would be in the South West and Bradford, with a possible third in Newcastle, to allow us to draw on the established links of the research team, as well as to explore difference in terms of prescribing and funding models, urban/rural setting and population (both in terms of demographics and illnesses/conditions). The final four English localities of interest were agreed with Defra and the project steering group as: Devon, Newcastle, Bradford, and West Yorkshire. These fit with personalised care demonstrator sites (shown here: https://www.england.nhs.uk/personalisedcare/upc/), whilst also representing a range of demographic, socio-economic, sociocultural and geographical features.

We have provided case study site profile in in Appendix 1. This outlines contextual information for each area, inlcuding geography and natural assets, service organisations, demographics, and key wellbeing and mental health statistics. It was not always possible to glean the same information for each site but this has been done as far as possible throughout.

Providing concise summaries of current and future social prescribing practice in each of the case study areas is difficult, and potentially hides important complexity. Social prescribing practice is disparate and involves multiple organisations, including primary care, the voluntary sector, commissioners, and activity providers. This organisational complexity is further complicated by the layers of geography, referrals made at the GP practice level, to link workers employed by third sector organisations, and people linked to activities that may be national, regional or the very local. So, for example in Devon, this incorporates work happening at the 'locality' (four in Devon) level, Primary Care Network (the new networks), and county level.

Additionally, the way in which services are currently funded and will be funded into the future is a patchwork. In some cases, it builds on existing social prescribing programmes funded by Primary Care Home, or the Department of Health and Social Care, or others sources where social prescribing has been happening for significantly longer. In the immediate future this will be supplemented (and hopefully not replaced) with Primary Care Network-funded link workers as promised in the NHS (England) Long Term Plan (2019).

There are moves to try to draw this disparity in practice together, through both Clinical Commissioning Groups (CCGs) and Sustainability and Transformation Partnerships (STPs), however this is in the early stages and the aim is to understand the complexity rather than to reduce variability (which is a potential benefit of social prescribing services).

Given the complexities in delivery, geography, funding and development over time, we think it is more useful at this stage to detail the range of pathways available to individuals (from their perspective) and provide illustrative examples to draw in how this complexity functions in delivery. The interviews with stakeholders in the four localities reported in Section 5 give further insight into experiences with nature-based social prescribing across and within the four localities.

The aim of Work Stream 1 was to undertake detailed review and mapping exercise of the current provision of nature-based therapeutic interventions to support people with a mental illness in four areas on England: Devon, Newcastle, Bradford and West Yorkshire.

Our inclusion criteria were fairly broad. We included any activities that:

- Provide any therapeutic nature-based intervention/activity. This could be standalone or in combination with other activities (eg counselling or creative activity).
- Are aimed at adults or children with mental health conditions. Where the target population included vulnerable groups or people experiencing other issues linked to mental health (for example drug and alcohol projects, or domestic violence), these were included. Projects aimed at the general population, where people with mental health conditions might attend but are not targeted, were not included.
- Are based in Devon, Newcastle, Bradford and West Yorkshire.

The included projects are described in detail from page 39.

Mapping the provision of nature-based interventions for diagnosed mental health conditions was conducted alongside the evidence review, since many of the searches performed are conducive to both gathering grey literature and gleaning project-specific information. Much of the methods are detailed here but apply to both work streams. A mixed approach has been used both seeking and inviting information, as well as direct efforts made to build networks within the case study areas which additionally aided Work Stream 3 in identifying key informants for the interviews.

Programme identification

Searches and connections:

- A Call for Evidence (Figure 4) was promoted through social media, relevant newsletters (e.g. Social Prescribing Network) and direct e-mails to key contacts (ECEHH are well connected in this field).
- A blog written by RL on the Beyond Greenspace website was additionally used to promote the project and call for evidence: tiny.cc/naturetherapy
- Direct online searches and 'snowball searching' from the following large-scale organisations (mental health and environmental) with known social prescribing foci. These organisations were identified through a) consultation with project team and b) use of the hand searching list of organisations detailed in the Cochrane review of conservation activities for health and wellbeing (Husk et al., 2016):

○ Mind (inc. ecotherapy & ecominds)	○ The Consortium for Therapeutic Communities	○ NHS England
○ DIVA Bradford (search allotment or mental health)	○ Rural action Yorkshire	○ Human-nature escapes CEC
○ Yorkshire Dales Millennium Trust	○ My Place (Lancs Widlife Trust)	○ NHS Shetland
○ Reach Out (Inverness)	○ Healthy Shetland	○ The Donkey Sanctuary UK
○ National Garden Scheme	○ Social Farms and Gardens - care farming map	○ Green Health Partnership Dundee
○ Kate Mulligan AllianceON	○ Chris Newman - Doctors for XR	○ Freshair Fridays

- Tickwood Care Farm
- A dose of nature network
- TCV Pro-active Minds
- Good Gym
- The Wilderness Foundation
- National Allotment Society
- Big Butterfly Count
- Royal Society for the Protection of Birds (RSPB)
- Nature Partnerships
- Council websites (should list)
- Be Mindful
- Beat
- NHS Greenspace
- Prison programmes (Natural England)
- Centre for Sustainable Healthcare
- Mental Health Concern
- Yorkshire sport
- Muddy Fork
- Plot22
- Sea Sanctuary
- Walking for Health
- Carry on Gardening
- Grow Wild
- Blue cross
- Bumblebee Conservation trust
- Wildlife Trusts
- Woodland Trust
- Google Ecotherapists
- Anxiety UK
- The Land Trust
- Green Wellbeing Alliance
- Our Bright Future]
- Wellbeing Exeter
- First contact clinical
- Blissability
- Incredible Education
- The Conservation Volunteers
- Let's Walk Cymru
- Groundwork
- Royal Horticultural Society
- Hedgehog Street
- Royal Society for the Prevention of Cruelty to Animals (RSPCA)
- Forestry Commission
- Wildfowl and Wetlands Trust
- Google equine therapy
- Bipolar UK
- Scottish Forestry
- Adventure Therapy
- Lottery funds - list of projects
- Wolsely trust Plymouth
- Ways to Wellness
- Marbles Lost and found

- Use of expert referrals e.g. from the project team and ECEHH staff, authors of relevant reviews, regional leads for the social prescribing network.
- Use of twitter and social media promotion:
    - Engaging in the fortnightly 'Social Prescribing Hour'
    - Full searches of hashtags from relevant conferences e.g. Social Prescribing Network Annual Conference (#socialprescribing2019), National Link Worker Day (#linkworkerday19), as well as promotion of the call using these hashtags
    - Following of key figureheads.
    - Social media engagement with umbrella and national-level social prescribing organisations such as @Its_Elemental (software for Link worker facilitation https://elementalsoftware.co/)
- Identification of relevant Link Workers (also called Community Connectors) operating within the case study areas alongside direct e-mailing of other key contacts nationally was conducted in order to access key informants. This enabled retrieval of referral project lists and direct introductions to relevant projects.

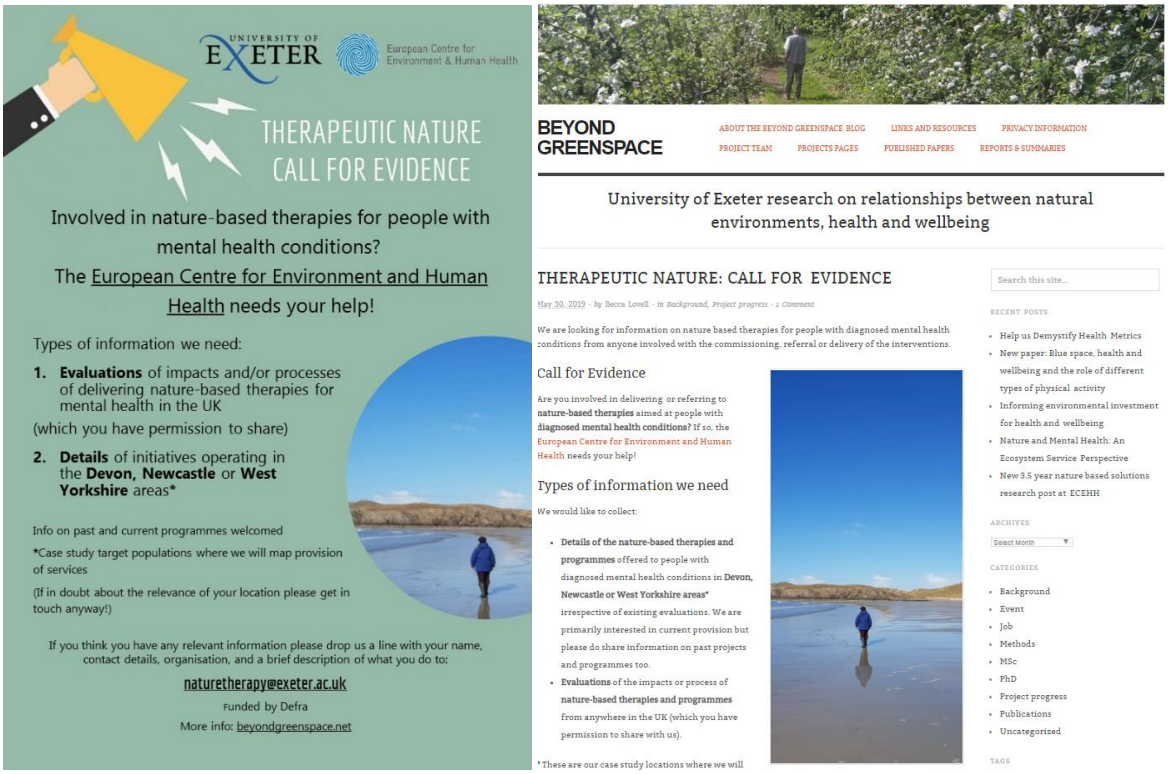


Figure 4: Call for evidence & promotion

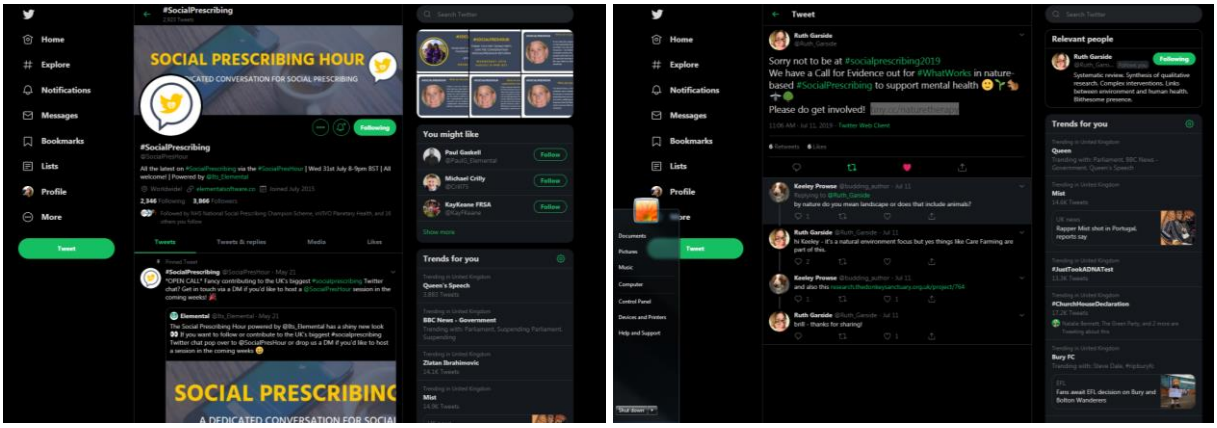


Figure 5: Twitter engagement examples

Approach to mapping identified Therapeutic Nature activities

- A proforma was developed for extraction of relevant information regarding aspects of provision from project websites:
    - Targeted population and location information
    - Intervention type, rationale, delivery and target outcomes
    - Detail of green spaces used e.g. access (paid or free), habitat, availability

- Relationship with mental health services including use of expertise (delivery) and referral pathways
- Modes and sources of funding
- Use of evaluation techniques and any application of appropriate frameworks

Identified case study therapeutic nature programmes and evidence review studies

As described above, the processes for identifying activities for Work Stream 1 and evaluations for Work Stream 2, overlap and informed each other. Figure 6 shows the how the process for this provision mapping informed the evidence review process. Further searches and snowballing increased the amount of evidence reviewed in Work Stream 2.

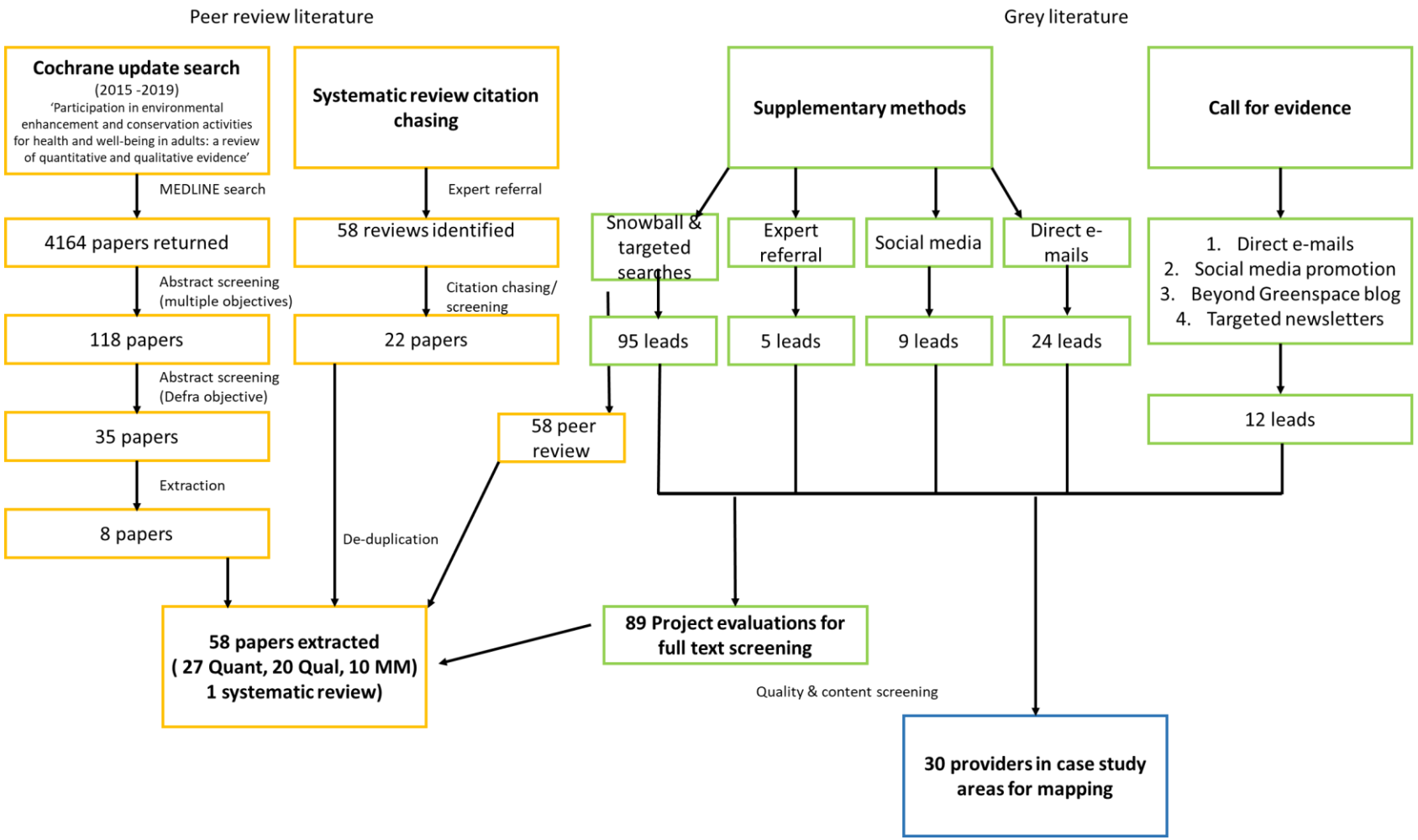


Figure 6: Flow chart for activity provision and evidence review study identification

Overview of identified activity

Following targeted searches in the four case study areas 59 organisations/projects were identified as potentially meeting the inclusion criteria. Of these, 30 have been finally included and details extracted as per the review pro forma. The remaining 29 were excluded primarily because the projects retain a web presence but are in fact not currently operational. Two identified in Devon were actually overarching networks for social prescribing, inclusive of nature-based projects. A further two from the Newcastle area are in fact consultancies operating under the Ways to Wellness social prescribing network which covers the entire area but which currently operates no nature-based activities. Three proved to be irrelevant, four provided too little information to be sure of their status and the remaining 18 were either inactive, seeking funding or yet to accept participants. This complicated provision landscape demonstrates the moving target that is these services. We are only able to capture a snapshot of the current provision, and the picture painted here is in rapid and constant flux.

In a similar vein, providers are broad in their foci and are not limited to targeted organisations focused specifically on nature-based interventions. Types of delivery organisation have included NGOs, NGOs focused on environmental issues with a social prescribing aspect and vice versa, social enterprises, CICs, local councils, NHS trusts, private therapists and academic institutions in partnerships. In Table 1 we have included just the current, active provision. However all organisations are documented in the database. Though a number of partnerships do exist, it is not always clear and certainly isn't universal for environment-focused NGOs to formally include mental health staff within project structures and vice-versa. Indeed, through the website scoping we found just 12 projects which openly outlined the mental health professional services which were directly involved in provision (though of course this information may be withheld from the project websites in some cases). The type of staffing also varied, from trained Mind volunteers to provision of qualified Psychotherapists. Many of these projects appear to struggle for both project-specific and core organisational funds, particularly where private land and infrastructure is at the centre of delivery e.g. care farms. This may have led in part to the difficulty in identifying active projects as organisations with mixed foci necessarily fluctuate between funding types, with websites retaining project information but unable to accept participants.

Regional networks which were identified are encouraging. The Exeter CoLab and Wellbeing Exeter groups (which are linked) are large in scope and extremely broadly collaborative across many local stakeholders – something which is explored in more detail within the MRC project. However the Newcastle Ways to Wellness network has yet to embrace nature-based initiatives and operates

differently, using a mixture of Link workers and consultancy input for delivery of social prescribing programmes. Though it is clear the Local Nature Partnerships can play a key role in facilitating and networking nature-based programmes, as is the case in Devon, it is unclear how well this is implemented elsewhere including within the other case study areas where they were inactive or not engaged in this sector.

Referral pathways were often not made obvious on project websites, which may reflect the adaptive and mixed nature of projects who may accept a broad spectrum of conditions (some self-referred, others through official channels). Of those which did indicate referral types, eight accepted self-referrals (or were private, paid courses), seven showed a preference for professional referrals though this did not necessarily rule out self-referral also. Other referral routes include through schools, job centres, housing groups, recommendations from previous participants, and friends and family referrals.

Specific funding was largely not declared and is particularly difficult to interpret where organisations may have a mixture of projects and core funders which are not disaggregated. Funders included local councils, Trusts, Foundations, the National Lottery, and the NHS. The Mind Ecominds funding has been at the centre of many projects and their development but has long run out (2013). Some projects charge a fee for participation or can only offer some/partly subsidised places.

Six projects included within the case study areas which are currently active had freely available evaluations online. However, none of these met our inclusion and quality control criteria.

Therapeutic Nature activities identified in the case study sites

Devon

We identified the most activity in Devon (n=19). Five targeted children with a range of mental health issues, as well as offending behaviour, ADHD, autism, traumatic backgrounds, and social exclusion. Two programmes work with both adults and children with mental health problems, and the remaining 12 target adults with a range of mental health conditions, recovering addicts, and young women with mental health and menstrual problems. Only one explicitly targets mental health inpatients.

Activities and settings were varied. Nine used private land, including two private estates, four working farms, and a privately owned field (one further unspecified, and two activities both used the same private estate). Four used local urban greenspace and three used natural greenspace such as the moors, beaches and rivers. One programme was based at the local zoo, one at an animal shelter and one at a donkey sanctuary.

Several programmes combined therapeutic nature with other activities, for example with creative arts (n=3) or mindfulness with outdoor activities, which might be conservation or horticulture focused (n=3) and one of these was residential. Three studies use horticulture therapy, and two care farming. Time spent with animals (horses, donkeys) was the focus of two programmes. Two programmes focused on walking groups in green settings and a further three on adventure or wilderness pursuits. One offers surf therapy. A total of six programmes explicitly incorporate formal therapy elements (such as CBT, or "talk therapy") as part of the offer.

Bradford

In Bradford, six programmes were identified: two aimed at young people and four at adults. Most included participants with a range of different metal health issues. Three programmes use local greenspaces, two programmes take place at community/ city farms and one uses a woodland setting. Two groups predominately focus on green exercise (walking groups), three use horticultural therapy (one of which also includes animal assisted therapy) and one runs a varied progamme including exercise, creative and counselling (Cognitive Behaviour Therapy, CBT) activities.

West Yorkshire

In West Yorkshire, five programmes were identified, all aimed at adults, one specifically targeting women. Two are based in urban green spaces, one offering green exercise (a walking group for mental health inpatients) and one facilitating conservation activities. One, run by therapists, offers equine therapy in a private equine centre. One aimed to support women who had trauma through domestic violence, trafficking, and used equine and arts activities, again in a private setting. One group facilitated wilderness activities. This last appears to undertake activities in a numbers of settings, as it was previously operating in Devon.

Newcastle

Three programmes were identified in Newcastle, all aimed at adults with mental health challenges. Two offered therapeutic horticulture: one on local allotments and one at an urban community garden; and one was based at an animal shelter.

Details are shown below in Table 1.

Table 1: Therapeutic Nature programmes offered in case study sites

Organisation and programme	Participants	Description of intervention	Setting
Devon			
The Sharpham Trust – Mindful-in-nature	Aimed at adults with a lived experience of mental health difficulties such as depression or anxiety – self funded	Mindfulness course delivered in natural settings with active conservation component	Private estate owned by the Trust including woodland, estuary, horticultural areas, agricultural land.
The Sharpham Trust/Ambios – Spring to Life **	Aimed at young adults 16-25 with non-specific mental health conditions	Uses the 'take a moment' approach to physical and mental recovery in natural settings inclusive of an active conservation component	As above
organicARTS – Community Garden	Open to all adults but minibus specifically funded for access by people with mental health conditions, efforts are also made to include marginalised and underrepresented groups	Uses a mindfulness approach with outdoor activities (largely horticultural)	Run on a working farm (private)
Double Elephant – Print on Prescription**	Aimed at mental health service users and residential patients (adults)	Eco-arts programme using natural settings for therapeutic arts activities – printmaking (structured art)	Use of Exmoor National Park (also do outreach sessions on psychiatric wards but unclear if nature element retained)
Tom's Farm CIC	For children and young adults with traumatic backgrounds and ensuing mental health problems	Range of residential, long term and short programmes building confidence through agricultural and horticultural work, eco-arts, animal care and other activities	Use of a working farm - private
The Donkey Sanctuary – Donkey assisted therapy	Aimed at vulnerable children and adults including but not limited to those with mental health conditions	Donkey-assisted therapy aimed at creating connections and training to deal with emotions on a life skills development programme	Donkey sanctuary site (farm)
Devon Mind – Bridge the gap	A range of undefined mental health issues including social isolation	A mixture of activity-based sessions such as gardening and eco-arts, alongside a traditional 'tea and talk' group	Various space uses – urban green spaces and community spaces
Ecotherapy Exeter – Walks for wellbeing	Adults with anxiety and depression	Green exercise alongside reflection and creative self-expression (formalized therapy included)	Various local green spaces (linked to a Dose of Nature project)
Breathe Outdoors – Adventure therapy	For children and young adults with anxiety, depression, social, emotional and behavioural differences, low self-esteem, confidence,	Active, adventurous, nature-based, experiential, reflective and discussion focused programmes. Mixture of outdoor light exercise, mindfulness, CBT,	Use of various locations around South Devon including Dartmoor, caves, woodland, cliffs, rivers.

Organisation and programme	Participants	Description of intervention	Setting
	attention deficit hyperactivity disorder and attention deficit disorder and some cases of Autism	talk therapy and adventure activities	
Adventure therapy	People of any age with a disability, life-limiting illness or life-changing condition (including mental health) and lacking access to the outdoors	Mixture of adventure pursuits in water and on land with a focus on facing personal and physical challenges for increased confidence	Use various providers of private outdoor space
Adrian Harris – Walk and talk	Adults	Private therapist delivered traditional talk therapy in green settings	Local urban green spaces (free to access)
Buckfastleigh Town Council – Dartmoor Naturally Healthy	For adults, previously inclusive of mental health conditions but under new funding appears to have expanded to include general wellbeing promotion	Walking for wellbeing – green exercise. Walks in nature, tai chi, arts, conservation, heritage.	Use of Dartmoor national park
Get your life back! – RENEW Project	Young women with hormonal problems: Pre-menstrual dysphoric disorder, severe PMS, polycycstic ovary, endometriosis, menopause, anxiety, depression, borderline personality disorder, bi-polar	Therapeutic horticulture, growing your own food.	Use of a privately owned field (very new project)
Knights Care Farm – Farming on prescription	People with 'mild' mental health issues	Meaningful work in therapeutic horticultural, conservation and other farm activities to boost self esteem	Private working farm
The Apricot Centre CIC – Wellbeing Service	Young people and families 'on the edge of potential' with mental health issues	Farm work alongside a range of specialist therapies, assessments, mentoring and also less intensive farm work if necessary.	Farm owned by Biodynamic Land Trust
Sirona – Therapeutic horsemanship	Young people and children, youth offenders with mental health conditions	Therapeutic horsemanship, equine assisted therapy and equine assisted learning.	Part of a private estate
Dartmoor Zoological Park – Grow 4 Good South West	Young people facing social exclusion with associated mental health difficulties	Organic gardening facilitating a physically active outdoors experience alongside conservation activities	Operates within the Zoo grounds with species of conservation priority
Wave – Surf Therapy	Young people and children with mild to severe mental health conditions	Surf therapy courses which connect children with the sea, facilitate exercise and build confidence	Operates from three public beaches: Bigbury-on-sea, Goodrington and Sidmouth
Write to Freedom	Adults recovering from addiction and associated conditions (formerly	Residential wilderness experiences – mentoring, therapy and creative writing	Use of Dartmoor National Park and other green spaces in North

Organisation and programme	Participants	Description of intervention	Setting
	focused on young men in prison)	which is done in wilderness settings	Devon including coastal areas
Bradford District			
PRISM Youth Project – Breathing Spaces	Youth offenders and deprived children/young adults suffering from depression, anxiety, eating disorders and attachment problems.	A mixture of facilitated green exercise and care farming including animal-assisted therapy and a horticultural programme aiming to increase employability.	Delivered on a city farm
Rooted	Girls and young women suffering from emotional problems, low confidence, suicidal thoughts and other mental health issues	A woodland-based psychoeducational learning approach including physical and creative activities surrounding reflective practices exercise and physical play, CBT, food and time to share as a group.	Woodland setting
Bradford District Care Trust – Champions show the way	Aimed at adults (largely the elderly) with long term health conditions including mental health issues.	Variable activities but predominantly run walking groups for adults.	Use of local urban green spaces with free access.
The Cellar Trust – Woodwork and horticulture	For adults suffering from a mixture of severe (residential) and less severe mental health issues	A mixture of horticultural and woodworking projects for individuals run on a weekly basis over several sites – one of which is a residential mental health care facility	Use of urban community green spaces e.g. community gardens. Indoor space needed for woodworking.
Lidget Green Healthy Living Centre – Lidget Green Walking club **	"Mental health conditions" – no further details	A walking group – green exercise	Local green spaces
Horton Community Farm – Social and therapeutic horticulture	Limited detail – adults with mental health conditions	Therapeutic horticulture volunteering programme	Community farm and allotments including mindfulness garden
West Yorkshire			
The Welland Trust – Under The Sky*	Aimed at care-experienced adults with care-linked mental health conditions	Fully facilitated outdoor immersive activities, one-off wilderness treatments with a roaming team	Use of partner-sites wherever the next session is. Rural wilderness spaces.
FrogLife – Kirklees Natural Achievers	Adult men with poor mental health, learning difficulties or social isolation	Wellbeing improvement through outdoor exercise and conservation work. Enhancement of a millpond space for amphibian conservation.	FrogLife owned mill pond (small wetland) in urban setting
Centre for Sustainable Healthcare – Green Walking Project	Mental health ward specific: Dewsbury Priestley unit & Bradford and district. Multiple severe conditions.	Outdoor exercise for residential mental health patients in NHS hospitals. Walking group run by staff.	Use of local urban green spaces – various dependent on group.

Organisation and programme	Participants	Description of intervention	Setting
Clouds counselling – Equine assisted therapy	Private therapists	Equine therapy facilitated by formal counselling organisation	Private equine centre
Yorkshire Sculpture park – Leap of Faith	Women who have experience of trafficking, domestic violence or mental ill health	Mostly based on arts but also includes element of equine therapy	Within private estate
Newcastle			
Scotswood Garden – Growing together	Aimed at people from deprived communities with complex health needs inclusive of mental health issues	Various social and therapeutic horticultural activities with tailored skills development	Use of urban community garden
Washington Mind – Pet Therapy	Unspecified mental health issues	Walking and quiet time with dogs and cats – time in the outdoors and time indoors with animals	Use of animal shelter grounds
Groundwork – HEAL: Health, Environment and Allotments **	Aimed at men with mental health conditions	Therapeutic horticulture	On local allotments

* This programme appears to roam – it has been in Devon and in W. Yorks
**Projects which are seeking funding, though still active, or which have folded since the review began

As noted in Work Stream 2, although some of the interventions operating in our case study sites had conducted evaluations (n=9), these were often produced more as summaries of their activities, briefings or project reports, rather than research reports, and many did not provide enough information about the methods used to recruit participants, or on how data was collected and analysed, to allow us to make an appraisal of the quality of those methods. These reports were not, therefore, included in the evidence review. Even the two that did provide methodological information (the *Wave Project,* Devon and *Hive* in West Yorkshire) used less robust, uncontrolled before-and-after study designs. While such approaches to evaluation may be understandable and appropriate for small organisations, who may wish to provide evidence for different audiences, such as funders, rather than academics or health professionals, it does limit the strength of the evidence developed. In addition, *Hive* is no longer operating. We are therefore not able to assess which specific case site projects are effective in addressing mental health problems.

In order to illustrate the kind of range of activities that are typically offered as therapeutic nature, we have produced four composite exemplars below in Box 1 to Box 4. These aim to illuminate the complexity and variety encountered across the therapeutic nature offers in terms of participants, activity types, intervention components, delivery factors and system considerations that different interventions operate within.

Box 1. Therapeutic nature Exemplar 1: Green walks

Green walks		
Activity	**Role of environment**	Setting for activity, nature as being away from institutional context
	Nature of activity	Walking
Intervention components	**Intention/Aims**	Reduce boredom and frustration, alleviate stress, promote healthy and active lifestyle
	Active therapeutic elements	Being in nature and doing in nature
Delivery factors	**Leadership**	OTs, doctors, nurses, psychotherapists
	Group Composition	Psychiatric inpatients 1 staff member to 3 patients, could be 1:1 depending on needs of patients
	Frequency	2 hours every week
	Duration	Ongoing programme
	Delivery mode	Consistent
System	**Access**	Taxi from ward to greenspace
	Funding	OT budget
	Referral	Selected offers made by ward staff

Box 2. Therapeutic nature Exemplar 2: Care Farms

Care Farms		
Activity	**Role of environment**	Setting for activities and also nature-based activities - animals and crops
	Nature of activity	Farming activities, e.g. Animal husbandry and arable farming
Intervention components	**Intention/Aims**	Promoting mental and physical health, improving social skills and practical skills, promoting resilience
	Active therapeutic elements	Physical activity, engaging with nature, learning skills and improving teamwork
Delivery factors	**Leadership**	Farmers, farm managers
	Group Composition	Mixed groups, recovering addicts, people with dementia, long term unemployed and people with learning disabilities as well as psychiatric patients
	Frequency	Twice a week
	Duration	Six months
	Delivery mode	Consistent ongoing
System	**Access**	Public transport or taxis
	Funding	Costs to participant £50 per session from: personal budgets, social services, charitable trust donations
	Referral	Schools, social services, volunteering organisations, residential homes

Box 3. Therapeutic nature Exemplar 3: Horticultural therapy

Horticultural therapy		
Activity	**Role of environment**	Active use of environment. Also more passive use, watching wildlife. Garden is a 'partner' in the therapy.
	Nature of activity	Gardening.
Intervention components	**Intention/Aims**	Return to work. Reduce rumination.
	Active therapeutic elements	Horticultural, sense of achievement, 'being in tune with nature', sustained process of care and growth, being away from the institutional setting. Undemanding environment.
Delivery factors	**Leadership**	Multi-modal team; physiotherapist, psychotherapist, gardener
	Composition	Long term incapacity benefit, long term stress
	Frequency	4 days a week, 3.5 hours per day
	Duration	12 week programme
	Delivery mode	Consistent ongoing, some element of progression (e.g. Going on to become a volunteer leader)
System	**Access route**	Mixed - self transport or organised
	Funding	Mixed
	Referral	Mixed - GPs, social and employment services,

Box 4. Therapeutic nature exemplar 4: Wilderness therapy

Wilderness therapy		
Activity	**Role of environment**	Setting, active setting
	Nature of activity	Adventurous activities, hiking, camping
Intervention components	**Intention/Aims**	Increase motivation, social competence, resilience, collaborative behaviours, peer behaviours
	Active therapeutic elements	Mindfulness, team building, leadership skills, group based mechanisms, nature immersion, chores, camp responsibilities.
Delivery factors	**Leadership**	Trained mountain leader
	Composition	Troubled teens, struggling in mainstream education, behavioural and MH issues
	Frequency	Ad hoc
	Duration	3 days, 2 nights
	Delivery mode	Step up programme of challenging/risky activity
System	**Access route**	Minibus organised by provider
	Funding	Costs £350 paid by participant plus extensive kit list to be supplied. Private funds, social services
	Referral	Self referral, commissioned

Even from these simplified exemplars, it can be seen that there are a wide variety of implications for evaluation, funding, and management strategies.

Cost and management implications

After the UK's exit from the EU, current agricultural subsidy payments will be replaced a new Environmental Land Management Scheme (ELM). This will form part of new agricultural policies, and

will "*transform how we support the agricultural sector by rewarding farmers, foresters and other land managers with public money for public goods*". (Defra, 2020)

Provision of access to the natural environment qualifies as a public good (being largely non-rival and non-excludable), with recreation and recreation infrastructure explicitly recognised as something that ELM could pay for (Defra., 2019b). This provision refers to general recreation rather than specific provision of spaces suitable for nature-based social prescribing. However, provision of such facilities falls within the definition of what ELM could support, and are also part of the specific objectives of the 25 year environment plan which include (under the "Enhancing beauty, heritage and engagement with the natural environment"): *"making sure that there are high quality, accessible, natural spaces close to where people live and work, particularly in urban areas, and encouraging more people to spend time in them to benefit their health and wellbeing"* (Defra., 2019a).

It should be noted that ELM is not (as in current payment schemes) restricted to funding farming, forestry and other 'rural development' (i.e. commercial) activities. It could therefore also potentially co-fund facilities for nature-based social proscribing in any type of natural or semi-natural environment (e.g. nature reserves, public parks).

Nevertheless, ELM does have explicit links to farming activities, and it is interesting to note the role of private farmland in delivery of the case studies examined in Devon. Of the 19 cases examined in the county, 10 take place on private farms. A further four cases used rural locations in a more flexible manner (e.g. describing their locus as 'within the national park'), and therefore presumably could use facilities on private farmland if these were. The case studies examined in Bradford and West Yorkshire unsurprisingly had a more urban locus, but some are also flexible to use a range of spaces and therefore could also potentially use spaces within farms if farmers provided them.

This evidence, while limited to the case study locations, strongly suggests that in rural and semi-rural areas there is strong potential for nature-based social prescribing to take place on private farmland and/or other types of semi-natural habitats/land uses that can be supported by public payments under the proposed ELM scheme.

Summary findings

- The amount of available nature-based activities targeting mental health needs varies widely by area. Rural areas such as Devon were found to have better provision, perhaps due to access to a wide range of green space, but also aided by the LNP network providing ongoing support and coordination.
- Regional/local networks are beginning to exist such as in Exeter where Wellbeing Exeter has brought together local providers, referrers and academics in order to co-ordinate and evaluate effectiveness.
- Recently increased interest in social prescribing may also have led to "research fatigue" in some quarters, this was noted by an informant in Newcastle.
- Sources of provision have been broad including: targeted NGOs, NGOs focused on environmental issues with a social prescribing aspect and vice versa, social enterprises,

community interest companies (CICs), local councils, NHS trusts, private therapists. Projects may be collaborative between multiple organizations.

- Most available activities are targeted at adults, and are broad in terms of the mental health challenges that participants may be experiencing.
- Types of activity are varied, including whether other therapeutic aspects, such as formal counselling or therapy – or other intervention components, such as skills learning or creative activities, are also included.
- The provision of specific interventions, and the involvement of specific organisations, is a moving target. Given the project based nature of much of the funding available, and shifting priorities, we will be able to only capture a snapshot of provision. Understanding these pressures and the factors that can lead to sustainability or is explored in Work Stream 3.
- In addition to these normal shifts of provision, we appear to be in a transitional period where a number of well known projects are finishing or have completed their pilots and initial funding and are seeking more sustainable options. These projects will be included in the map e.g. projects arising from the EcoMinds initiative (>100 projects) who may have leveraged additional funding to better develop their programmes are now seeking to embed these programmes in to their long term plans.
- Some voluntary/ NGOs have struggled in the current austerity climate, and this has led to closures. It has been suggested that Newcastle has been particularly hard hit in this respect which may help to explain less activity here. It was also suggested that what provision there is here is very local, and may be difficult to identify.

4. Work Stream 2: Evidence review

The aim of Work Stream 2 was to review the current available evidence base to describe and update existing reviews. Alongside work already underway as part of a separate but highly relevant MRC project we have conducted an evidence syntheses of existing research and reviews focusing on common mental health conditions, and mechanisms of action that may be present in nature-based activities, with the aim of understanding what works, for whom, in what circumstances.

Review question

- What are the impacts of therapeutic nature for people with diagnosed mental health conditions?

The qualitative evidence synthesis also aimed to explore:

- How are these impacts thought to be achieved?
- What participant and intervention factors might affect the impact of therapeutic nature for diagnosed mental health conditions?

Study identification

In addition to the grey literature searches described in Work Stream 2, we conducted update searches based on those used in a previous systematic review of health and wellbeing impacts of taking part in environmental enhancement activities and targeted searches for horticultural/ gardening activity and citation chasing of relevant systematic reviews (Lovell et al., 2015, Buck, 2016, Bragg and Atkins, 2016).

Potentially relevant titles and abstracts were uploaded into ENDNOTE and screened by two people. Full texts of those that seemed to meet inclusion were obtained and similarly screened against inclusion criteria (see Figure 6 on p. 38).

Inclusion / exclusion criteria

Population: adults and children with defined mental health issues. As qualitative research tended to contain more mixed groups, we included these where the majority of the population included had defined mental health issues.

Intervention: any intervention taking place using nature/ green /blue space

Comparator (for quantitative review only): any temporal (before and after) or group based comparison/ control.

Outcomes (quantitative): Any outcomes related to mental health, quality of life/wellbeing, psychological or behavioral measures.

Findings (qualitative): participant experiences of participating in therapeutic nature interventions.

Study design (Quantitative): Any quantitative design including a comparison: RCT, nRCT, before and after studies

Study design (Qualitative): Any study design using recognised methods of qualitative data collection (including observations, interviews, focus groups etc.) and qualitative methods of analysis (including thematic analysis, ethnographic methods, grounded theory, phenomenology etc.).

We excluded papers where the population showed no or little overlap with our population of interest (those with diagnosed mental health conditions) or where this was too poorly defined to be sure. For example, although the Devon based *Dartmoor Naturally Healthy* and *Exmoor Moor to*

Enjoy projects were evaluated, the population was described only as those with a "health need" and as this was not further defined this evaluation was not included.

We also excluded grey literature reports where the methods of data collection and or analysis were missing, or too thin to allow quality appraisal. Finally, we also excluded studies from the review of quantitative data where the sample sizes were less than ten, as the results are unlikely to be meaningful. This included the pilot and further evaluation of the *Rooted* project for adolescent girls in West Yorkshire, as they included five and eight participants respectively. Just two evaluations from projects identified in the four case study sites described in the previous section met the inclusion criteria: *Hive* in West Yorkshire and the *Wave* project in Devon.

Evaluations associated with service provision identified in Work Stream 1 and excluded at full text stage are listed in Appendix 2 with reasons for their exclusion.

A systematic review on Care Farms was published in late 2019 (Murray et al., 2019) after our searches were conducted, and we have provided a summary of findings from this review.

We included 58 articles and reports: 1 systematic review, 27 quantitative and 20 qualitative studies and 10 mixed methods studies. The ten using mixed methods appear in both quantitative and qualitative study numbers and descriptions below so that sixty eight studies are reported.

We used the EPHPP Quality Assessment tool, which can be applied across a range of quantitative study designs, to assess the extent to which potential sources of bias may be present. Key participant, intervention, methodology and outcome data for each study were extracted and tabulated. Due to heterogeneity in population, the nature of the interventions examined and the outcomes measured, we provide a narrative summary for the findings from the stronger study designs and tabulate the results across the other included studies.

For the qualitative evidence synthesis we assessed study quality according to the Wallace criteria. Key participant, intervention and methodology data for each study were extracted and tabulated. Findings were synthesised using a combination of deductive and inductive approaches. Initially, we used an existing conceptual model as a framework to guide coding (see Figure 7). This conceptual model was previously developed by team members as a synthesised output from a mixed methods systematic review of health and wellbeing impacts of taking part in conservation activities (Husk et al., 2016). Additional themes and subthemes were developed using thematic synthesis.

Interventions evaluated in the quantitative and qualitative evidence reviews

When assessing intervention effectiveness, particularly complex interventions, it is important to detail key aspects of the intervention and its delivery in order to gain a better picture of what was done, and to inform the development of future interventions in order to maximise the chance of success. We used the Template for Intervention Description and Replication (TIDieR) for reporting intervention details in public health, to consistently assess and describe the interventions that were evaluated in the evidence reviews. Table 2 outlines the items present in the template.

Table 2: TIDieR framework for intervention descriptions

Brief name	
1	Provide the name or a phrase that describes the intervention
Why	
2	Describe any rationale, theory, or goal of the elements essential to the intervention
What	
3	Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (such as online appendix, URL)
4	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities
Who provided	
5	For each category of intervention provider (such as psychologist, nursing assistant), describe their expertise, background, and any specific training given
How	
6	Describe the modes of delivery (such as face to face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group
Where	
7	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features
When and How Much	
8	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity, or dose
Tailoring	
9	If the intervention was planned to be personalised or adapted, then describe what, why, when, and how
Modifications	
10	If the intervention was modified during the course of the study, describe the changes (what, why, when, and how)
How well	
11	Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them
12	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned

Source: (Hoffmann et al., 2014)

The details of the interventions included in the evidence review of quantitative and qualitative research evidence are shown in Table 9, Appendix 3 (p.186) organized using the TIDieR framework headings, and summarized below.

Theoretical basis for included interventions

These are shown in the second column of Table 9 "Why," indicating any theoretical basis or rationale for the intervention that informed its design, delivery and intervention components. Interventions

varied in the explicit theories or mechanisms that they hypothesized would benefit the people attending them.

Broad theories mentioned from environmental and evolutionary psychology include Biophilia, Attention Restoration Theory (ART), Psycho-evolutionary Theory (PET) and Supportive Environment Theory. *Biophilia* suggests that people have an innate attraction to nature and seek out opportunities to affiliate with living things (Wilson, 1986). *Attention Restoration Theory* suggests that time in nature leaves people better able to concentrate, due to elements of "soft fascination" which draw attention without effort (Kaplan and Kaplan, 1989). By contrast, tasks that require concentration need "directed attention" which is a finite cognitive resource and, when depleted, people become less able to concentrate, less effective and more stressed. ART suggests that nature facilitates the restoration of this limited resource. *Psycho-evolutionary Theory* posits that man-made environments can create stress, while people respond to natural features such as open space, greenness and pattern, and water (Ulrich et al., 1991). Nature induces feelings of pleasure and calm that allow psychophysiological stress recovery. *Supportive Environment theory* suggests that, while humans have evolved in the context of a natural, cultural and social environment that has been manageable and meaningful, modern living often does not provide this (Grahn et al., 2017). People need supportive environments to develop physically and mentally. Recreating small communities of people in natural settings can reproduce these needed supportive environments.

Several studies mention that the increase in physical activity that their interventions led to would have physical and mental health benefits.

Social interaction in groups was also regarded as having the potential to improve mental health and wellbeing by reducing isolation, increasing social networks and supporting community cohesion – this latter impact was especially important in gardens that were community based or attached to other facilities. Groups were generally seen as safe and supportive aspects of the intervention.

There were also a variety of hypotheses that related to specific types of interventions, and some differences could be seen by type of intervention. For example, wilderness therapy and outdoor sports sometimes drew on the idea that risk-taking in a safe environment was healthy and built resilience – particularly in adolescents. *Experiential learning* was also mentioned. This allows participants to meet challenges and overcome problems in a controlled setting, and to draw lessons and skills from this that can be applied more broadly. This includes experiencing emotionally demanding situations and developing a sense of self-efficacy. By contrast, therapeutic gardening tended to draw more on theories of nature providing stress reducing environments and the benefits of undertaking meaningful activities. There appear to be more men taking part in the outdoor sports activities described, and more women enrolled in gardening programmes although recruitment strategies for these are not always clear.

Several studies had an aim of returning people to work. Nature-based activities were thought to reduce stress, provide meaningful occupation and develop social skills that would be beneficial in facilitating future occupation.

Intervention features

These are reported in Table 9 in the columns about "What Procedures" (listing activities undertaken), "How" (listing modes of delivery),"Where", "when and how much", "Tailoring," "Modifications" and "what materials" (where provided equipment is described).

The most frequently evaluated intervention was therapeutic gardening, followed by wilderness therapy. Other interventions included green walks, mountain hikes, surfing, scuba diving, forest

activities, creative activities combined with being active outdoors, and a nature-based spiritual retreat.

Ten studies, six from the UK, mentioned referral source for their participants. For others this is unclear or participants were self-referred. In all cases, the referral process does not appear to be part of the evaluated intervention – participants were recruited to research whilst undertaking the nature-based intervention, so the evaluation does not assess the whole system. Barley, et al (2012), assessing a London-based garden, received referrals from local professionals such as GPs. Coan et al (2017) assessed the impact of creative eco-therapy for those referred through mental health or primary care, and self-referred participants. The Horticultural Therapy intervention by Harris et al (2017) included participants who had been referred by community mental health practitioners, occupational therapists and recovery teams. O'Brien et al (2011) assess environmental volunteering in the UK and participants were referred to the project by their health or social care practitioner, GP, or they could refer themselves. In Stephens (2007) UK therapeutic horticulture intervention, bout a quarter were referred by a doctor or job centre personnel. Participants in *Branching Out,* Scotland (Wilson et al 2011) were referred from secondary and tertiary mental health teams.

For Clark et al, assessing Wilderness Therapy in the USA , participants were referred, but it is not clear who by. The population is described as "troubled adolescents." Eriksson et al (2017, Sweden) report on participants referred to a therapeutic garden by the National Health Insurance Office. In Molsher & Townsend (2016), most were referred by Australian mental health or employment services. Finally, for the *Nacadia* Therapy Garden project in Denmark (Stigsdotter et al 2018) health practitioners (private practice doctors, psychologists and psychiatrists), and insurance companies referred participants.

Most were group activities, although some also incorporated individual elements, particularly if counselling was part of the offer or if the participants had more serious mental health conditions and required one-to-one support. The surf therapy was also supported one-to-one. Groups were typically small – usually around 5-8 (mostly in the range of 3-12) and the largest group included 25 people.

Interventions varied widely in scope and length/ intensity from a single green walk in an urban park to 5 months of therapeutic gardening. Some were drop in activities with no strict duration. Wilderness therapy and care farms were usually residential offers and could last for months – the longest was 6 months on the care farm with 6 months community follow up. By contrast, other interventions offered an intensive programme completed over 4-10 days. For those programs offered for a number of weeks, this too varied: it could include a weekly session of a couple of hours, to four days a week. For several studies, a weekly led session was supplemented by *ad hoc* access to the site.

Typically, studies did not report whether or not the intervention was modified during implementation, whether intervention fidelity was assessed or whether the intervention was delivered as planned. There were also few details explicitly supplied about tailoring, although this is implicit in many interventions as many people are able to work at their own pace, or select the details of the nature-based activity in which they get involved. Similarly, physical materials provided were described by few studies although, implicitly, seeds, plants, tools or other equipment must be available for participants for them to undertake gardening tasks or conservation activities. Some of the equipment and settings are likely to be expensive – such as long-term wilderness adventures, or scuba diving, and it is not clear how these activities are funded. This lack of detail makes it difficult to understand the resource implications of any specific nature-based activity.

Staffing

This relates to the column "who provided" in Table 9.

Interventions were supported by a variety of staff depending on the type of people it was aimed at, the size of the group and the nature of the intervention. Healthcare related staff included counsellors, psychologists, physiotherapists, occupational therapists, psychotherapists, recreation therapists, doctors and nurses. Social care staff such as social workers and youth workers were also involved.

Intervention related staff included surfers, divers, horticulturalists, outdoor guides, volunteer coordinators, farmers, landscape architects, landscape engineers, project managers and wilderness leaders.

Studies included in the evidence review: Quantitative

We included 36 quantitative studies, ten of which were mixed methods studies and are also included in the report of qualitative research. Details of these studies are shown in Appendix 4 (p. 220) and summarized below. We have also summarized key findings from a systematic review of Care Farms, published during this project (Murray et al 2019).

Systematic review of Care Farms

One mixed methods systematic review (Murray et al. 2019) was published in late 2019 and is included in our evidence review instead of individual studies of care farms. The exception is the study of *Ecominds* projects by Bragg et al (2013), who evaluated a wide range of interventions, and of which two of the 52 were care farms. Given care farms provided a minority of the participants, we describe this study in the review below.

This Campbell Library registered review investigated "The impact of care farms on quality of life, depression and anxiety among different population groups." Care farming involves the therapeutic use of agricultural and farming practices. The review assessed 18 qualitative studies and 13 quantitative studies, one of which was a mixed-methods study. Not all of these papers included the population of interest here, as the review included study participants with mental health problems, and also those with learning difficulties, health problems, substance misuse problems, and offenders and disaffected youth. However, the two RCTs included are in mental health patients so the findings of those are summarised separately below.

The review found a lack of quantitative evidence that care farms improve people's quality of life, but some evidence that they might improve depression and anxiety. The qualitative studies showed that people valued, among other things, being in contact with each other, and feeling a sense of achievement, fulfilment, and belonging.

RCTs included in the Care Farm review

Berget et al. (2007, 2008, 2011) (n=90) assessed the impact of undertaking a 12-week Care Farm intervention compared to usual treatment. The intervention was for 3 hours, twice a week for people with mental ill health. No significant change in anxiety or self-efficacy between groups was found at 12 week follow-up (Berget et al., 2011). However, at 6-month follow-up, they found a statistically significant positive effect of the intervention in reducing anxiety and increasing self-efficacy.

Pedersen et al. (2012b) assessed the impact of a small, 1.5–3 hr, twice a week, 12 week care farm intervention 29 people with clinical depression. No significant change in anxiety or self-efficacy between groups was seen at the end of the intervention or 3 months after the intervention.

Included primary studies

We included 36 quantitative studies, ten of which were mixed methods studies and are also included in the report of qualitative research. Key study characteristics are shown in Table 10 (Appendix 4, p. 220) for details.

Only four of the quantitative studies (Detweiler, 2015; Kam & Siu, 2010; Stigsdottir 2018; Warber 2011) used a randomised controlled trial design, all were pilots with relatively small sample sizes (n=38, n=20, n= 84; n=58 across three arms respectively). Two further studies used a crossover study (Berman et al 2012; Plorderl 2012), and these were also small (n=20 in both). One study used a non-randomised controlled design (Banaka & Young 1985). One study (Wahrborg et al 2014) used a retrospective cohort, using matched controls from a health care register in order to compare impact of a rehabilitation garden on healthcare usage between groups. One pilot study (n=54) used a case and wait list control design (Voruganti et al 2006). One study (n=50) used a control group which attempted to match symptoms, but there were significant other differences between the groups at baseline (Son et al 2004). One study used a convenience comparison group (Kelley et al 1997). The other studies used before and after designs, without a control group (uBA), limiting our ability to attribute any measured change to the intervention. Other common methodological weaknesses include potential selection bias, lack of researcher blinding and poor reporting of withdrawal and drop outs. Overall the quality of two studies was rated strong, one moderate and the rest weak (for details see Table 11, Appendix 5 on p.241).

Population

Sample sizes ranged from 12 to 796 people. Most participants had mental health conditions although some studies also included those with a range of behavioural, social and substance abuse issues. Eight studies were in adolescents, and the rest in adult populations. Only five studies reported whether or not participants were also receiving other treatment, including prescription medicine.

Studies came from the UK (n=9), Australia (n=2), the USA (n=10), Canada (n=3), Scandinavia (n=10), Austria (n=1), Korea (n=1) and Hong Kong (n=1).

Participants accessed the interventions in a variety of ways, again these are not always described – those that were described were referred through local health or social care providers, including GPs, mental health, or drug/alcohol recovery services, or were referred through employment or social insurance services. Five studies involved those in residential mental health care who accessed the programmes (Banaka & Young 1985; Gabrielsen et al 2019; Polderl et al 2012; Woodford et al 2017) and another a garden attached to a residential substance abuse facility (Detweiler et al 2015). One took referrals from a military rehabilitation service for those with PTSD after limb amputation (Morgan et al 2019). One study used a purely research intervention – nature walks (Berman et al 2012). Other participants accessed services by self-referral, or methods of accessing were not described.

Interventions

Interventions were based on therapeutic gardening (n=14), wilderness therapy (n=8), outdoor adventure (n=3), urban nature walks, natural resource management, mountain hikes, surfing, scuba diving, forest activities, creative activities combined with being active outdoors, and a nature-based retreat. Some explicitly included other therapeutic guidance, especially where the intervention was part of a wider residential programme. Bragg et al 2013 undertook a combined evaluation of 52 *Ecominds* projects, including horticultural therapy, conservation, nature arts and crafts, green exercise and care farming. Owing to this variety, it is not included on the TIDieR assessment.

Outcomes

Outcomes measured included general wellbeing or quality of life measures, mood, self-reported benefits, psychological and behavioural measures, physiological measures (cortisol), mental healthcare service usage, and occupational measures. Some papers reported overall effect sizes combining these outcomes. Individual studies assessed between one, and 10 outcome measures. Most used pre- and post-intervention measures or time series, with seven studies also providing data 3-18 months after the programme finished.

Results: Quantitative studies

Results from RCTs

For further details see Appendix 6 (p. 245).

Detweiler et al (2015) reported on impacts of container gardning for a small sample (n=22) of veterans with mental ill-health undergoing residential treatment for substance abuse. This trial was rated as weak. None of the wellbeing, mood, psychological, behavioural measures used showed a statistically significant change over the programme. This was also the only study to use any physiological measures - in this case, cortisol levels (indicating stress level) from saliva (n=11). No statistically significant change was recorded.

Kam and Siu (2010) examined the impact of an hourly, 10 day horticultural therapy intervention, led by an occupational health worker, on people with serious mental health problems who were already engaged in work-related workshop activities at *New Life Farm in Hong Kong.* The comparison group continued to receive usual care involving work related skills training. The independent outcome assessor was blinded to the study aims. The samples were small – 10 received the intervention, and 12 acted as controls. Two participants dropped out of the intervention arm and the analysis was not conducted on an intention to treat basis. For the experimental group compared to the control group, significant reductions were seen in the depression ($p = 0.04$) and anxiety ($p=0.01$) subscales of the Depression Anxiety Stress scale (DASS), but not the stress subscale ($p = 0.05$). Overall DASS was reduced ($p=0.01$). Other work related (Works Behavioral Assessment) and Quality of Life (Personal Wellbeing index) measures showed no significant difference between the groups.

Stigsdotter et al (2018) assessed the impact of *Narcadia* therapeutic gardening in a wild forest garden in Denmark compared to a specific CBT based treatment (Specialised Treatment for Severe Bodily Distress Syndromes, StreSS). Again it was relatively small, with 84 people randomized but few participants completing all follow-up points, potentially more in the control arm (67% in the treatment arm and 42% in the control.) The intervention participants had three times as much contact as those in the control arm (3 times a week compared with once). Patients improved over time in both groups, in terms of wellbeing (Psychological General Well-Being Index) and burnout symptoms (Shirom–Melamed Burnout Questionnaire), with no difference seen between the groups. However the study did not use recommended advice for equivalency trials, which can require a sample size up to four times greater than superiority trials (Christensen 2007). Long term follow up of this study was reported by Corazon et al 2018, using data from the Statistics Denmark national database on sick leave and health-care consumption. This showed that both *Narcadia* and STreSS lead to a significant decrease in number of GP contacts twelve months after treatment compared to the twelve months prior, a significant decrease in long-term sick leave in the same period.

Waber et al (2011) examined the impact of *Medicine for the Earth*, a 4-day nature retreat with natural, creative and meditative elements compared to a lifestyle behaviour change programme and usual care for cardiac patients with depression. This is a pilot trial and again sample sizes were relatively small (n=23, 14, 10 in each arm) with some differences between groups at baseline. No

statistically significant difference was found between groups for depression, measured on BDI and using repeated measures (p=0.2085); for Quality of Life (SF-36 p=0.3473) or psychological measure on the BDI (p=0.144). Hope, measured using the State Hope Scale did show a significant improvement at post-intervention and this was maintained for longer term follow up (3 and 6 months; p=0.014)

Other randomised designs

Berman et al (2012) used a randomised crossover trial design to explore the impact of a 50-55 minute walk in a green park, compared to an urban walk, on 20 people with major depressive disorder who were first asked to ruminate on a negative memory. Positive and negative affect were assessed (measured with PANAS) as well as a memory test (BDS) as an indication of Attention Restoration. Both walks improved mood - positive affect was significantly reduced, and negative affect significantly increased, after both walks ($p<0.05$). ANOVA showed statistically significant effects of place but not time on positive affect (nature vs urban positive affect $F(1,16) = 16.85$, $p<0.001$, but not negative affect (nature vs urban $F(1, 15) = 0.13$).

Sturm et al (2012) used a randomised crossover trial design (rated moderate) with 20 psychiatric inpatients who were at high suicide risk. There were statistically significant reported reductions in Hopelessness (BHS; $p<0.0001$) and Depression (BDI; $p<0.0001$)) but not suicide ideation ($p=0.25$).

Results from before and after studies

As these study designs are likely to produce less robust results, findings from these studies have been provided in Table 12 and are not further described (Appendix 6, p. 245).

Studies included in the review: Qualitative

We included 30 qualitative studies, eleven of which were mixed methods studies and the quantitative data from these is also reported in the quantitative studies section above. Study characteristics are shown in Table 13 found in Appendix 7 on p.263 and summarized below.

Population

Sample sizes ranged from five to 43. Five of the studies involved adolescents (one of which was adults and young people) and the remainder included adults. Most had mental health conditions, often described as severe or serious, although detail is not always provided, groups had mixed diagnoses and participants may have experienced multiple issues. Among those conditions that were described were those who experienced psychotic disorders, depression, anxiety, severe stress, PTSD, mood disorders, and schizophrenia. Participants might also have learning disabilities, who were long term sick or on incapacity benefits, and problems with substance abuse. Some of the adolescents were struggling with mainstream education.

Participants accessed the interventions in a variety of ways, again these are not always described – those that were described were referred through local health or social care providers, including GPs, mental health or recovery services, or were referred through employment services. One study involved those in residential mental health care who organised access to the programmes (Gabrielsen et al 2019). Other people accessed services by self-referral, or methods of accessing were not described.

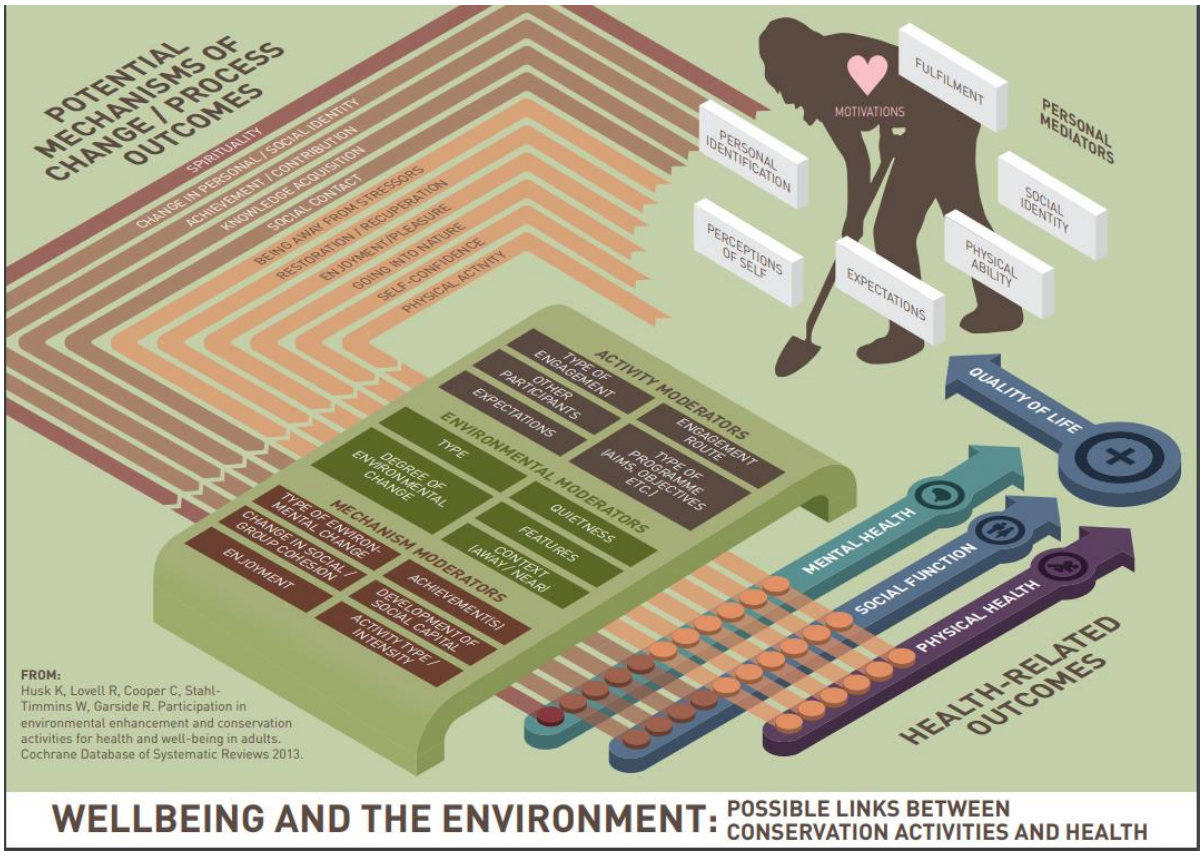
Interventions

Again interventions varied: there were 16 studies of horticultural therapy, five of wilderness therapy, five involving environmental management/ volunteering, two surfing projects and one scuba diving.

Findings: Qualitative Evidence Synthesis

Qualitative Synthesis

The Conceptual Framework (see Figure 7: Conceptual framework informing qualitative evidence synthesisFigure 7) was used to inform the synthesis because it conceptualises a range of pathways through which health and wellbeing impacts may come about following participation in environmental (and conservation) activities. This conceptual framework was developed through a previous systematic review by members of the team (Husk et al., 2016). This kind of framework synthesis has been described as a "scaffold against which findings from the different components of an assessment may be brought together and organised" (Carroll et al., 2011). It also allows flexibility, in that new themes identified inductively in the data that do not fit into the existing framework can



also be incorporated.

Figure 7: Conceptual framework informing qualitative evidence synthesis

The framework themes used were:

- Activity moderators;
- Environmental moderators;
- Mechanism moderators;
- Personal mediators and motivation;
- Potential mechanisms of change (Process outcomes).

The first two themes – activity and environmental moderators – relate to the types of activity and the environment in which the activities are undertaken; and the third theme – mechanism moderators – reflects the reactions of individuals during implementation of an intervention in a given context that might bring about change. The fourth and fifth themes refers to those factors

such as personal mediators (e.g. expectations and physical ability) which affects outcomes, and potential mechanisms of change which discusses *how* an intervention might work, through different pathways or mechanisms to bring about change. These themes are interlinked, and try to capture the complexity of factors within the intervention, the setting, the group and the individual that can impact on how an activity is perceived and experienced and the ways in which these can lead to health and wellbeing outcomes. The analysis also allowed additional observations to be developed inductively as themes and sub-themes as required. These are used as headers in the write-up below.

Theme 1: Activity Moderators

Activity moderators relate to the types of activity itself, who it was undertaken with and for what purpose. Twelve studies reported on therapeutic garden rehabilitation and horticulture programmes (Adevi & Martensson 2013; Barley et al, 2012; Eriksson et al, 2011; Harris, 2017; Howarth et al, 2018; McCaffrey 2007; Palsdottir et al 2014a; Palsdottir et al 2014b; Perrin-Margalis et al 2000; Rappe et al, 2008; Sidenius et al, 2017; Stevens 2008); four studies (five papers) reported on wilderness therapy programmes (Bryson et al 2013; Cook, 2008; Fernee et al, 2019; Gabrielsen et al, 2019; Woodford et al, 2017); four studies reported on community garden/allotment projects (Crossley 2018; Fieldhouse 2003; Grabbe et al, 2013; Whatley et al, 2015); three studies reported on woodland/forestry programmes (Nordhl et al 2009; O'Brien, 2018; Wilson 2009); one study reported on a therapeutic environmental volunteering programme (O'Brien et al, 2011); two studies reported on surfing (Caddick et al 2015; Devine-Wright & Godfrey 2018); and finally, one study reported on scuba diving (Morgan et al 2019).

Type of programme, Type of engagement and Engagement route

All of the therapeutic garden rehabilitation programmes and horticultural programmes aimed to support people with mental ill health and help recovery and rehabilitation. Four of the therapeutic garden rehabilitation programmes were specifically for those experiencing symptoms of stress and aimed to enable a return to work life (Adevi & Martensson 2013; Eriksson et al, 2011; Palsdottir et al, 2014a; Sidenius et al, 2017). The routes by which participants came to be involved on the rehabilitation programmes were reported for a few of the studies (Barley et al, 2012; Eriksson et al, 2011; Harris, 2017), and included GPs, Community Health practitioners, Occupational Therapists and recovery teams, with a small number of people self-referred. Harris (2017) noted that mental health professionals 'typically' accompanied participants on an initial visit, after which they returned for periodic reviews. Descriptions of type of engagement and engagement route are described below, organised by the different programmes types: wilderness therapy, community gardens/allotment projects, woodland/forestry programmes, and surfing and scuba diving. We also identified in the literature that how the participants reacted to other participants on the programmes could impact in how the effects of the activities were experienced, and this is reported as a subtheme.

Wilderness Therapy

All of the wilderness programmes were designed to treat mental ill health, with participants either admitted to a specialised mental health care system (Bryson et al, 2013; Gabrielsen et al, 2019; Woodford et al, 2017) or assessed as needing treatment within the hospital setting (Fernee et al, 2019). The 'Wilderness Wellness' programme was designed for adults with mental illness living in institutional care and preparing to 'transition' to their lives at home (Woodford et al, 2017). It was clear that some of the programmes were treating individuals with rather severe and enduring mental illness (Bryson et al, 2013; Gabrielsen et al, 2019; Woodford et al, 2019). One intervention, called 'Rise-Up', was specifically for adults (both inpatients and outpatients) of a large schizophrenia programme, all of whom had psychosis as their primary mental illness (Bryson et al, 2013). Two of the programmes were for adolescents and varied in length from eight single days and two overnight

trips of three and six days (all completed within an eight- to ten-week period) to one year (Cook, 2008; Fernee et al, 2019; Gabrielsen et al, 2019). The year-long programme was for male adolescents (12-16 years) who had treatment for mental health issues in the community but the treatment had been unsuccessful. In this case, parents chose the wilderness programme as an alternative treatment. There were various entries to participation for the other programmes, including external referral or internal referral – where individuals were already receiving treatment, and expressed an interest in wilderness therapy, could be referred by a therapist or case manager (Bryson et al, 2013; Fernee et al, 2019; Gabrielsen et al, 2019). The final decision to participate in wilderness therapy was based on a mutual agreement between the individual and outdoor therapist.

Two papers focused on the Norwegian adaptation of wilderness therapy, called *Friluftsterapi*, where the emphasis is on connecting to nature through a 'simple outdoor-oriented lifestyle' (Fernee et al, 2019; Gabrielsen et al, 2019).

In *Friluftsterapi,* the focus is more on the experience of oneself and others in wild places, and it is less focused on facilitating outdoor adventure (Gabrielsen et al, 2019: 284).

The programme was conducted in the outdoors - apart from the introductory and closing days - and the 'intermittent structure' of the programme enabled the young people to be at home and continue with school and other activities. The *Friluftsterapi* treatment was undertaken in groups of eight to 10 adolescents (16-18 years) and was led by an inter-disciplinary team of three therapists. Each individual was allocated to a therapist, and together they developed a treatment plan with individualised goals. There were both individual and group therapy sessions during the programme to help individuals process their experiences. Knowledge of how to engage in wildlife settings was developed over the course of the programme and culminated in the final expedition, when the group 'hiked and paddled along a predetermined route over six consecutive days' (Fernee et al, 2019: 1360). The programme did not include follow-up sessions but on completion, decisions were made as to discharge or need for further treatment.

The residential wilderness programme targeting adolescents (Cook 2008) was specifically for boys and for groups of eight to 10 participants. The overall aim was that the group would serve as a 'support system' and enable individuals to work through their problems and issues. A range of group activities such as daily chores, cooking meals and participating in 'campfire circle' at night encouraged the development of the group as a support system. Individual goals would be set with a family service worker and progress on these and group goals would be reviewed weekly with key staff. Progressing through the various stages of the treatment was contingent on the boys achieving their goals, and at the final stage they worked towards the transition to their home community. After completing the programme they continued to attend 'voluntary after-care' with the programme.

The two wilderness programmes targeting adults were also group based: up to 10 adults participated in the 'Wilderness Wellness' programme (Woodford et al, 2017) and 10-15 adults participated in the 'Rise-Up' programme (Bryson et al, 2013). The 'Wilderness Wellness' programme was designed to develop a range of skills, namely social and organisational, to increase the independence of participants. The programme included nature walks, outdoor games, creative arts, mindfulness activities, and meal preparation and clean-up. Each participant had an individualised treatment plan created with the therapeutic recreation specialist, and had personal goals for the camp experience. The 'Rise-Up' programme comprised team-building exercises, snowshoeing, downhill tubing, camping and a closing celebration and meal. It was led by two recreational

therapists who used a 'psychosocial rehabilitation framework' to engage participants in the group activities.

Community garden/allotment projects

The community garden/allotment projects aimed to promote mental health and wellbeing by enabling "…occupational participation and social inclusion for people experiencing mental ill-health" (Whatley et al, 2015: 429). A wide range of mental health conditions were identified in the studies such as bipolar disorder, depression and severe anxiety (Crossley, 2018; Grabbe et al, 2013). The Sprout Community Garden's programme was explicitly for 'people with severe and persistent mental ill-health' (Whatley et al, 2015). The Scotswood Community Garden was less explicit but acknowledged that there was an increasing number of participants presenting with more complex health issues (Crossley, 2018). Both of these community gardens offered sessions three days per week (Crossley, 2018; Whatley et al, 2015).

The projects involved physical activity such as landscaping (levelling ground and building raised beds) and maintenance activities (pruning and mulching trees), and horticultural activities such as planting seeds, weeding, watering and harvesting vegetables and fruit for their own use or selling at a market stall (Whatley et al, 2015). Other activities included simple food preparation (Grabbe et al, 2013), and more, as at the Scotswood Community Garden and the Mind 'Sprout' Taste Community Kitchen, with a weekly cooked meal (Crossley, 2018: 35; Whatley et al, 205: 430). There were also opportunities for creative projects.

Woodland/forestry programmes

Of the three woodland/forestry projects, two were directed at people with mental ill health (O'Brien 2018; Wilson, 2009). The community project at the Westonbirt Aboretum offered a range of activities which could be adapted to suit the interests and abilities of the participants (O'Brien, 2018). Examples of the activities were woodland management and maintenance (coppicing, deer fencing and bramble clearance), creative and sensory activities (leaf printing and sound mapping), and social activities (preparing, cooking and eating food together). The groups would spend approximately five hours on site (usually between 10am and 3pm) every week or fortnight. 'Branching Out' was a 12 week ecotherapy programme for those with severe and enduring mental health problems who were referred by services such as community mental health teams and mental health employment services. The programme comprised three hours of ecotherapy per week in outdoor woodland settings and participants worked together in small groups of six to 12 for a 12 week period. Activities included health walks, conservation, environmental arts and bushcraft skills.

The third project aimed to improve the health of people on long-term sick leave who were living with mental fatigue and stress-related illnesses by offering meaningful activities in a forest environment. The rehabilitation programme was a 10 week intervention and the activities were forest based such as training in using maps and a compass, learning about wildlife, flora and fauna, and walking in the forest.

O'Brien et al (2011) reported on environmental volunteering and specifically on a targeted therapeutic programme for people with mental health issues. The programme was based at a therapeutic garden, Meanwhile Wildlife Garden, (London) where participants could volunteer on average two to three times a week for a full day. The focus of the programme was on "…healing of the environment through conservation and of the self through physical and mental health improvements" (O'Brien et al, 2011: 75). The participants were referred to the project by their health and social care practitioner, or GP, or they could self-refer.

Surfing and scuba diving

Two studies, one on surfing (Caddick et al, 2015), and the other on scuba diving (Morgan et al, 2019), were focused on the therapeutic and wellbeing benefits of these activities for military veterans who were experiencing posttraumatic stress disorder (PTSD). In both studies, UK-based charities supporting military veterans were involved: no details were given for the surfing charity but the other was Deptherapy which supports military veterans who have experienced life-changing physical and/or psychological injuries, through scuba diving. The surfing charity provided twice-weekly surf camps for veterans and Deptherapy offered a programme enabling veterans to progress through a graduated series of accredited scuba diving qualifications. There was a continuing 'Buddy Peer Support Service' available during scuba diving activities, both during scuba diving excursions and upon their return home.

The other surfing study (Devine-Wright & Godfrey, 2018) reported on the 'Wave Project', a six-week programme designed for vulnerable young people (8-21 years) who had physical and mental health issues. On referral, around a third of the participants had been diagnosed with mental health issues and around a third were socially isolated because of a disability, caring responsibilities and being bullied. The young people are taught surfing with one-to-one assistance of a volunteer overseen by a surf co-ordinator.

Other Participants

How the participants reacted to other participants on the garden rehabilitation programmes were reported in two of the studies (Adevi & Martensson 2013; Sidenius et al, 2017). Sidenius et al (2017) described how 'getting to know' and 'getting on' with the other participants in the Nacadia Therapy Garden could be perceived as a challenge, as illustrated in the following comment:

> I have not completely understood the guidelines – how much we should talk to each other – why you are here, what you feel and stuff (…) It's a little strange to walk around with seven people that you know you will be around for the next ten weeks, three times a week(…) But it is really fine (Sidenius et al, 2017: 6).

The authors noted that while several participants needed time to develop strategies to cope with the presence of others, most were able to find ways of managing. For the participants at the Alnarp Rehabilitation Centre, being with others with mutual experience of illness made them a 'group of equals':

> Before I've always felt that when I meet people I don't know and stuff like that I was always tense and...but since *everybody's in the same situation* it's been so…yeah, felt like I've been able to let a bit more out (Palsdottir et al, 2014: 7100, reviewer emphasis).

Belonging to a group of people facing similar difficulties in life was described as an important aspect of the programme. In certain situations this sense of fellowship became especially salient, as when challenges were overcome together. For example, participants associated eating a piece of bread that they baked together in the garden with the Holy Communion (Adevi & Martensson, 2013: 234, reviewer emphasis).

Involvement at community gardens meant contact with others, to a greater or lesser degree. It was clear from participant comments that some were experiencing social isolation:

> Staying on my own all the time makes me feel tense and frustrated – but now I was going out with people that I could talk to – adults. (Victoria, Allotment Gardener) (Fieldhouse, 2003: 290).

At Scotswood Community Garden, the volunteers often arrived in advance of the 'official' start of the session and stayed after the sessions had 'formally' ended "…just enjoying the garden, sitting and talking to staff, or helping out with other tasks" (Crossley, 2018: 32). One volunteer explained that he welcomed the chance to stay longer as he would only be returning to an empty house:

> You get lonely you know – I just end up going to bed very early because there's no-one to talk to and nothing on the telly. (Volunteer, Scotswood Community Garden) (Crossley, 2018: 47).

Others volunteers confirmed that their time at the garden was often the only time they saw and spoke to others. However, not everyone at the community gardens wanted to work with others all of the time: for example, one volunteer requested a job working alone in the morning and then worked with the wider group in the afternoon. For the volunteer, the time spent alone was 'therapy' time (Crossley, 2018).

For the homeless women in one study, the lack of privacy at the shelter was one of the negative aspects of being homeless; one woman described the shelter as a 'very tight environment' (Grabbe et al, 203: 262). It seemed that interactions in such an environment could be casual and fairly superficial. What the gardening project offered these women was the possibility of seeing 'others' in a different context and in a different way:

> People who I have seen since I've been coming [to the shelter] but not really had an opportunity to interact with…There's a lot of nice folks. (Grabbe et al, 2013: 263)

> It also gives me an opportunity to see a different side of women that I interact with. It lets me see the not so homeless side of them. (Grabbe et al, 2013: 263)

All of the wilderness programmes were group-based and required individual participants to interact with each other. Two of the studies noted how participants experienced social isolation due to their difficulties in interacting with others (Cook, 2008; Woodford et al, 2017).

> I did not like being around people so I shut myself in a room all day. I feel like people were not responsive to me. (Cook, 2008: 761)

> My personality makes it hard for me to make friends. I always want to talk and sometimes I cannot shut up, I guess that can be a problem (Cook, 2008: 761)

Participants in the 'Wilderness Wellness' programme identified social isolation and feeling more comfortable in groups as areas for improvement. 'Forging friendships' with others was a goal for one of the programme's participants, and for another, it was 'to be more social' (Woodford et al, 2017: 264).

Theme 2: Environmental Moderators

Environmental moderators relate to the type of environment in which the activity or intervention takes place and explores context (away/near), quietness and other features such as the sensory aspects associated with the various natural environments. In this synthesis, the 'degree of environmental change' was not identified as a theme in the data from the included studies.

Type and Context (Away/Near)

Four papers (Adevi & Martensson 2013; Eriksson et al, 2011; Palsdottir et al, 2014; Sidenius et al, 2017) discussed the therapy gardens in which the rehabilitation programmes were based. The Alnarp Rehabilitation Garden (Sweden) was described as 'ergonomically designed' (Adevi & Martensson 2013: 232), according to 'theories on nature's restorative effects and supportive

environments' (Palsdottir et al, 2014: 7097), and was particularly for people with exhaustion disorder. It comprised a two-hectare area with separate garden rooms; the *Nature* area was an informal nature garden, and the *Cultivation and Gardening* area had gardens and rooms for horticulture and other garden work. Similarly, the Nacadia Therapy Garden (University of Copenhagen, Denmark) was specifically designed to support the nature-based therapy for people experiencing stress-related symptoms (Sidenius et al, 2017). Eriksson et al (2011) also noted that the therapy garden in their study was specially designed to promote health and informed by theoretical ideas from environmental psychology. It was divided into different areas with different characteristics to encourage different activities such as relaxation and conversation.

There were less details on nature in the studies that focused on community garden/allotment projects: some of the shared characteristics were vegetable and herb gardens (Grabbe et al, 2013; Whatley et al, 2015). Two of the community projects were situated in larger public parks, one in Annala Manor Park in Helsinki, Finland, and the other was set in the Westonbirt Aboretum, Gloucestershire, England (O'Brien, 2018; Rappe et al, 2008). These nature settings could be described as 'near' in that they were mostly nature in an urban setting. The therapeutic volunteering programme (O'Brien et al, 2011) was based at Meanwhile Wildlife Garden which was part of a larger urban public green space in central London.

The descriptions of the wilderness programmes varied but the common point seemed to be that the treatments as a whole were provided outdoors (Fernee et al, 2019; Gabrielsen et al, 2019). The natural areas that were integral to the programmes may not be 'wilderness' in the traditional sense and were often in fairly close proximity to civilisation (Fernee et al, 2019). For example, the Wilderness Wellness Camp (Whatley et al, 2017) was approximately 60 minutes from the hospital. The wilderness programmes also varied in the amount of time participants spent in nature: only one programme was a year-long residential programme (Cook, 2008), with the others involving variations of day trips, overnight trips, and longer expeditions (Fernee et al, 2019; Gabrielsen et al, 2019; Whatley et al, 2017). The shorter programmes were offered in spring, summer, autumn and winter (Gabrielsen et al, 2019; Whatley et al, 2017), so the participants were exposed to a mix of weather conditions typical of the seasons.

The two surfing studies (Caddick et al, 2015; Devine-Wright & Godfrey 2018) and the scuba diving study (Morgan et al 2019) were the only studies in the review to focus on 'blue space'. Surfing brought the participants 'away' to coastal locations across the UK and the scuba diving was undertaken by the military veterans 'away' at the Red Sea for 10-14 days. The Red Sea "..offers a relaxed diving environment with some of the best marine environments in the world" (Morgan et al, 2019: 2834), and both the warm waters and visibility afforded by the Red Sea are beneficial for participants with amputations and spinal injuries.

Quietness

Quietness was highlighted as an important feature of the natural environments whether garden, woodland or wilderness. The most frequent descriptions of the nature environment were peace, calmness and quietness and how it contrasted with modern life:

> It was sort of another mindset in the forest…I noticed that *when you are in nature, it is so quiet*. You do not hear any cars. There is no family chaos or anything, and you are not on the computer. When it is so quiet and you just sit there, you enter into your own way of thinking…and it really helps (Male participant) (Fernee et al, 2019: 1365, reviewer emphasis).

Two of the community garden studies highlighted that participants appreciated the sense of peacefulness experienced in the gardens.

> When you realise nature's surrounding you…you don't need to worry about the ambulance going driving past, or what's happening across the road…If a bird sings you're not going to worry about that. (Jack, Allotment Gardener) (Fieldhouse, 2003: 289)

Although not stated explicitly, it seemed that the peace and quietness in the garden helped participants 'clear their minds': "just being out here, listening to the birds, helps me feel relaxed and I can think about things better" (Volunteer, Scotswood Community Garden) (Crossley, 2018: 36). The garden was a good space to think about problems.

Other Features - Sensory

The natural environment is a sensory environment offering abundant opportunities to smell, touch, taste or look. Whatever the environment, garden, farm or coast, the rich sensory environments were commented on by many participants:

> I stood still quite a lot. I could sort of be there next to a flower for a really long time and just look at and smell and pet, or how can I put it, feel it (Participant, Alnarp Rehabilitation Garden) (Palsdottir et al, 2014: 7102).

> It's a difference in texture and colour. That's dark – you know that you pick it up it's gonna break in your hands – very soft; and that's grey – and that's very dry and brittle. I'm not a gardener but I like the smell of that soil too…'cos I mean, you can't get more real than digging up a clod of earth, and the smell of that – it's real (Norman, Horticultural Allotment Group) (Fieldhouse, 2003:290).

Some of the surfers' comments gave an insight into how they felt about the sensory aspects of the 'blue environment' and how it gave them relief from the PTSD symptoms:

> Well, it's the atmosphere, the surroundings, and also the sound I suppose, as well – of the waves – because that can be used for relaxation. It calms you, helps calm you down. And the smell. There's no smell, you know – it's clean, fresh air. And then you're just focused on your waves and your board. (Surfer) (Caddick et al, 2015: 80).

Theme 3: Mechanism Moderators

Mechanism moderators refers to those aspects which might impact on the mechanisms or processes of an intervention or any component of the intervention that brings about change. The following subthemes are discussed: relationship with nature, change in social group, cohesion; achievements; development of social capital; and activity type/intensity. The subtheme from the original conceptual framework 'type of environmental change' was not observed in the data and a new sub-theme 'relationship with nature' has been incorporated into the framework.

Relationship with nature

A number of studies demonstrated how participants, particularly those who were on the therapeutic garden rehabilitation programmes, articulated their personal relationship with nature, finding symbolism in nature and weaving descriptions of nature into their own personal narratives of rehabilitation (Adevi & Martensson 2013; Eriksson et al, 2011; Palsdottir et al, 2014; Sidenius et al, 2017: 6). Participants spoke about the garden as a 'responsive partner' (Adevi & Martensson 2013: 233) with nature as a 'patient receiver' allowing them to express their feelings freely:

> So a garden does not ask for something back. I could talk, I could say what the hell I wanted to the pine trees there, and they didn't shout back at me (Adevi & Martensson, 2013: 233)

Others described their relationship with the garden in terms of specific shrubs and trees:

> I have different shrubs and trees that I keep an eye on to see how they are doing (…) I have developed a connection to the place. And I'm happy every time I go there (Sidenius et al, 2017: 6).

The symbolism of the garden in time and the rhythm of nature was embraced by participants as a way of gaining insights about life and themselves. That nature cannot be hurried provided participants with a perspective on modern living:

> You can't speed nature up in any way. But see this slow, regular communication of nature. You can't speed it up. And it's an amazingly nice thought. It's very pleasant. It makes you put your brakes on (Adevi & Martensson, 2013: 234).

Participants could also follow the growth of plants and make it into a narrative about their own personal progress (Adevi & Martensson, 2013; Eriksson et al, 2011):

> It [the garden] almost confirmed my own growth. In this way, I think it interacts with me. So we grew together, so to say. There is something with this growing, I think, that made it fun (Adevi & Martensson, 2013: 233).

Their newfound appreciation of nature enabled them to draw lessons for their own lives – patience and nurture were needed in their own lives.

Two of the studies highlighted how the participants thought about their relationships with the natural environment (Fieldhouse, 2003; Grabbe et al, 2013). One participant reflected on a 'moment' when he had been captivated by the beauty of a robin in the garden:

> I'll never forget that robin sitting on the fork when Frank was there [laughs] – just stood there on the fork without a care in the world, y'know…I just think it's beautiful. (Tim, Allotment Gardener) (Fieldhouse, 2003: 289)

Others participants expanded about their caring relationships with plants, their growth and the stability that nature could offer:

> I just like plants, y'know – to see them growing. It's a bit of stability in the world, I think. They're not going to go anywhere and they're not threatening or anything…they stay in one place – not like people, or vehicles, or something. (Kevin, Allotment Gardener) (Fieldhouse, 2003: 290)

> It reminds me of life…the growth, the tenderness of handling things. (Victoria, Allotment Gardener) (Fieldhouse, 20003: 291)

Some would take metaphors from nature and integrate them into their own personal narratives which then helped them gain perspective on their own lives, and draw strength and hope for the future:

> You plant it, you water it…you hope that it turns out but sometimes it doesn't, but you can't stop planning just because it doesn't.

> Here you can see immediate progress. You know you put stuff in the ground and you see it growing. In other things that you have when you're homeless you don't see that. (Grabbe et al, 2013: 263)

Change in social/group

For those participating in the wilderness therapy programmes, the role of the group was central to the social and emotional development of the participants and they recognised the importance of their peers:

> Just the support from others in the group is what has helped me feel accepted here. (Cook, 2008: 763)

In the *Friluftsterapi* programme (a Norwegian adaptation of wilderness therapy), the other participants were also regarded positively:

> It was sort of the mix of people to be honest…It had a lot to do with meeting others, learning about people's past and why they were there. It was very interesting to learn that everyone was there for different reasons…You learn so many things about everyone. It was very fascinating…We managed somehow to *make room for everyone because everyone was so different*…Everything seemed to work with us, I think…You felt that *others were there to support you*. (Female participant) (Fernee et al, 2019: 1369, reviewer emphasis)

Similarly, in the woodland activities, the participants acknowledged that they had learned tolerance of others in the group:

> I've been learning on my patience and tolerance. Tolerance of other people, getting to know people, all the people here have been really lovely. (O'Brien, 2018)

Cohesion

In all of the included studies, participants in the nature-based treatments or activities were with other participants. As already noted, being with others experiencing similar symptoms and who had a mutual understanding of the difficulties their illness had caused, could be helpful. There was no need for explanations or a need to keep up appearances. This was highlighted in the therapeutic gardening rehabilitation programmes and it was observed at the Alnarp Rehabilitation Garden, where a sense of coherence could grow amongst the group of participants:

> I was afraid to be in a group, but this went away fast, we were all on the same level and you could leave the group without having to explain yourself (Palsdottir et al, 2014: 7101).

Cohesion within a group was likely to be linked to acceptance and a non-judgemental approach. The importance of an 'accepting environment' was emphasised by participants in a number of studies and seemed to enable them to 'be themselves' and not feel pressurised to be someone else:

> You feel a sense of acceptance, people aren't judging you…we don't really know what different people's situations are, but people you know, are accepted whatever, and that's lovely (Coworker, Sydenham Garden) (Barley et al 2012: e129).

The community garden/allotment project studies describe how a sense of community was created around the 'occupational focus of gardening' (Whatley, 2015: 432). Leaders were important in setting a culture of acceptance and facilitating activities that encouraged cohesion to develop amongst the participants. Participants commented on the accepting and safe environment which helped them feel that they could contribute and be part of a team:

> I just felt I was part of a team, sort of thing. I felt like my life had a bit of worth to it, y'know, it wasn't worthless or anything. I could achieve something. (Jack, Horticultural Allotment Gardener) (Fieldhouse, 2003: 289)

The leaders adopted a 'we are all in it together' approach (Crossley, 2018) which resulted in a 'socially inclusive community in which roles were diffused' (Whatley et al, 2013). For example, at Scotswood community garden, a gardening session focusing explicitly on 'mental health' had been dropped, as the leaders felt uncomfortable with the potential stigma associated with the session. All of the participants were regarded as 'volunteers' and worked together. Similarly, a leader at Sprout observed:

> I think the one good bit of feedback I got was: 'it's great when you go to Sprout because you can't tell who's who' [laughs]; which is kind of good…that you can't tell the difference between the volunteers and the participants…(Dave, Senior Staff Member, Sprout Community Garden) (Whatley et al 2015: 432).

Staff could bring people together to work on certain tasks in pairs or in larger groups which opened up opportunities for conversations to take place 'organically', often easier than in more formal situations. It was clear that staff put considerable thought into managing group dynamics and supporting existing relationships (Crossley, 2018).

> Yesterday there were three of us tying up tomatoes and we just talked the whole time, but you get a job done. So it's a medium. The activity is a medium I think for, you then leave at the end of the day as the participant or as a staff person thinking 'oh that was enjoyable'. (Lee, Staff Member, Sprout Community Garden) (Whatley et al 2013: 432)

> I don't know why, when we are more – like we are five or six – we will be more busy working, and helping each other, and talking with each other. But if we are two or three we don't have a lot of things to discuss. (Zelda, Horticultural Allotment Gardener) (Fieldhouse, 2003: 292)

Through conversations, participants could learn about each other, find ways to connect and provide encouragement and support to each other:

> [Tim] might say 'Oh I'm having trouble with my flat' – and because I've been in the same boat – or might have been – I can at least empathise with what he's going through. (Norman, Horticultural Allotment Gardener) (Fieldhouse, 2003: 291).

Shared tea breaks and weekly meals when staff and volunteers prepared, cooked and ate together (Crossley, 2018; Fieldhouse, 2003; Whatley et al, 2013) were valued by all, and cultivated a sense of group cohesion.

The cohesion that existed at the Scotswood community garden, as perceived by one of the leaders, was nicely illustrated in her use of the bee colony metaphor:

> The structure of a honey bee colony is very social, and no single bee can survive on its own. A bee colony is often described as a single organism because they are that reliant on each other for survival…
>
> Some of us have great carpentry or building skills, some are great at identifying plants or digging some keep team spirits and make us all laugh, but, just like the bees, all of these skills are needed to keep our team working well. (Leanne, Leader, Scotswood Community Garden) (Crossley, 2018: 33)

However, one study noted that conflicts could arise with participants disagreeing over gardening decisions such as when to harvest produce (Grabbe et al, 2013). Conflict could be resolved with or without staff involvement, but it was noted that in some cases that participants took a break from gardening activities due to conflict. No further details about this were provided.

Achievements

Whilst engaging in the various treatments or activities in the natural environment, participants reported satisfaction with what they were able to achieve. Growing plants and tending them were regarded as very rewarding by participants. One man described how important caring for plants was to him:

> That I actually gave life to something. That I did something, even though I was daft in the head (Allotment Gardener) (Fieldhouse, 2003:290).

Others felt a sense of achievement from using skills they had used previously:

> I love gardening, but I was also missing working with my hands, fixing things, so that they have a purpose again. I also love working with wood so I thought about repairing an old table. I worked with two other people to design and refurbish an old table. I felt the table was a bit like me and was worth giving a second chance. It took a long time to finish, but I was *elated and proud* of what I had made. I feel useful again. When I was working I always had dirty fingernails, and when I had finished [the table] they were dirty again. (Volunteer, Scotswood Community Garden) (Crossley, 2018: 41)

Other people could feel a sense of achievement at just having taken part in a programme, as described by a participant on 'Branching Out'

> When you get back from the Branching Out it's as if you've done a day's work or something like that which is quite satisfying in a way, cause you just get tucked into your dinner, relax and have a good night's sleep. (Participant 20) (Wilson, 2009: 41)

Importantly, participants appreciated and enjoyed occupations without the focus on performance and results. Allotment and community gardeners reported the importance of being able to set their own pace:

> I can come here and do what I like. And there is no pressure, that's the other thing. There is no standard to which you have to perform (Co-worker, Sydenham Garden) (Barley et al, 2012: e129).

> If I do nothing, I suppose I do nothing. My main thing is to come and do something, even if it is weeding (Daggles, Sprout Community Garden) (Whatley et al, 2015: 433).

Gardening, as part of the rehabilitation programmes, was also experienced as undemanding. Palsdottir et al (2014) noted that particularly in the early stages of the rehabilitation process, participants did not experience pressure to achieve. They could enter and leave as they pleased and had no responsibility for the work to be completed, or for its outcomes.

For participants on the wilderness programmes, experiencing a sense of accomplishment was a recurrent theme:

> A lot of the things that we do here give you a sense of accomplishment which help in making me feel better about myself (Cook, 2008: 760).

Development of social capital

Community gardens enabled the participants to develop connections beyond the gardens by providing opportunities to link into the wider community. For example, participants could be involved in fundraising events and Open Days, other projects with older people and pre-school children, and more generally, in welcoming visitors to the gardens (Crossley, 2018). The Scotswood Community Garden had a 'Sticky Business' which produced chutneys and jams using produce from the garden and the Sprout Community Garden had a market and weekly 'Open Gate' stall which brought the local community to the garden. In the words of one participant:

> it's sort of an intimate close market. I think a lot of people come here…they seem to be…catching up and meeting together. So I think people use it as a bit of a social focal point sort of thing. (Romana, Participant, Sprout Community Garden) (Whatley et al, 2015: 432).

Working at the market stalls could cause anxiety for some participants and they needed support from the leaders. One of the leaders from the Sprout Community Garden described how one anxious participant he had supported, went on to form a social connection through the market:

> They'd made a good connection themselves with one of the stallholders, separate to Sprout. I think that helped them feel good. Just that friendliness. That was good. (Jules, Staff Member, Sprout Community Garden) (Whatley et al, 2015: 433)

Not all of the gardens seemed to offer opportunities to link to a wider community, but in the case of the shelter-based garden project for homeless women, gardening seemed to generate aspirations for more connections, with one woman wanting to start a blog and link with other homeless women to communicate "what we did to be able to go beyond where we were" (Grabbe et al, 2013: 264).

Activity type/intensity

As already noted, the community gardens and allotment projects offered a range of activities for participants with diverse backgrounds, skills and abilities. They were able to accommodate the different reasons participants had for coming to the gardens and allowed participants to work at their own pace, "…with no pressure to 'get things done' or to work to a tight schedule" (Crossley, 2018: 48). This is illustrated by comments from both staff and participants:

> The decisions I think always come from the participants, that we don't make anyone do anything. Just offer different activities or different options…(Jules, Staff Member, Sprout Community Garden) (Whatley et al, 2015: 433).

> they've all got their own jobs and they have a bit of a talk. You don't have to just do it; you can have a bit of a chat as well. (Daggles, Participant, Sprout Community Garden) (Whatley et al, 2015: 432).

One of the women at the homeless garden simply observed what the others were doing - she did not like to put her hands in the soil:

> For me I don't need to wallow in dirt…I'm participating by observing what they're doing. (Grabbe et al, 2013: 263)

Theme 4: Personal Mediators

Different people may experiences nature interventions differently, and accrue different benefits through different possible mechanisms. We considered these possible personal mediators in terms of social identity, personal identification, physical ability, perceptions of self, expectations of the intervention and motivations. The theme of 'fulfilment' taken from the conceptual framework was

not noted in this section, although linked concepts such as achievement and contribution, and changes in personal and social identify are noted here and elsewhere. We also incorporated the theme of motivation into this theme.

Social Identity

For some participants, identity as someone with mental health problems, or associated drug and alcohol problems or homelessness, led them to feel excluded from, and stigmatised by, mainstream society. Where this was the case, as noted above, the sense of belonging generated by group activities was very important.

> I belonged to that group – y'know – this is *my* group. (Allotment Group, Fieldhouse, 2003: 290)

> I know I got somewhere to go…I got a club to come to. (Garden, Grabbe et al, 2013: 263)

In contrast to some other projects, community gardens were often local spaces where a number of different activities were hosted, informally as well as formal interventions. These projects often aimed to enhance the sense of community locally, and to provide a hub where connections between members and out to the wider community were supported (community garden, Whatley et al, 2015). Groups who are isolated or marginalised may particularly value these linkages.

Caddick et al (2015) investigated a group of combat veterans living with posttraumatic stress disorder (PTSD) who belonged to a surfing charity which provided twice weekly surf camps with other activities such as coastal walks and yoga meditation sessions. Although the purpose of the charity is not explicitly stated in the research paper, the charity brought veterans together to do surfing and helped overcome the loneliness and social isolation associated with PTSD. The importance of undertaking the activity with others experiencing similar symptoms was highlighted:

> The buzz you get from, "Shit! I'm standing up!" You know, back on the world-wide, free ride, riding waves. And *looking across at everyone else riding the same wave* and wiping out and flying wetsuits. And just the kind of "whoop-whooping" and the *encouragement you get off everyone else as they're paddling out: it's just a really, really good feeling*. And for those moments when you're out there, all your crap and PTSD doesn't exist. You know, just being out by the sea is good in itself; being in it is far better and learning how to ride waves doesn't compare with anything. *Especially with a bunch of blokes [men] in the same situation, so there's none of that peer pressure or no one is looking down on you. All these ex-forces guys, you know they're all here for the same reason. They've all got this PTSD or whatever, not that we talk about any of that.* It's simply about the surfing and just leaving all that emotional stuff behind you, and just going out and egging each other on and taking the piss and having a bit of a laugh, as the squaddies [soldiers] do. Yeah, it's good (Caddick et al, 2015: 81-82, reviewer emphasis).

For this group, being with those who had similar backgrounds in the military, all with similar problems and doing physical activities, was very important. This was also noted in the study of diving with veterans with PTSD (Morgan et al 2019).

Personal identification

One study looked at the impact of diving on veterans with PTSD, many of whom had serious physical injury such as limb amputation and gunshot wounds (Morgan et al, 2019). The change from highly fit individuals to those with serious disabilities was a source of loss of independence, frustration and changed sense of self. Diving provided an opportunity to undertake physical activity in a weightless

environment, putting them back on an even footing with able-bodied divers and restoring their sense of being able to achieve:

> I no longer feel held back by my injury. (Diving, Morgan et al 2019: 2837)

These activities allowed them to reconnect with a personal identity that had been lost through injury.

Physical ability

People's preferences and abilities influenced the intensity and physicality of the activities in which they got involved, so that the relevance of this possible mechanism for generating impact might differ between different groups of people:

> Some volunteers enjoyed the 'heavy, dirty work' such as digging, moving earth or woodchips and bigger projects such as creating a new pond, and developing an accessible garden from scratch. Others were able to participate in less physically demanding jobs, and with a different focus, such as tidying different areas, keeping paths clear and weeding different plots. There was work available for people with less mobility, such as potting and plugging seeds and help preparing the volunteer lunch, chopping vegetables and working in the kitchen (Author quote. Crossley 2018: 38)

People appreciated their abilities being acknowledged and supported positively:

> Rather than just everyone being like 'no, you can't do that, you can't do that', coming here and being like 'well, do you want to do this? Do you want some help to do it? (participant with physical disability, garden, Coan et al 2017 :12)

The study looking at the impact of diving on veterans with PTSD, contained many participants who had serious physical injury such as limb amputation and gunshot wounds (Morgan et al, 2019). The qualities of diving were felt to be particularly impactful for these participants:

> Being weightless underwater whilst diving offered the amputees a sense of freedom from their physical impairments and allowed them to perform activities equal to an able-bodied person, which was highly significant to them. (Author quote, Diving, Morgan et al 2019: 2836)

Diving and the associated weightlessness also seemed to offer relief from physical pains. For this group, diving was particularly appropriate as it allowed them to overcome acquired physical limitations they experienced on land, giving them a "confidence boost from knowing I have to, and can, meet the same requirements standard as an able-bodied diver" (Morgan et al 2019: 2836).

Perceptions of self

For some participants, undertaking new things, or physical challenges, meant that their previous perceptions of themselves were altered:

> I learnt that I can handle a lot more than I thought I could…I did not really know…I wouldn't have found that limit had I not been on those trips…It enabled me to break out of just laying around indoors. (WT, Gabrielsen et al, 2019: 289)

Over time, some people found that they now felt able to offer support to others, through their ongoing involvement in nature-based activities, especially with community gardens. They had changed their sense of self from one who needed support, to one who could support others:

> I'd like to make a difference and help people who have come across similar challenges I have. (Garden, Coan et al 2017:15)

Working in the garden helped people to change how they perceived themselves:

> I've learnt so much – yes, new skills from learning to work with my hands, but I've also learned how to relax and have fun. Now, as well as the person who does well in maths and occasionally cries in class, I'm the person who starts snowball fights whenever the weather's right; the person who starts crossword during lunch and gets everyone guessing clues; I'm a good cook who enjoys making food for other people. (Community Garden, Crossley, 2018: 31)

Both wilderness therapy and surfing interventions noted the benefits for adolescents and children of being able to navigate risks and failure, which was thought to support resilience.

> he doesn't necessarily cope with failure very well, but the encouragement and support he was provided with enabled him to learn from the falling off (Surfing, Devine-Wright & Godfrey 2018)

Expectations

Some people had few expectations of, or motivations to, participate. For those with more serious mental health conditions, apparently small gains or changes can be profound. Such participants may need support to accomplish the basics of getting up, dressing, engaging with people or participating in any activity, as seen for this participant in a Wilderness Therapy camp:

> I thought that this [Friluftsterapi] would never help me in any way … I did not want to get up, I just wanted to remain in my bed. Then a while later when I realized that it had actually helped me a little just to have the motivation to get up, I was almost in denial that it had helped me … Thinking back on it now I know that it was very good for me … Just that push that enabled me to move on. I needed that. (WT Gabrielsen et al 2018; 289)

The Wilderness Therapy approach was considered to have offered the "push" required to make a start to the day – even after it ended.

Motivations

There were differences in motivation among the participants, which might lead to different aspects of the intervention and their mechanisms being valued and sought, and different pathways to health and wellbeing outcomes. For a number of participants undergoing Wilderness Therapy camp, mostly with severe mental health conditions, improving their ability to interact with others and form social connections was an aim for individuals and was behaviour targeted by the staff facilitating the camp (Woodford et al 2017). This led to specific activities being encouraged in the program, such as ice-breakers and use of teams who had responsibility for aspects of camp management such as meals. This intervention was also aimed at increasing basic life skills – practical ones, like cooking, but also life skills, resilience and the ability to cope with stressful situations. Developing social competence was also an aim of other Wilderness Therapy interventions, especially those aimed at adolescents (WT Cook, 2008; WT Fernee et al 2019). For adolescent boys, improving their ability to interact socially could include reducing immature and aggressive responses to other people (WT Cook, 2008: 762).

For some with mental ill-health, the interventions provided the needed motivation to do *something*, and get out of the house:

> It helped me a lot, a great deal, cause if it wasn't for this I wouldn't have got out that door. I wouldn't have come out. So it's done a great deal for me … (Forest, Wilson 2009)

One study explicitly noted that the community garden provided opportunities for people with a range of motivations for coming, giving flexibility for different people, as well as for people's changing needs over time:

> The environment accommodated different reasons for coming to *Sprout*, such as to get out of the house, have something to do or a desire to garden. (Community garden, Whatley et al 2015: 433)

For some, developing skills that could lead to employment was also noted as a motivation:

> I hope to get a bit more training this year… formal, not just on-the-job training… I would like to do that. I think I'd like to do this as a job, rather than drive lorries, too much stress… I don't want to be stressed anymore. (Forest, O'Brien et al 2011: 79)

Participants in Morgan et al (2019) were working towards a recognised diving qualification, and this seemed to be important for this group of veterans with serious physical injury and PTSD. The qualification was a motivating factor, as many found it hard to adjust to civilian life and felt they had little hope of gaining a job outside of the armed forces before this. Aiming towards certification gave "a goal and sense of purpose again" for these participants, whilst for many other studies in this review, the lack of formal structure and qualification goals was considered to be a strength.

For others, the motivation was more clearly aligned with nature itself – with participants expressing a strong drive to be outdoors or get some outdoor exercise (Rappe et al 2008).

Theme 5: Potential Mechanisms of Change

This theme refers to how aspects of the participant experience might lead to impact when they are participating in the interventions. It explores *how* this impact might accrue, and so potentially helps to elucidate those features of an intervention, and their action – the "mechanisms" – which can be important. As therapeutic nature is a complex intervention, these mechanisms of change are likely to be multiple, interacting, and may impact on different groups of people in different contexts in different ways. They may also be seen as process outcomes, valuable in themselves and processes through which broader impacts on physical and mental health and wellbeing occur. As well as the themes of physical activity, self-confidence, going into nature, enjoyment and pleasure, restoration/recuperation, being away from stressors, social contact, knowledge acquisition, achievement/contribution, change in personal or social identity, and spirituality, we also include two new themes as potential mechanisms of change; nature as a therapeutic space and symbolic identification with nature.

Physical activity

All of the nature-based programmes and activities in the included studies involved some degree of physical activity. In the therapeutic garden rehabilitation programmes, participants described how they enjoyed the repetitive gardening tasks such as raking leaves, and the gardening work of planting, growing and harvesting:

> We have sown basil and oregano, taken geranium cuttings, and propagated mint. I went there to check on the plants, what had happened since the last time – I thought it was fun (Palsdottir et al, 2014: 7101).

> We made apple juice after gathering all the fruit. I felt fine. I was out walking among the apple trees, picking up as much as I wanted; the smell taking me home (Adevi & Martensson, 2013: 233).

For some, physical work could act as a distraction from many stresses in their lives, as was the case of homeless women involved in a shelter-based garden project. The tangible results of their vegetable and herb gardens was a 'psychological boost' (Grabbe et al, 2013:262), as the women regularly ate the produce.

Participants often recognised the role of doing physical activity for their own wellbeing, as a way of replacing sometimes unhelpful mental effort, with physical:

> It's good to do something physical as well, really. I live in my head a lot, y'know, sometimes (Allotment Group) (Fieldhouse, 2003: 290).

This is echoed by a participant on a mental health recovery programme using therapeutic horticulture:

> I think [gardening] just, it puts you in a state where it's just enough to stop you from having thoughts about this, that and the other, and you're focused and what you're focused on isn't that important, that you're going to get really nervous about it. So yeah, I really enjoyed it. (HT, Howarth et al, 2018: 485).

Being physically active was fundamental to the Wilderness Therapy (WT) programmes and one participant described how his mind was always racing, and it was through moving in nature that he experienced calmness:

> One sort of calms down when you are out hiking and things like that. It is easier to get a hold of your thoughts (WT, Fernee et al, 2019: 1365).

Some participants experienced quite powerful psychological responses when they successfully completed – sometimes unexpectedly – a particular 'physical feat' such as a climb or run:

> When I got to run back, it was just like my body suddenly became happier and well… was energized in a way… I don't know exactly what it was, I just… I felt something had to be released in a sense. And then it got better (WT, Fernee et al, 2019: 1367).

Fernee et al (2019: 1367) noted that such achievements could have an 'emancipatory quality' to them and had potential to bring about 'considerable psychological rewards'. The surfers also described the 'feel-good' effect they experienced even though they were 'knackered':

> The *feel-good it has is fantastic, really for me*. I mean, I just come out of here [sea], one, I'm *pretty knackered*, and two, you've got that feeling of just like, "Ahhh, God," you know, "that was so good!" But that feeling of-it's not just being in the water, *it's like washing away [of PTSD], you know, with the water*. And especially when it gets a bit rough and you get turned over by the waves a few times, it feels like it's just pummelling it out of you or just washing it out of our system a little bit (Surfer, Caddick et al, 2015: 81, reviewer emphasis)

Fernee et al (2019: 1367) observed that the physical challenges experienced on wilderness therapy could be overwhelming for some people and gave participants insights into their physical and mental limitations.

Participants credited their increase in physical activity through nature-based activities with improvements in sleep and mood (Adevi & Martensson, 2013: 233; Nordh et al 2008: 214)

Self-confidence

Through their participation in nature-based activities, improvements in self-confidence were noted by participants and support staff. This self-confidence was personal – linked to an increased sense agency and empowerment through their ability to acquire new skills and choose what they did - as well as in terms of social confidence.

> Gaining confidence might begin through being able to achieve, sometimes small, things that would be built on (Eriksson et al 2011: 277). Successfully taking on tasks that were perceived as challenging was also seen to build confidence (Wilson, 2009).
>
> I became strengthened through *Friluftsterapi*, in terms of doing things that I thought I would never be able to, and that is what made me able to realize that now I need to do something myself. (Gabrielsen et al, 2019: 290)

Homeless women expressed feeling devalued, and described homeless shelter regimes as affording them little privacy or choice regarding meals and activities:

> Nobody's listening… nobody has asked, what do you need?... people just feel not so valued here, in this land of homelessness. (Grabbe et al, 2013: 262)

However, the garden at the shelter was 'their garden' as they made the decisions about what to plant and how to manage the plants and produce. Being able to make decisions gave the women a degree of autonomy and a sense of personal control. The sense of agency from growing plants, and choosing activity, was highlighted by other gardening studies (Harris, 2017):

> You see all the produce growing and you think 'I'm partly responsible for that'. (Kevin, Horticulture Allotment Gardener) (Fieldhouse, 2003: 289).
>
> My confidence is ecstatic. The more I work, the more my confidence grows. (Howarth et al 2018)

Community gardens could provide longer term contact with a place, which facilitated learning over time, and allowed people to take on more roles and leadership over time as they grew in confidence:

> gradually people take over and do more stuff off their own bat... because they've learnt to do (Whatley et al 2015: 433)

Where staff encouraged peer learning, rather than always relying on staff, this was seen as a way of reinforcing knowledge acquisition and developing participant confidence (Howarth et al 2018; Whatley et al 2015: 433; Crossley 2018: 44). People also appreciated "being trusted with tools" (Crossley 2018: 43) and tasks which helped them feel more confident that they were able to complete tasks. However it was also noted that some people had high support needs and might not be able to attend without help:

> Once the care worker stops coming they don't have the self-confidence at that particular time to come back on their own. (Harris, 2016: 1332)

Young people who undertook a surfing intervention were reported to gain confidence through acquiring skills.

> [My child became] less negative about life in general. It had a huge impact at home, towards me, towards her brother. She'd get more excited, 'I'm going to Wave Project tomorrow'… rather than 'uh' [depressed] 'everyone hates me' 'I'm rubbish at everything', she got excited and 'I can do this'. (Parent of participant. Devine-Wright & Godfrey 2018: 11)

Although this study also noted that some parents became competitive about their children's achievements, despite the non competitive ethos of the project, which could be detrimental.

Going into nature

All of the included studies were nature-based, so reported aspects of how this setting affected the participants. The starting point for all the programmes and activities in the included studies was the individual decision to become involved in mental health treatment in the natural environment. Each participant had to make the choice to go into nature and this could be a decisive step toward change. Participants often emphasised the necessity of leaving the comforts of their own home. For some with mental health conditions, this motivation simply to get outdoors was vital:

> For me it made a difference that I went outdoors and away from everything at home, everything that was safe and familiar. That gave me a challenge (WT, Fernee et al 2019: 1364).

> If I hadn't come here, I just would have stayed in bed…To be able to come along and engage in some activities – that can help to get you out of it, sort of focus on something else rather than one sitting at home just being able to see what your problems are (Garden, Barley et al, 2012: e129.)

> spending time outside in the fresh air and surrounded by the green is great for my mental health (Crossley 2018: 36)

Nature itself was perceived as non-judgmental and accepting – allowing people to be themselves:

> In the garden I can take off my mask, I can just be myself, you are allowed to think and feel whatever you want (garden, Eriksson et al 2011: 277)

Taking part in activities in nature, and experiencing "mutual nurturing" (forest activities, O'Brien et al 2011: 77) activated or reactivated participants' relationship with nature and the desire to continue engaging in nature stewardship.

Being in nature was also valued as a multi-sensory experience, combining sights, smells, sounds and touch (HT, Perrin Margalis et al 2008; Stevens et al 2008), and this might be particularly welcome for those in residential care:

> Getting to play in the dirt … it's great to see what you will grow there afterwards (HT, Perrin Margalis et al 2008).

> all the different sights and sounds and smells is very different from the hospital environment that I'm used to, you know and the city environment of course, and I've really enjoyed being out in the countryside (Forest, Wilson 2009).

One Wilderness Therapy study described the experience of nature as having a "catalyst effect" – with empowering and emancipatory impact, through taking steps towards change in their life more broadly, and the extensive contextual change (especially for patients from residential care) from inside to outside, urban to nature, familiar to unfamiliar, confined to unconfined, and so on (WT, Fernee et al, 2019: 1363). This comprehensive contextual change was also noted among adults from an acute ward undertaking Wilderness Therapy (Woodford et al 2017: 266). Although this effect might be lessened for participants already used to natural environments:

> I grew up in nature, so I am used to nature, so it does not exactly have any therapeutic meaning to me. (WT, Fernlee et al, 2019: 1364)

Fernlee et al (2019:1364) also identified being away from modern technology – such as computers, cars and television – as allowing people to focus on new experiences and perspectives.

Enjoyment/pleasure

In many papers, being in nature was a source of pleasure and enjoyment and this promoted feelings of happiness and wellbeing (Crossley 2018; Eriksson et al 2011; Fieldhouse 2003; Perrins Margalis et al 2008; Stevens, 2008). In some cases this related to just being in nature:

> It's when I come to the field [interviewee's voice softens and slows significantly], it's that field I love. The field is beautiful. When it's got this high with grass, it's absolutely gorgeous. I love grasses … the subtle colors through them (HT, Stevens, 2008: 264)

> they felt joy and happiness in being given the possibility to be in such an inspiring environment (author quote. HT, Eriksson et al 2011)

Other people found the activities in which they were involved, even simple ones, gave them pleasure:

> when people are pushing a barrow they're smiling (Community Garden, Crossley 2018: 43)

Restoration/recuperation

Natural spaces were seen as restful, calming and restorative, where people could slow down and relax (Crossley 2018; Fieldhouse 2003; Nordh et al 2008; O'Brien, 2018; Palsdottir et al, 2014; Steven 2008) and this impacted on how they felt. This could help to shift previous negative states:

> [after leaving the local mental health unit] I walked down the back of the garden, down the [river] bank, with my wellies on and old coat, and came here. And it was wonderful. It was just absolutely wonderful. I could listen to … the river going and listen to the birds and all the rest of it, and it was so soothing coming here. (HT, Steven, 2008: 265)

> I do like the water. y'know it's quite peaceful cos … I do not know … You just look at the water. It looks calm and they've got nice plants around the area. And it does make a noise ... a nice trickling sound … You just relax. (HT, Steven 2008: 266)

Some participants noted how the sights and sounds of nature helped them to "be in the moment":

> So we walked through the other side of the arboretum up through the redwoods and we all found a bit of time to go off and sit by ourselves so I chose a tree and sat down next to it, put my jacket over my knees like a little old lady but I don't care and the sun was shining down on me and literally you hear the birds, I've never really sat and listened to the birds lost in that tranquil moment. It felt really calm and safe. (Forest, O'Brien, 2018: 12)

Nature and gardening allowed people to move at a slower pace, and focus on one thing at a time rather than multitasking:

> My thoughts flowed freely, that happens when you walk around in nature (Forest, Nordh et al 2008: 214)

For people off work with long term stress, this feeling persisted even once they returned to their normal activities (Garden, Palsdottir et al, 2014: 64).

Being away from stressors

Participants noted that going into nature felt that they removed themselves from stressful situations and emotions of their everyday lives, giving the feeling of "being away" and being able to relax:

> I learnt that to just get away from everything every now and then is important in order for me being able to function, so that is actually something that has meant a lot… And I have learnt to take breaks a lot more since then… Once I got away from everything I became a lot less stressed and it was wonderful. (WT, Gabrielsen et al, 2019: 290)

> Many of the clients experienced various forms of internal and external stressors and pressure in their daily lives so that seeking out nature could have a calming effect on the chaos they were normally surrounded by. The most frequent descriptions of being in nature were feelings of tranquility and stillness, which enabled the time and space to engage in prolonged, undisturbed reflection. (Author quote, WT, Fernee et al 2019: 1363)

In the Fernee et al study (2019) this was described as moving "from chaos to calm"(p. 1364). One study describes the move into absorption by nature from a more urban environment as bringing about a change in consciousness that might be seen as akin to self-hypnosis (HT, Steven, 2008):

> As well as being noted by participants in Wilderness Therapy groups, where participants may be away overnight or for longer periods, this sense of being away from stressors was also found by participants spending a few hours in nature (Allotment group, Fieldhouse, 2003: 289)

For those in a homeless hostel, the garden provided distraction from the stresses of being homeless:

> I'm more relaxed when I'm out here, taking care of plants and checking on Rosie [the herb Rosemary]… it's a stress reliever. I sniff her every time I'm here to make sure she's still growing. (Garden, Grabbe et al, 2013: 262)

For those in residential mental health, getting into nature and away from usual stressors of institutional settings, and mixing with others, could be felt keenly:

> I guess we are mixing with people we wouldn't get to know so much in our houses [residential] and it's not too big a group that you feel overwhelmed and where you would struggle with interaction. It's kind of a safe space, you feel comfortable that you can be yourself. (Forest, O'Brien, 2018: 10)

However some participants doubted whether this relaxation would be carried into the rest of their lives:

> It all disappears very fast, and when you don´t get [a] reminder, it is very easy to fall back in old patterns again. But it is now that my efforts begin because it is a new way of living that you have to learn (Garden, Eriksson et al, 2011)

For veterans with PTSD on a surfing intervention, "being away" included respite from their own cycles of thoughts and flashbacks that same with that condition:

> It frees you up. It's freedom for those two or three hours, kind of like a bit of respite. It takes your mind off it. Just leave all that away somewhere on the beach and then, we'll deal with that later. But for now, when we're surfing, we're going to have a laugh. And there's not a lot you can do to not have a laugh; it's kind of the antidote to PTSD in a way. You know, get your wetsuit on, go for a paddle, ride a wave, and it's like PTSD doesn't exist for that short time, which is all good in my book. (Surfing, Caddick et al 2015: 79)

This didn't come with the expectation that PTSD would not return, but was valued nonetheless for the respite it provided in the moment.

Social contact

Social contact was a critical aspect of most of the included studies across a range of mental health conditions and interventions. Participants in a range of interventions valued groups that were safe, relaxed, supportive and non-judgemental (Coan et al, 2017; Cook 2008; Devine-Wright & Godfrey 2018; Eriksson et al 2011; Fernee et al 2019; Fieldhouse, 2003; Harris, 2018; O'Brien et al 2011; O'Brien 2018; Palsdottir et al 2014; Perrins-Margalis et al, 2008; Rappe et al 2008; Steven 2008; Whatley et al 2015; Wilson 2009); Woodford et al 2017). For ex-service personnel in the diving study, being with people in a similar position to them restored a sense of "comradery and brotherhood" that they associated with their previous military life (Diving, Morgan et al 2019, 2836) and this was also noted by service personnel in the surfing study (Surfing, Caddick et al 2015). In other studies, having a mixture of people with different experiences, including around mental ill-health or cognitive disabilities, was thought to be important:

> It was challenging sometimes with Big D because he had learning difficulties. But you had to adapt and if he was happy to do something you left him to that. Big D came out and there was a young boy P and they would never [normally] have interacted; never. They [young men] would have laughed at him in the street the way he was, and it ended up he [P] was very defensive of him [D]. He ended up getting on great with D. (O'Brien et al 2011)

Those on Wilderness Therapy camps were noted to have experienced improved social contact and ability to interact with the groups (WT, Woodford et al 2017; Cook 2008: 761). The make up of the group could impact on this experience, for example, those containing people with different issues nonetheless found commonalities and understanding in all having suffered, helping to support a non-judgmental environment (WT, Fernee et al, 2019: 1369; WT, Howarth et al 2018: 484; WT, Nordh et al 2008: 214). This was also noted for those in other interventions such as an allotment gardening group (Fieldhouse 2003, 291)

> This non-judgemental approach was identified as key in studies of other intervention types, including gardening groups (Coan et al 2017; Steven, 2008; O'Brien 2018), as was the understanding and acceptance of others having an "off-day" (Nordh et al 2008: 214).
>
> I really felt that no one would judge me because everyone struggled with something. So if I was quiet that was fine and if I was talking a lot, that was also ok … So it was really good to sort of feel that everyone had something and no one really minded that much. It was fine to just be yourself. (WT, Fernee et al, 2019: 1370).

This could malfunction however, if some people regarded others as having a lesser degree of suffering compared to others, or if "[a]ttempts at providing support, despite their good intent, could be experienced as a form of pressure" (WT, Fernee et al, 2019). In other cases, group members could get impatient if they felt others were not going fast enough (Forest, Nordh et al 2008: 215.

Furthermore, being exposed to other adolescents' suffering was overwhelming for some in Wilderness Therapy, particularly for the individuals who were preoccupied with managing their own struggles at the time. (WT, Fernee et al 2019: 1370) Other (gardening) studies also noted that an awareness of the difficulties or reticence that people might have in making disclosures about themselves was appreciated:

> In other (non-Hive) groups it was normal to ask personal questions about other people's backgrounds but this could feel intrusive to individuals who lacked confidence and/or who had had mental health problems. Participants said that at Hive this issue did not arise - there is an understanding that people may not wish to talk about personal experiences and they

> appreciated not being put on the spot by others with direct questions (author quote, Garden, Coan et al 2017: 11)

The way in which people in groups have to cooperate with and rely on each other, building trust and appreciation for others, was emphasised in Wilderness Therapy interventions:

> We hiked the Appalachian Trail and you help each other out and the group comes back a whole lot more supportive of each other (WT, Cook, 2008: 764)

Social contact, particularly of a kind that was available, but not obligatory, was mentioned by a number for studies (Garden, Coan et al 2017; community garden, Crossley 2018; forest, O'Brien 2018; garden, Rappe et al 2008:). Gardening allows people to be as connected or separate from others as desired.

> It's a very unthreatening place to come to for somebody who is a bit anxious about joining a group (Garden, Coan et al 2017: 10).

A community garden study was described as a *medium* for sharing of tasks and interaction, even becoming a "therapeutic space" (Harris, 2017: 1331; Whatley et al 2015: 432).

These shared activities, blurred distinctions between volunteers, staff and participants of a mental health group, created an inclusive environment which facilitated social bonds. In some cases interventions deliberately used the same terminology to refer to anyone working in the garden to reduce the stigma that might be attached to people with mental health problems (Community garden, community garden, Whatley et al 2015; HT, Stevens, 2008). *Branching Out* encouraged mental health inpatients and staff to work together, and for patients to take the lead:

> It must be really empowering, even the recent one we're out at now. Some of the patients were building the benches and I'd say "Right you're the foreman" and they're going about telling the staff what to do. But it must be really empowering for patients who don't always get the opportunity to be empowered to make decisions to do that you know (Forest, Wilson 2009).

As with Wilderness Therapy participants, there were some who resisted this blurring, maintaining a distinction between "them" and themselves. Where these community gardens also encourage use by the wider neighbourhood, they became spaces where mixtures of people visited, hung out and interacted – providing links into the wider community (HT, Harris, 2017; community garden, Whatley et al 2015).

> I think a lot of people come here... they seem to be... catching up and meeting together. So I think people use it as a bit of a social focal point sort of thing (community garden, Whatley et al 2015: 432).

This is in contrast to the wilderness therapy, where it is hoped that skills and interactions learned whilst away will be carried back by participants to their wider lives after the interventions end. For activities that take place in a permanent local setting, the social links are repeated, ongoing and reciprocal, drawing the neighbourhood into the garden, as well as reaching back out beyond it.

In some cases, this improved ability to connect with people carried over into their lives beyond the intervention (Garden, Palsdottir et al 2014: 64) and also gave people new, positive experiences to talk about:

> Also getting home afterwards, having something nice to talk about when other people approach me about what I'm doing I don't have to just say about the stressful things, I can say I've been going to Westonbirt, so it helps me socially to have something nicer to talk about. (Forest, O'Brien 2018: 10)

Some studies did report frustrations with groups and sharing, especially if there were limited tools or time available (Garden, Perrins Margalis et al, 2008: 22).

Knowledge acquisition

Being a participant in the nature-based programmes gave an opportunity to acquire knowledge and develop skills in gardening, ecology, farming, conservation, craft and outdoor survival skills (WT, Fernlee et al, 2019; WT, WT Gabrielsen et al 2019; garden, Howarth et al, 2018; forest, O'Brien et al 2011; forest, Wilson 2009; WT, Woodford, 2017). This subtheme is closely related to 'achievement'. People with serious mental health conditions may also use some nature-based activities, such as Wilderness Therapy or gardening related activities, to support basic skills like cooking, and other knowledge that they could use in their daily lives (Fernlee et al, 2019; Gabrielsen et al 2019; Howarth et al, 2018; Woodford, 2017). Other studies, such as this forest-based intervention, noted increased awareness and knowledge about nature and the outdoors:

> I've learnt more about things I didn't know about and done things I've never done before … The first couple of weeks opened my eyes to the outside sort of thing; eh, I just enjoyed it from there … I've thoroughly enjoyed them, the different kinds of trees and other parts of the forest. The woods that we're going to. Not everybody knows about, eh, there's a lot more activity can be done outside than what I thought about (Forest, Wilson 2009).

O'Brien (2018) illustrated how undertaking practical outdoor tasks that participants had never experienced before gave them a real sense of satisfaction, achievement and competency for activities:

> Lighting fires, coppicing, layering. I saw a tree getting chopped down over there which was pretty cool using all the old tools, which was really good. I've made my own pencil, made charcoal, did drawing with the charcoal. We have used the kettles and learnt how to boil our own water.
>
> Interviewer: Are these things you have done before?
>
> No, never, never, in my wildest dreams did I think I would be doing that. This is all new. (Forest, O'Brien, 2018: 11)

Being able to learn in a hands-on way, even with potentially dangerous items like tools and fire, was particularly appreciated by some young people:

> Everything, everything you wouldn't learn in the classroom, like teachers don't let you experiment but here they always let you have a go. They don't just talk you through it and do it on a piece of paper they let you do it and experience it. (Forest, O'Brien, 2018: 10)
>
> For some, learning in a very informal environment, where skills acquisition may be practical and gradual takes the pressure off "learning" as a goal, as it seems to occur 'kind of like osmosis' (community garden, Whatley et al, 2015; 433)(Garden, Rappe et al 2008).
>
> Not have necessarily as a stated goal at the beginning, 'I'm going to get an education' or 'I'm going to get a job'. Because my belief is that those things just grow out of something else. (staff, community garden, Whatley et al, 2015; 433)

Other aspects of the programme took the form of more guided opportunities for learning, or were supported through formal counselling or coaching – this included practical skills, but also self-knowledge and ability to handle situations in new ways. (community garden, Whatley et al, 2015)

A number of projects also incorporated creative activities – such as painting, flower arranging or making things and these were appreciated as an opportunity to learn new skills but also express themselves. (WT, Cook 2008; WT Fernee, 2019; Perins Margalis et al 2008)

Achievement/contribution

Studies with participants undertaking gardening or other environmental activities noted that participation in activity that was felt to be worthwhile was very important, where the impact of what they did was purposeful and "tangible" (Community garden, Crossley 2018: 43; Garden, Grabbe et al, 2013; HT, Harris, 2017; Forest, Wilson 2009).

> It's the process... from cutting the cuttings, to propagation, to potting on … and then selling them … 'cause it's a very productive thing and it gives everybody a taste of contributing to broadly the work here, and it ties it all together, and people can be proud of the achievements they've done. It's a bonding thing. (HT, Stevens 2008: 268)

This might also reconnect people with skills and abilities that felt lost, although they had them in the past(Crossley, 2018: 41)

Spending time with people, talking and getting on, and doing things together was also felt to be meaningful and worthwhile:

> The only thing I ever do with my week is all the hospital appointments and medical stuff so coming here and being able to sit down and talk to people, and do something worthwhile with my time, it's really beneficial (Garden, Coan et al 2017: 14)

Where groups were supportive, this facilitated peer-to-peer learning, and participants who were able to help people feel a sense of achievement in helping others to achieve tasks (Garden, Perrins-Margalis et al 2008). In some cases allowing this help was also felt as accomplishment:

> It was an accomplishment to allow someone to help me when I was becoming frustrated, because it was so hard working with my fingers, when I had so much on my mind. (Garden, Perrins-Margalis et al, 2008: 22)

For some, lack of pressure to achieve was equally important:

> Participants did not feel under pressure to achieve certain targets and they had control over what they wanted to do and how much they wanted to push themselves. (Author quote, Garden, Coan et al 2017: 11)

This was the opposite of the ex-service personnel in the diving study, where the ability to complete a formal diving qualification was seen as motivating and gave a sense of "pride and achievement" (diving, Morgan et al 2019: 2837).

Change in personal/social identity

Gardening, preparing and talking about food and recipes are 'ordinary' activities for many, but for the homeless women, these activities allowed them "… to feel more themselves and therefore less marginalised" (Garden, Grabbe et al, 2013: 262). This was also noted for clients of a community mental health service (allotment, Fieldhouse, 2003: 289). For one woman, gardening made it possible for her to be her true self:

> [The garden] makes us able to be whoever we are and not stop [being who we are] because we don't have money or housing (Garden, Grabbe et al, 2013: 262).

The authors observe that this woman was reflecting on her loss of identity as a result of her homelessness and how the garden enabled her to identify with her 'original self' and the 'mainstream of society' (Grabbe et al, 2013: 262-3). This was also reflected for people with serious mental health conditions which could be stigmatising:

> Can you imagine how isolated people are and how difficult it can be to talk to people, but here they can just naturally chat about stuff. I think people get fed up of being recognised as someone with schizophrenia, sometimes they just want to be recognised as people. (Group leader. Forest. O'Brien, 2018: 9).

This was echoed by another allotment gardener who, after a gardening session, described how he felt:

> You walk differently, you're breathing differently, you wouldn't mind if you bumped into somebody you knew – whereas ordinarily you don't want to bump into anybody you know 'cos that means a conversation. (Fieldhouse, 2003: 290).

Those with mental health conditions also highlighted the importance of others' change in attitudes:

> I am so passionate about this project, and the stigma of mental illness is just....I mean, my parents have learned a lot through me, and they come down here now and they help out, and they integrate with the volunteers, and you just want to get the message out: 'Come in, and we're not mad—we're normal human beings. Yes, we've had difficulties and problems, but a lot of the public come in and say, "Oh, are you staff? Are you a volunteer? But you cannot be a volunteer." Well, I am a volunteer, and people do not know the difference, and that is a good thing (garden, Stevens, 2008: 267)

Participating in the activities of the garden initiated a change in sense of self, but also one that shifted social perceptions of who the participants were.

Adolescent boys on Wilderness Therapy also described how achieving things changed their perception of self-worth:

> A lot of the things that we do here give you a sense of accomplishment which helps in making me feel better about myself. (WT, Cook, 2008: 760)

The ability to respond to people without aggression, and to open up and express emotions was also noted in this group. This changed the young men's understanding of how they were seen, and options for responding to others, offering alternatives to machismo:

> Yes, (campfire group) helps just because I never expressed my feelings before and it helps with that and makes me feel better. (WT, Cook 2008, 766)

> I didn't usually express my feelings to people outside of here because I thought it made me soft and I had to keep up an image but I learned here that there is no point because it is not really who you are (WT, Cook, 2008: 761)

For veterans with PTSD in the diving study, a change from feeling dependent and, in some cases, unable to adjust to a new physical reality after injury, was a key perceived benefit of the intervention. Weightlessness allowed them to complete tasks in the same was as able-bodied

colleagues and restored a sense of physical competence. However for some, this dissipated after the diving trip (Diving, Morgan et al 2019: 2837).

Spirituality

A feeling of spirituality was another way in which some participants reported when connecting with nature. Gardeners reflected on how nature engendered a sense of awe at the wonder of nature:

> Suddenly you realise that you are at one – you don't know with what – but it's a nice feeling. (Allotment, Fieldhouse, 2003: 290)

For some participants who had drug and alcohol problems, this linked to understandings previously learnt in recovery:

> In recovery you are told to find your higher power, it can be anything, it doesn't have to be God or anything like that. I love it here, I absolutely love it here, so nature is mine (her higher power) (Forest, O'Brien, 2018: 11)

Nature could be seen as promoting an awareness of being at one with the Earth, feelings of connectivity and emotional and spiritual growth.

On a personal level participants found their relationship with nature to be therapeutic, rewarding, facilitating spiritual growth, allowing them to develop a sense of pride and helping them develop a sense of self and sense of place (author quote, Forest, O'Brien et al 2011: 77)

Nature as a therapeutic space

The conceptual model on which this framework was based included a range of participants – not all of whom were engaged due to mental health problems. A theme in this synthesis not captured in that framework, was the explicit role of nature within the therapeutic relationship. Eight of the studies included therapists or counsellors as staff on the intervention (see the TIDieR table on p.186). Where the therapists participated in the activities, this was seen as helping to develop and support trusting relationships between the clients and staff:

> Time spent together in the outdoors and the direct care from therapists appeared to gradually foster trust and feeling safe, which became important precursors to establishing a therapeutic alliance (Author quote, WT, Fernee et al, 2019: 1369)

This was contrasted with the enclosed office space where therapy usually took place and highlighted the benefits of spending concentrated time together:

> Sitting in a room and staring at the wall and listening to the therapist talking … It is not the same as hiking in the woods … When you just talk for an hour, you don't get to know each other. When you hike together for six days, you get to know each other. (WT, Fernee et al, 2019: 1370)

Symbolic identification with nature

Another new theme from this set of papers was the symbolic identification that participants had with nature. People benefited through noticing the ways in which nature grew, revived and renewed – seeing links with their own recovery through "metaphors of stability, growth, resilience, hopefulness and nourishment" (author quote, allotment, Fieldhouse 2003, 290). Specific activities like pruning, planting, growing, taking cuttings or even cleaning were mentioned:

> I also love cutting the hedge at the back, that's nice... Yeah, that's quite therapeutic … 'Cause when I cut dead plant off, it's like me getting rid of my problems. They cut off as well; you know what I mean: You're cutting off your problems... (HT, Stevens 2008: 267)
>
> I started to focus on this and thought of the pot as if it was me; then I noticed how I really wanted the pot to be clean and nice. It became my project and I feel that I am also worthy of being taken care of. (Eriksson et al 2011: 278)

In contrast to this symbolic relationship, veterans with PTSD going surfing identified with the physicality of the activity. They often focused on the embodied experience of surfing and the ocean:

> the body's haptic connection with the ocean was strongly emphasized and was portrayed by the veterans as charged with emotion; for example, in feeling their troubles being "pummeled out" by the force of the waves" (author quote, surfing Caddick et al 2015).

Conclusion

We included 37 quantitative and 30 qualitative studies in the review from 57 papers (10 were mixed methods studies that reported both quantitative and qualitative studies of the same intervention) and one systematic review.

The studies varied widely in terms of population (age, type of mental health condition and whether the sample was drawn from general populations, or people referred from health services, or in residential MH units), interventions (type, duration and intensity) and type of greenspace used (forests, farms, mountains, gardens, parks, the sea). Most evidence was about therapeutic gardening, wilderness therapy and care farms, although there were also studies about walking, mountaineering, surfing, scuba diving, forest activites, and a nature-based retreat. A wide range of outcomes were also measured assessing wellbeing, quality of life, various psychological and behavioral outcomes, physiological and return to work.

Despite a large amount of research effort in this area, there is little robust evidence of effectiveness, with few high-quality, reliable RCTs available. Only four RCTs were identified and these are generally small in size. A further seven used some kind of control or comparison group. Much of the quantitative evidence, therefore, comes from uncontrolled before and after studies which are subject to a range of potential biases. Although studies reported impact across a range of wellbeing, quality of life, psychological, behavioral and occupational measures, the lack of a control group makes it difficult to attribute such change to the intervention. There is some evidence from the trials that nature-based activities may positively impact on depression, anxiety, mood and feelings of hope.

The qualitative evidence synthesis showed broad and wide-reaching perceived impacts on wellbeing, mood and functioning from participants. They also reported appreciating increased knowledge and a sense of achievement from what they were doing, enjoying being physically active, and even being tired- out by taking part. The groups they took part in were important, generating a sense of belonging and support. Nature itself provided quietness and calm, away from their usual day-to-day living environments. Participants also found solace in nature as a "patient receiver" of their needs and symbolically in the rhythms of the seasons, growth and renewal. Participants weaved these understandings of nature into their own narratives of recovery. Moments of pleasure and beauty in nature could resonate strongly and provide nurturing memories.

There may be differences in experience, depending on the type of intervention undertaken. While calm and restoration were highlighted in engagement in nature through activities like gardening and walking, some activities were more exhilarating – including surfing, scuba diving and activities in Wilderness Therapy interventions – and people might also focus on overcoming challenges and managing risk. These tended to be with younger people and the interventions contained more men (including veterans). It is not clear if this reflects different need, or relates to activities believed to be more appropriate for these groups.

This apparent difference between the quantitative and qualitative research findings may be the result of several features. Good quality trials of complex interventions like nature-based activities are difficult and expensive to do well. Less robust designs may be fit for purpose if an organisation mainly wants to evaluate their activity to understand how they are doing, or to inform potential funders. In addition, impacts may be more holistic, with small changes across a range of domains creating a positive experience overall that is more difficult to pick up with specific quantitative measures.

Taken together, these themes show the interlinked qualities of setting, intervention, person and group that interact in complex ways for participants in therapeutic nature activities. The sheer range of qualities that impact in these interactions, with different needs, preferences and priorities illustrate the complexity of designing appropriate interventions to support mental health, and equally the range of possible impacts that could be measured in an evaluation.

5. Work Stream 3. Interview study: Deeper understanding of current systems

The aim of Work Stream 3 was to gather insights from service commissioners, mental health service professionals, primary health care services, environmental voluntary organisations, community-based providers and other intermediaries in four key locations: Devon, Newcastle, Bradford and West Yorkshire. These interviews focused on the place of nature-based interventions within the social prescribing system in order to understand factors that may impact on success.

Methods

Research questions/aims

The overarching aim of the interview study is to understand the factors that influence successful providing, prescribing and commissioning nature-based interventions for mental ill health.

The specific objectives of this stage of the research are to:

- identify the key models of social prescribing used in different locations for nature-based therapeutic interventions;
- explore stakeholders' perceptions on what works well and less well;
- establish the factors that influence success in commissioning, delivering and implementing nature-based therapeutic interventions.

The potential outcomes of the study include:

- increased knowledge of the models of social prescribing used for nature-based interventions;
- greater understanding of key stakeholders' perceptions and experiences of what works and what works less well;
- improved understanding of therapeutic nature-based interventions and how they can be planned, delivered and embedded in wider practice.

Study design and methods of data collection and data analysis

This Work Stream uses qualitative methods to explore how providing, prescribing and commissioning nature-based interventions work from the perspectives of a range of stakeholders, including: (i) service commissioners; (ii) mental health service professionals; (iii) primary health care services; (iv) social prescribing link workers; and (v) service providers. The data collection was undertaken in four locations - Devon, Newcastle, Bradford, Harrogate and West Yorkshire; these locations were agreed with the funder and project steering group and represent a range of geographical and demographic characteristics.

Semi-structured telephone interviews were used for data collection. The interviews lasted between 30 minutes and one hour and were conducted by Noreen Orr (Exeter) and Rukhsana Rashid (Bradford). The interviews were recorded and transcribed verbatim. NVivo was used to manage the qualitative data.

Topic guides for interviews are shown in Appendix 8.

The qualitative data was analysed using framework analysis (Spencer et al, 2014). Analysis and writing was ongoing and iterative from the commencement of data collection and undertaken by

Noreen Orr and Rukhsana Rashid, overseen by Ruth Garside, with input from the research team. As we were, concurrently, developing the conceptual models presented in Work Stream 4, the logic model of successful factors (see Figure 9 p. 125) was iteratively used to develop, and as a framework for, analysis.

Sample and recruitment

We used purposive sampling to include participants in key parts of the social prescribing system – GPs, Community Mental Health Nurses/Psychiatrists, Social Prescribing Link Workers, Intervention Providers – with experience of providing, prescribing and commissioning nature-based therapeutic interventions for mental ill health. We aimed to recruit two people in each of the cells of Table 3 below (total n=32, 8 in each row and column), but ultimately only managed to interview three secondary care health workers involved in social prescribing and had varied numbers across the localities. This was partly due to additional delays in gaining approval to contact people in secondary care through the HRA governance system, but may also be because these people are less visible and harder to identify within the emerging social prescribing system with its current focus on primary care. Nonetheless, we manage to gain a range of views from the four localities, including the views of commissioners who were not in the original plan but provide an important perspective. The total interviews undertaken was 32. As numbers for some cells are very small, we have anonymised localities in the write up where this has the potential to reveal individual identity.

Table 3: Sample for interviews

	Primary care	**Secondary care (MH profs)**	**Link workers**	**Intervention providers**	**Total by locality**
Devon	2	1	3	5	11
Bradford	2 + 2 commissioners	1	1	4	10
West Yorks	1 commissioner	1	2	2	6
Newcastle	0	0	1	4	5
Total by participant	7	3	7	15	32

Participants were recruited via existing networks of the research team, including personal networks, and local social prescribing networks, of which the research team are members. We advertised details of Therapeutic Nature on social media and used publicly available professional contact details for GPs, Community Mental Health Teams and Link Workers in each location. All evidence submitted via the call for evidence from projects within the case study areas was followed up with a request for expressions of interest for their potential participation in interviews. Snowball sampling was used as an additional recruitment strategy (Robinson, 2014), where participants were asked to pass on details of the study to others who might qualify for participation and asked to contact the researcher if interested. Potential participants were approached via email that included a participant information sheet and other relevant information.

Consent

Potential participants who were interested in finding out more about the study were given a participant information sheet which detailed study purpose, method of data collection and details of how confidentiality would be ensured. They were given the opportunity to ask for clarification and further questions either on telephone or via email.

A statement of consent was taken at the beginning of each interview including that:

- participants had read and understood the information sheet;
- participation was voluntary and they were free to withdraw at any time, without giving a reason and without any negative effect;
- open questioning would be used and participants could decline to answer any particular question(s);
- interviews would be recorded, transcribed and anonymised (it is possible that certain individuals or their organisations could be identifiable from the data due to the unique nature of their roles/geographic settings, and we ensured that this was known to be the case and consented to prior to data collection);
- quotes from the interview could be used in presentations, academic publications, the project reports, in print and online.

Patient & Public Involvement

To ensure readability, the Participant Information Sheets and Consent Forms were circulated to the University of Exeter Medical School's Health and Environment Public Engagement Group (HEPE) (https://www.ecehh.org/about-us/engagement/https://www.ecehh.org/about-us/engagement/).

HEPE consults and collaborates with researchers from the European Centre for the Environment and Human Health (University of Exeter Medical School), ensuring that the public perspective is considered at all stages of research, from design and conduct to dissemination.

Ethical approval

Before starting research for Work Stream 3 appropriate approvals from both the University of Exeter Medical School Research Ethics Committee and the Health Research Authority (HRA) were required. HRA approval is needed for research projects involving NHS organisations for which the NHS has a duty of care, ie for patients and/or staff who are recruited to the study as participants. It is oriented around governance and legal compliance. As we were carrying out research with NHS members of staff (and not patients) we needed to secure HRA governance approval.

The Medical School Research Ethics Committee application was prepared and involved detailing the research methodology – data collection and analysis, recruitment and sampling of participants, and preparing Participant Information Sheets and Consent Forms, and Topic Guides for the qualitative interviews (Appendix 8). This application was submitted at the end of June and was approved in July 2019 (UEMS REC Approval Reference Jul19/D/217). HRA approval was received on 16/12/19.

Findings

> 'Help people to live well in their communities and reach their potential'. And to me, if everybody in this country could live well in their community and reach their potential, we'd have a great society. (CMH 1)

The Person being referred

The person being referred is at the heart of the social prescribing system and can access the social prescribing activity by means of a referral from a health professional (such as a GP to a Link Worker or Community Connector) (path A), by self-referral to the Link Worker (path C), or self referred to the nature-based activity provider (path D; see Figure ***8***, p. 124). The following explores how GPs, Link Workers and providers regarded 'the person' for whom a social prescription was appropriate.

The GPs explained why they would refer a patient for a social prescription and the most common reasons were social isolation, loneliness and anxiety, followed by particular problems such as with

housing, benefits and debt. One GP gave an example of a person who needed help because s/he could not read or write and was struggling with housing and loneliness. GP responses also suggested that they were seeing these patients frequently:

> people that are very socially isolated that take up a lot of GP time, so people that we are literally seeing every week. (GP 1)

> a lot of people who come on a number of occasions with a series of problems will have underlying issues that are not medical in nature. So, as a doctor and as a GP I've known a lot of these people for ten years and I feel I'm able to tease out those who would benefit from a deeper look at the underlying issues. (GP 4)

One GP reflected on his experience of doing social prescribing and he felt that he was growing in confidence in referring people for a social prescription:

> I have found that I'm referring people that I wouldn't probably have referred before…because I wouldn't have thought there would be much point. I maybe thought that they were a bit of a lost cause! Or think, 'Well, I don't know…they've never engaged with anything in my experience so far, so why would they do something now?' And then I've actually tried referring a few people, that have been in that kind of category in my mind, and they've actually been helped quite a lot, so then I've actually gone 'Well…I will actually, I'll do that now'. And that's partly a confidence thing, as in feeling that they could be helped. (GP 3)

With one exception, those who worked in the social prescribing services were very clear on who was eligible for a social prescription and it was "…*anyone with anything* that will affect their health and wellbeing that isn't a medical need" (SP LW 1). These needs could be related to housing, finances, bereavement and mental health such as low level depression and anxiety. One service had quite strict eligibility criteria and only supported working-age adults from 40-74 years who had long-term health conditions such as diabetes, asthma, osteoporosis, epilepsy and heart failure (SP LW6). The majority of people referred struggled to manage their conditions (often failing to attend regular hospital and GP appointments) and needed support with "…lifestyle and associated issues…finance, housing, relationships, work, volunteering and other activities" (SP LW 6). One Link Worker explained that while she could work with 'anybody from 18 years upwards', she did not tend to do much with those over 55 years, as there were 'good' voluntary organisations in the area working with older people (SP LW 5). In contrast, another Link Worker, located in a different part of the county, found that most of her referrals were 50+ years experiencing mental ill-health and in particular, social isolation (SP LW 7).

The community providers of nature-based projects were providing for a range of people and a number focused on a particular demographic group – adults, young people, men, women, asylum seekers and refugees – but all were united in that their aim was to support mental health and wellbeing. Some providers were set up with a specific focus on mental ill health and explicit about who they wanted to help and actively targeted people with 'mental health challenges':

> to create opportunity for people who were often isolated and excluded, experiencing long term mental ill health to have opportunity to get out and socialise in a safe environment and within nature. (Community 5, Devon)

> …anyone that self-identifies as having mental health challenges, whether that's really current and they're sort of in the middle of something, or whether it's something that ebbs and flows for them throughout their life. (Community 1, Devon)

Active participants in the process

A number of those interviewed emphasised the importance of the person being an active participant in the social prescribing process, as highlighted by one GP:

> you really want the individual to actually get involved and get engaged with it rather than just be a recipient…I think that is the risk of the whole movement in a way, that people – is it another service that people expect to sort their life out, in some ways? You know, I think it's really important to try and help that person do that, but they need to also take part…it's an active thing, it's not a passive – so it's not – they're calling it a 'prescription', whereas you're kind of a passive recipient of a drug. (GP 3)

Another GP discussed how he avoided using the word 'prescription' and stressed the importance of working with the individual and understanding their needs:

> So, I never say to someone 'I'm going to prescribe you social prescribing', I say 'Listen, I think we've got lots of issues going on here, I've got somebody who I think can help you, so would you just go and talk to them'. And I never say 'I'm going to give you a social prescription'. (GP 4)

He believed the time spent with the Link Worker discussing options was giving them 'agency to move forward'. Similarly, the commissioners stated that they preferred not to think of 'prescribing' but rather of supporting individuals to choose:

> we would start from the perspective very much of what's actually important to that individual, not kind of prescribing…because we're social care, we're not medics and we're starting from a point of view…if people have capacity to make their own choices, then that's what we'll support them to do. (Commissioner 1)

Those working within the social prescribing services also highlighted the importance of the person engaging with the process:

> to be able to work with people we need them to want to engage with us enough to be able to make decisions and think about what kind of things they can do to take the next step and what support they might need, if there are any barriers in the way and we can help to remove those barriers. (SP LW 3)

They also reported that they encountered people referred by their GP who then declined the referral:

> people need to have agreed to be referred, which sounds really obvious but we still get people through who have no idea that they've been referred or people who say that they'll come along just because they want to make their doctor happy, but they don't really want the service. (SP LW 3)

Some suggested that while a person may have agreed to the referral, it may be that the time was not right for the person:

> I think a lot of clients say 'Yes, refer us in, refer us in' and then when it comes to us actually contacting them and working with them, they are just not ready to make that change just

> yet and we have to have quite a serious conversation about 'look, we are here to help you, but you need to be in a position to be ready to help yourself as well'. (SP LW 6)

> we see a lot of complex clients…who are maybe not at a point where they feel like they want to accept anything other than medical intervention. I think some people who've been struggling with something for a very long time…almost say to us that 'I need a diagnosis, I need to know what it is' and we do find it quite difficult maybe to engage them at that point until we've had some support from a medical service to have a discussion…So it might not be that they're ready for us then. (SP LW 4)

This point about the 'time being right' for people to take up a social prescription was reiterated by some of the providers. For example, one of the providers explained how a person applied to join the Mindfulness in Nature course and how she would have a conversation with the person to

> find out what's going on for that person now and how they are, what's happening for them and…sometimes it isn't the right time for people. (Community 1, Devon)

Another nature-based activity provider concurred but recognised the challenge people with mental ill health could face when contemplating trying a nature-based activity:

> when they are emotionally in low health, having the confidence to go on something…that's always a challenge. But I have found that when people have found me it's – it's because they are ready to. Whereas if they're really feeling that they can't, then maybe they're not ready to and they need that extra support work to take them. (Community 14, Devon)

GPs, primary care

GPs are an important component of the social prescribing system as they offer one of the referral pathways to the activity. It is important to understand their attitudes and understanding of social prescribing and their knowledge of what is available in the local community.

Attitudes and understanding of social prescribing

> I think social prescribing is an essential part of how we manage healthcare going forward, because of the complex population we look after at the GP practice I work at. (GP 2)

The GPs interviewed were positive about social prescribing. Knowledge and understanding of social prescribing had evolved over a period of time for some GPs, while for others it seemed to be a more recent phenomenon. One GP had learned about social prescribing in the last year and regarded it as a much needed service, saying "I really like the idea of social prescribing" (GP 1). Another GP explained how his practice had been involved in some small projects 'a good ten years ago' with the [project name]. It started a project which was a type of social prescribing, after the Link Worker model. His surgery had been part of the project and had a Link Worker

> who'd come in, say once a week and then people could come in and talk to him about a variety of problems and he would put them in touch with different things in the community…he would give them advice about money and debts and work and housing…And that was done in quite a small way and went on for several years. (GP 3)

He and his colleagues recognised the value of social prescribing:

> we were open to it and myself and a few other colleagues at that time were very interested in it because really, we could just see that a lot of what we were doing with trying to help patients wasn't really effective 'cos we didn't have time, because a lot of the problems that they were having were really linked to their social situation. (GP 3)

He noted that 'we really switched on to it' and were 'helpful to them at that time'. His role as clinical lead for long term conditions also influenced his perception of social prescribing. He recognised that what can make a difference to outcomes or people's quality of life is their social situation and their mental health, which helps them manage their condition and keep themselves healthy.

Another GP was a lead on Naturally Healthy social prescribing, and passionate about both social prescribing and the natural environment and their benefits for people who are isolated, lonely and physically inactive, with stress and anxiety because of lifestyle issues.

> I think the thing about social prescribing, if you like, social prescribing is a failure of society, isn't it, effectively, because we're saying that we need to help people reconnect with communities and reconnect with assets in communities, because they don't have that at the moment. And in an ideal world, we will help strengthen the community to a point where social prescribing is not needed. (GP 4)

These GPs were clearly supportive of social prescribing but as one commissioner cautioned, when discussing the adoption of social prescribing by GP practices in [locality], GP attitudes are likely to be mixed:

> so if we've got XX practices in [locality], let's not be naïve to think that they're all referring in really, really well and the right people, because they're not. Some of them are bought into it, they'll get it, they love it, they're supportive of it, they refer into it…Some practices are absolutely not connected in with this, they don't believe in it, they don't think it's the right approach, they don't want to refer it to their patients, so it's a real mix of engagement within the GP practices. (Commissioner 3)

Similarly, the Link Workers reported a mixed picture in relation to GP engagement with social prescribing and noted variability across and within GP practices. One Link Worker who received referrals from five GP surgeries felt that younger GPs were more aware of social prescribing than their older colleagues:

> some of the older GPs, I think, whether they just don't have time to understand, and they…feel that actually it's really wasteful that I have an hour to two hours with people, when they have ten minutes with people, it's almost like they can't understand what I can be doing for that amount of time…there are those GPs that are very definitely on board with social prescribing and those that maybe haven't had the time to actually sit down and maybe think about what all the benefits are. (SP LW 5)

Knowledge of local community offer

Knowledge of local community groups varied and one GP described that before the Link Worker started at the practice, she had referred patients to organisations that she knew existed but she felt that the Link Worker

> has been great because I'm not aware all the time of what the options are and what's right for a specific patient, and also don't have time in my clinic to go through all the different options, so having someone else to have more knowledge and is more aware and time to allow the person to talk about what would benefit them the most, is ideal. (GP 2)

Other GPs made it quite clear that their difficulty lay not only in being aware of the local offer but also on how to access local groups:

> this is the hard bit with social prescribing because there are lots of community groups and nature groups out there but we, as GPs, struggle to know actually what the community

> groups are. So, I don't know specifically about any nature groups off the top of my head. I mean, there are some allotments, I think, near to where I live…but I don't really know how to access that. (GP 1)

> one of the big advantages of having the link worker, because before, if you're a GP, you might have known that there may be some little interventions or projects that were going on locally, it's very difficult to keep – one, to know what is going on, two, to know how to get in contact with the organisation, and also three, to know if it's still going on or not. So that's why the link worker model really works well, 'cos you don't have to know what's going on locally. (GP 3)

One of the community providers felt that the NHS approach to social prescribing was based on a flawed model of a GP being 'at heart of the community' and knowing what goes on in that community. His argument was that

> most GPs these days don't live in the catchment areas of their own practice, and they don't really know what goes on outside their practice door, and they're too busy trying to cram in another few seven-minute appointments. And they're not the heart of the community. (Community 12, Newcastle).

One of the Link Workers was quite clear that for her, it was not the GP's role or within their remit "to remember all the different services that are out there." (SP LW 4).

Dynamic between GPs and LWs

The dynamic between GPs and Link Workers is an important factor in helping social prescribing to work successfully. The following considers the location of Link Workers and their accessibility, the referral from the GP to the Link Worker and how appropriate referrals were, and support for Link Workers.

Location of Link Workers

There were varying arrangements as to where the Link Workers were located and how much time they spent at the GP practice. Link Workers could often work across practices which impacted on the time available at a particular practice:

> and because they only work with us one day a week, so they're split between sites… and I suppose that's a shame really, because it would be nice to have an actual social prescriber in our practice all the time. (GP1)

One GP explained that although social prescribing had been happening for five years with the Link Workers based at a community centre, it was only within the last year when funding had been secured, that the practice had been able to have a Link Worker based there (part time). However, this Link Worker was only available at the surgery for two hours a day (SP LW 7). In another location, the Link Worker was based in a Wellbeing Centre which was part of the practice but in a separate building.

One GP was unclear as to how many Link Workers actually worked at his practices because of how the situation had changed since the introduction of the Primary Care Networks (PCNs). In one locality, all but one of the PCNs have signed contacts with the social prescribing service who then employed the Link Workers on the PCNs' behalf. This meant

> you don't say this link worker belongs to this PCN or that PCN, and what's actually happened now is the organisation in [locality] has looked at how they put the Link Workers in different

> practices, because it seems sensible to have them covering a particular geography rather than one PCN [primary care network]. So you find that one link worker, for example, will cover maybe four or five different practice sites, in a particular geography, but actually… those practice sites may belong to three different primary care networks. (GP 3)

Link Workers could be 'attached' to a GP practice or a number of practices, but this did not necessarily translate into being 'located' in a GP practice. They appeared to be peripatetic, perhaps starting and ending their working day in an office base, and seeing people in the surgeries or elsewhere during the day. One Link Worker described herself as a 'little nomad' going between two locations 'lugging all my files!' (SP LW 7). One Link Worker, who had set days when she worked at the GP practice, believed that people were more willing to engage if she called them from the surgery:

> People are a bit more reluctant to come and see us because we're based elsewhere, and I think clients feel that we're not quite as important as going to an appointment with a doctor or a nurse. (SP LW 6)

In contrast, another Link Worker felt it was important to emphasise that she was a non-medical member of staff when she met people at the surgeries:

> If they feel uncomfortable, they feel like they're talking to a clinical member of staff and you can see them unwinding when they realise that, actually, that's not what I'm there for and I do always introduce myself as being non-medical and not a counsellor. (SP LW 5)

Link Workers were often limited to the number of appointments they could set up at surgeries because of room availability. In fact, one Link Worker had never been able to have an appointment at the practice and she used the local library for her meetings. Another Link Worker who provided a signposting service at the GP practice, described a similar situation:

> they have told me, I have use of rooms, but then I have to go and ask a receptionist and they're always on the phone, because I don't know what rooms are free, and then if I go to the room, obviously I haven't got my computer and everything all set up and all my information, so it's not quite so easy 'cos I don't have everything at my fingertips. (SP LW 7)

As a result, she preferred to meet people for appointments at her local community centre.

If the Link Worker was physically present at the surgery for even a short time, there could to be advantages for both the GPs and the patients:

> It's good for the GPs 'cos a lot of the time, after they've seen a client, a patient, they will walk round to me and say, 'Oh I've just seen this person and she needs help with X, Y and Z, have you got a minute?' And so it flows better for the patient as well. (SP LW 7)

However, working across different practices could mean that Link Workers felt that practice staff did not know who they were and as one Link Worker described:

> I'm seen as somebody that just comes in. Everyone is very pleasant, everyone is very accepting, but it's almost like I'm not really part of their team, even though I'm actually employed by the PCN…and so I am a member of their team. (SP LW 5)

Accessibility

One of the GPs emphasised that accessibility was key with different locations enabling people to access the Link Worker, either through health or the community. This was echoed by another GP

who felt that it was important that the benefits of social prescribing were not just accessible through general practice:

> Now I feel very strongly… that people should be able to go somewhere and get some support for non-medical issues without having to go to see the GP. (GP 3)

They observed that the funding of social prescribing through the PCNs resulted in tying Link Workers to the surgeries.

The issue of widening referrals beyond the GP practice was raised by Commissioners in [locality], who felt that it was far from ideal that a person could only access a Link Worker via a GP and was a 'wasted GP appointment' (Commissioner 2):

> we're encouraging referrals from GP practices, but actually we would love to widen those referrals much more. And for those referrals to include all the other agencies that people come into contact with…whether that's as a social worker or a care home…I would like to widen the referral offer, because I think…if you try and reduce GP appointments but you're waiting for the person to go into the GP practice, it seems a little bit of a juxtaposition against what you're actually trying to do. (Commissioner 3)

One Commissioner pointed out that one of the lessons learned from a social prescribing pilot project locally was that GP-only referrals could mean a delay in access for the person:

> Sometimes the community connectors actually identified people in the community that would benefit… but there was a delay because they'd had to get the patient to go through the GP to get a referral to go into their service, rather than just becoming part of the service. (Commissioner 2)

Where social prescribing activities and services were already well established before the introduction of PCNs, and where there had been integration, an increase in GP referrals enabled social prescribing services to "…expand and see more people" (SP LW 1). As the Service Manager of the social prescribing service explained,

> it's a completely integrated service that's allowed us to expand and see more people… we were always high in demand and so this has allowed us to extend the service and be able… to work with primary care networks to get more referrals from primary care. (SP LW 1)

The ease of the referral process, in terms of the 'who' and the 'how' also promoted accessibility:

> we try to be as open as possible in terms of being easy to access, so people can be referred by a professional, that's any professional, so it might be a doctor, a nurse, a social worker, it might be somebody at the local coffee morning. But equally they can self-refer as well. We try to be, again, as accessible so people can refer online. We have people message us on Facebook, we allow e-referrals from a database that most GPs use. So, yes, we try and make it as easy as possible to either be referred or refer yourself to us. (SP LW 1)

They also highlighted the accessibility of the Link Workers, who could work from a range of bases beyond GP practices:

> we have all the equipment to work completely agilely. So, some of the link workers work out in GP surgeries every day, a lot of them visit people in their own homes because we feel that that adds massive value to the service… we can work from community organisations, we can work from other NHS buildings or the council buildings, we can work from home. (SP LW 1)

Referral from GP to LW

Some GPs described the referral process for social prescribing as being quite simple in practice, with the completion of a referral form which was then sent electronically to the Link Worker or centrally to the social prescribing service "… and then they will make sure they divvy them out to the correct Link Worker" (GP 3). In some cases the Link Workers could access patients' notes but in others they could not. Accessing the patient records supported a 'unified approach', according to the Link Worker Co-ordinator, and was "… an opportunity for each of us to support each other in trying to get the best outcome for the individual" (SP LW 4).

Not being able to access patient record was for one GP, "… a shame, really, 'cos I think it's hugely beneficial." He explained that this meant

> quite a delay… if you refer someone, you don't know if they might go and see the person… it might take a few months, and then you get some sort of letter. So it's quite nice to see – if you end up seeing that person again, say you're treating them for depression… you might be seeing them every few weeks for a while, if you knew… the link worker had seen them and had written a few notes… and then when you saw them again it would be very helpful, you could encourage them and work together with the link worker. (GP 3)

It was also deeply frustrating for the Link Workers and patients, as explained by the manager of the social prescribing service:

> We have some ongoing challenges around information sharing because the data protection officer that covers most of our primary care networks doesn't agree that externally employed staff should have access to patient notes and information. So, that has a knock-on effect and it makes the link workers sometimes – it makes it a bit more challenging for them to do their roles because they don't have all the information to hand, and it can cause frustration for patients when they have to tell their story over and over again, because we've got no idea what has happened in the appointments that have led up to that referral. And it makes it difficult for us to share information with the GPs in real time around how we're working with someone. (SP LW 3)

A Link Worker felt that because they could not access patient notes they had to 'basically do it blind' and that it added to the administrative burden, requiring emails to the doctors with updates and then the administration team to update patient notes (SP LW 7).

In another area, where there did not seem to be the same issue of Link Workers accessing the systems, there were still problems for GPs receiving feedback on their patients:

> we get quite a lot of complaints from practices that they don't always know what's happened to the person, even though we've got the systems in place, they don't always seem to receive them. (Commissioner 3)

Ensuring that GPs received feedback did not just have to rely on the 'systems', as noted by ne social prescribing service manager, who said that they encouraged Link Workers to *talk* to GPs:

> I try and encourage… the Link Workers to – if they see a GP in their staffroom, grabbing their coffee or they may pop in and just feedback any good patient story, it helps to build that relationship and it helps the GPs and the staff to understand exactly what the Link Worker role is, as it's a bit of a new role to them. (SP LW 1)

Interestingly, there was one situation where Link Workers could access the GP systems to generate referrals by identifying people that met their eligibility criteria – those with long term health conditions – and requesting that medical staff consider discussing the service at the patient's next appointment. Even though they could access the GP system, they preferred to email the GP or nurse directly with updates as they found that 'gets more attention than just putting a message on the system' (SP LW 6).

Appropriate referral

Some GPs indicated that they thought about who was appropriate for referral to the Link Worker:

> I wouldn't send somebody who I would feel would be too…we've got to protect our social prescriber, so I wouldn't – if some of our population might be a little bit unpredictable, so unless a support worker could go with them…I wouldn't refer. (GP 2)

In one practice it was clear that the GPs referred so many patients to the Link Worker that they were overwhelmed with referrals:

> And we've got a social prescriber in our practice…However we've inundated her with patients, so we haven't been able to refer to her…we had so many people that could benefit from social prescribing that she became saturated. I think now I would be thinking twice about the people that I'm sending to the social prescriber, so I'll be sending people that really need a kind of higher level of social prescribing. (GP 1)

This situation had made the GP reflect on who they should be referring to the Link Worker. One of the Link Workers added their perspective on 'being inundated' and not having capacity to deal with the referrals:

> I'm inundated, I can't cope with the numbers, I'm always running to a backlog, I can't, I don't know how to do it. (SP LW 7)

They described their frustration and clearly wanted the situation to change so that they could spend more time with people but

> there is no funding to help with additional time or getting somebody else on board…so it's going to have to be a different way of shaping the referrals to bring the numbers down…or I'll have a nervous breakdown myself, won't I?! (SP LW 7)

A number of the Link Workers indicated that they received inappropriate referrals from GPs and had to refer back to the GP or onto a more appropriate service. Most of these referrals involved complex mental health issues such as psychosis and suicidal ideation:

> there are limits to what I'm able to provide, and when somebody's at a certain level, they really need the professional assistance from the mental health teams and all that can encompass and help them overcome their crisis point. It's got too far down the road…if they just had the social prescribing intervention earlier, it might have helped to stop them get to the crisis point, but sending me somebody at crisis, it's too late, I'm afraid. (SP LW 7)

What the Link Workers did emphasise was that if they could not support someone with high level mental health needs, they would ensure that these people were referred to other professionals:

> we would never just leave somebody and say 'You're not appropriate for us, sorry'. We would always signpost to somewhere that can help. (SP LW 6)

Where the Link Worker was working with people with long term conditions over a period of time, that could mean that an individual's needs, and the level of support required, changed over time. The Link Worker emphasised that "we'll not just close a person based on change."

> we know how hard it can be to withdraw support from somebody that's had it for a while…that can lead people down a very negative spiral, so, we would never just close somebody or reject them from our service without making sure that something else has been put in place for them. (SP LW 6)

Some of the Link Workers and managers of the social prescribing services described various strategies that they had developed to deal with the problem of inappropriate referrals. One approach was to create a guidance sheet for GP practices, describing social prescribing, how to refer and for whom the service is suitable (SP LW 3). In another GP practice, one of the GPs had been instrumental in developing a leaflet using a 'traffic light' approach of red, amber and green to indicate levels of mental ill health and the appropriate actions to recommend. The Link Worker had used this with patients and felt that it helped her deal with the issue:

> So that has really helped me…to understand the levels of people and what intervention…that person can go there, and he's in this category, X, Y and Z…and so…it takes the pressure off me, because I know that the bases are being covered, 'cos the person had to answer a few questions and depending on their score, as well, if they score over a certain amount, that's an automatic GP referral…so that really takes the stress off me. (SP LW 7)

An additional point raised was that although GPs may refer patients with social isolation, for example, the link Workers often discovered from an interview that the referral was much more complex:

> actually when a referral's gone through for low mood, anxiety, there's so much unravels out of that, and it isn't just the low mood that needs interventions: debt advice, housing, and it unravels loads of other things…so they might get referred for one single thing but actually they've got many needs, when it comes through, it's very complex. (Commissioner 2)

This was not necessarily a criticism of the GP referring the patient but was an acknowledgement that people could 'open up' with the Link Workers who spent time with them.

Support for Link Workers

> being a link worker is quite a *unique role* and you never know what you're going to get when you sit down in a room with someone. (SP LW 3)

The Link Workers were from diverse backgrounds with diverse skills and experience. One Link Worker observed that the job descriptions or person specifications for link workers do not require specific experience, other than having worked with members of the public, and went on to outline the diverse experience of team members:

> the experience varies massively…we've got people who have come from occupational health, nursing, psychology, counselling, drug and alcohol misuse. (SP LW 6)

The notion of 'specialisms' within teams was mentioned several times and was regarded as an advantage for all:

> And just the range of experience is amazing because people have got pockets of knowledge about very different things, so because we help with housing, finances, mental health,

> physical health, work and activities…you need to rely on other people to help you out if you have a question…I couldn't do this job without having my team around me. (SP LW 6)

Being able to draw support from other team members was highlighted as very important:

> I think that peer support the link workers offer each other is *so* valuable. (SP LW 3)

> and constantly having that peer support…it's really beneficial to be sat with people who might have already seen someone with similar needs. (SP LW 4)

Those that had a central office base with a social prescribing service had various options such as team meetings at the end of the day when "…they all come and talk about their days and offer each other a bit of peer support" (SP LW 3), fortnightly meetings, monthly or six-weekly supervisions and WhatsApp groups. (SP LW 2)

> we've got the bigger team dynamic where we all meet together, but then they break down into the smaller teams and within the smaller teams they'll often bounce ideas around each other. (SP LW 2)

And there were those all-important 'little conversations' that happened between the Link Workers that enabled information sharing: "…it's really like just working as a team, to kind of update each other." (SP LW 4)

For the Link Workers based at the GP practices, peer support was just as important, albeit in a different form. A number of Link Workers in the county had set up a peer support group "…because everyone was working is isolation and it's really helpful to be able to bounce ideas [and] scenarios across" (SP LW 5). There was also an email group which included the Community Connectors and Community Builders.

> it doesn't matter where you are as long as you feel that you've got someone to bounce those thoughts and exasperations…around, if you're feeling completely on your own…it's great…really valuable. And sharing resources and sharing thoughts and ideas, is really important as well…I think we're doing really well as a group...and I love being part of it. (SP LW 5)

Developing key skills

There was unanimous agreement amongst the Link Workers and social prescribing managers that 'lived experience' or 'life skills' and 'people skills' were of paramount importance to the role. Additional skills identified were communication skills, listening skills, problem solving skills and organisational or administration skills. Other essential qualities mentioned included being non-judgemental, being patient, being empathetic and being calm. Not everyone prioritised these skills and abilities as to which was most important, but one social prescribing serviced manager stated that

> for me it's the people skills, it's being able to listen and really understand what's important to people and not impose what you might think people need. (SP LW 1)

The importance of 'not telling an individual how he or she should live their lives' was reiterated numerous times by the Link Workers and clearly, being non-judgemental was a key part of their approach.

> we have a lot of people coming to us who have made poor life choices in relation to anything, and even whilst you are working with them, they might continue to make those

> poor choices, but they've come to you for a reason, and it's about not passing any judgement and just being there to support them in what choice they make. (SP LW 6)

She added that because she worked in an area of high deprivation, "the last thing our client group wants is to be judged by another health professional" (SP LW 6). Many of her client group felt that they were 'talked down to' by their GP and felt judged.

'Being patient' seemed to follow on from being non-judgmental as she noted the importance of working with individuals at their pace:

> you have to be patient with people in different ways. So, some people are quite motivated, other people aren't motivated whatsoever, they're not even aware of how their lifestyle might be affecting their health. So some people need more time than others, and you have to be patient because you have to take it at their pace. If you try and rush somebody to do something, they're just not going to want to work with you…a goal for one person might be four weeks, but for somebody else it might be twelve. (SP LW 6)

'Being calm' in the face of the unexpected such as dealing with a person in crisis and being 'able to turn on our heels when something changes' were highlighted as important. The Link Worker described how an individual seemed to be doing very well but then she received a phone call from him because he was having suicidal thoughts:

> I had to think on my feet and think...what am I going to do because I can't see him face-to-face, I need to help him plan out the next few hours, so that he's got something to focus on while I do some work in the background, so you do have to think on your feet and be able to problem solve for people that can't always do that on their own. (SP LW 6)

The Link Workers also needed good organisational and administrative skills as they could be working and supporting over a hundred people and therefore managing and recording a considerable amount of data. Recording data was also important for evaluation and feedback for funders, and could be onerous for some:

> it's also typing it up into a spreadsheet for evaluation…there's so much admin with it, there's case studies you've got to do, there's so many reports I have to do as well…oh, there's so much paperwork! (SP LW 7)

An added benefit for the Link Worker's skills set, according to a social prescribing service co-ordinator, was to have a natural interest in communities and understanding how they work, as often the Link Worker role involved both advising on what support is available and identifying any gaps to ensure that provision is provided in the future (SP LW 4).

The social prescribing services managers outlined some of the training provided for the link workers. Examples included motivation interviewing, mental health first aid, safeTALK and ASIST (both suicide prevention programmes), Making Every Contact Count, and a Blue Stream eLearning package covering health and safety and diversity and equality. There was also more 'informal' training where

> …we'll get a specialist service into give us a brief workshop around what kinds of things people can access and what kinds of things we need to know, 'cos we're not going to be experts in everything. (SP LW 1)

The topics covered could be the benefit system, budgeting, finance, housing, and care and support.

One of the Link Workers noted that she would have like formal training on how to support people with low to medium mental health issues. She felt that long waiting lists for psychological services meant that she was providing 'interim mental health support' without any formal training.

> ….we've had an increase in the amount of suicidal ideation individuals, people who are thinking about hurting themselves in light of what's going on [Covid19 lockdown], and it can be really scary to have that conversation with somebody if you've not had experience or training in doing it. (SP LW 6)

Link Workers/Community Connectors

As seen above, Link Workers are a key component of the social prescribing system and so it is important to understand the factors that influence what they do; the referral process and adequacy of the existing systems, the mapping and understanding of community assets, and value of nature-based offers.

Process and interaction with person

The Link Workers working within social prescribing services received referrals from GP practices electronically. This had not been without its problems, as noted by one of the Commissioners, who said that "…we've had to work very, very hard for the voluntary sector to get on that system" (Commissioner 3). Once referrals were allocated to individual Link Workers (usually passed on to the Link Worker attached to the surgery), they then contacted individuals to make an appointment to meet. One manager described the initial contact was to

> advise that the referral had come through for them, they would run through what was on the referral and for what reason the referral had come through…they would establish what would be the best place for an appointment to take place, so that could be within the GP practice, it could be within the community or it could be within the individual's home. (SP LW 2)

There was a variation in preference for doing home visits: one manager believed that it allowed the Link Workers to see that person's 'real lifestyle' (SP LW 1), while others tried to avoid them (SP LW 5) or only did them for those who were reluctant to go out of their homes (SP LW 6). The main reason for this seemed to be the time-consuming nature of home visits.

In the first meeting the emphasis was on listening, being non-judgemental and understanding the person's needs:

> …we would listen to what that individual's needs are, try and have a look at it from the *holistic* point of view, have a look at what the doctor says they need help with, which doesn't necessarily always marry up with what that person would like. (SP LW 2)

The Link Workers described the assessment tools they used to guide the interview; one was the Well-being Star[3] and the other was the Social Prescribing Wellbeing Tool that had been developed by the service and was based on the Five Ways to Wellbeing[4] and endorsed by NICE. Both of these tools

[3] The Well-being Star is designed to support and measure progress in eight outcome areas that together enable people to live as well as they can with a long term health condition. An example can be seen here https://www.outcomesstar.org.uk/wp-content/uploads/Well-being-Star-Guidance-for-Service-Users-2ndEd-preview-1.pdf

[4] https://www.mind.org.uk/workplace/mental-health-at-work/taking-care-of-yourself/five-ways-to-wellbeing/

facilitated a conversation between the person and the Link Worker, as explained by the Link Workers:

> It doesn't have to follow the flow of the tool, we try to just get the answers through the *conversation* so that the individual feels like they've had a chance to really speak to someone about the struggles they might be experiencing or any positives in life. (SP LW 4)

> It's an open-ended assessment tool which allows you to have quite a *relaxed, informal conversation* with your clients about all of those areas [e.g. finance, housing, relationships etc.]. And for each of the areas we ask clients to score on how well they feel they're managing on a one-to-five basis and that's based on readiness to change. (SP LW 6)

These tools were used to generate a wellbeing score for each individual and are used at intervals to monitor wellbeing. In one service the tool was used on a six-monthly basis and in another it was used at six weeks, then six months and twelve months. That the tools were 'holistic' was regarded as key in that "a lot of people's mental health conditions or health inequalities actually stem from a social inequality" (SP LW 1). They also helped the Link Worker work with the person to agree realistic goals:

> they actually do give an indication of how someone is feeling at that moment and whether they have an ambition for things to get better because some people just feel there is no hope and they just don't think, they cannot see a way for things to get better…when someone doesn't feel there's any hope at all, it's much, much smaller steps and much, much smaller goals that you'll be working towards with these people. (SP LW 5)

In one service people could be offered up to six sessions of up to one hour; not everybody needed all six sessions and sometimes appointments could be longer (SP LW 2). For the Link Worker based in GP surgeries, six or eight or even twelve sessions were offered after the initial conversation (SP LW 5). In the service targeting people with long term conditions, up to eight assessments were a possibility which could cover a period of around four years. The Link Worker explained that because of her 'caseload', the majority of contact she had with people was via the telephone but that she tried to do the assessments face-to-face. The advantages were clear to her:

> because you get much more rich data from the client than doing it over the phone, and with what's going on at the minute [Covid19 lockdown], that has been more apparent. So, some assessments can take up to an hour and a half, if somebody's particularly troubled or they're really struggling with something, and I think that having that face-to-face appointment you just get so much more from the person than what you do over the phone. And as a link worker, I feel like I ask more questions, I give more advice, if I'm face-to-face with someone. (SP LW 6)

Link Workers stressed that while they aimed to encourage self-help and independence, the support they provided varied according to the individual's need, and they could accompany a person on the first appointment or visit to a community group. As one Link Worker observed, "…very often actually getting over the threshold is a major block to some people" (SP LW 5).

> we're often able to ring ahead and let them know that someone new is coming so that they can be welcomed and made a cup of tea…But if somebody is very anxious or we know that they wouldn't go without some accompaniment or help, then either our advisors or link workers would go with that person for maybe the first or second time, or we do have some volunteers that act as buddies that go along with people to groups as well. (SP LW 1)

Mapping and understanding of community assets

A social prescribing manager described connecting people with support in the community as their 'everyday bread and butter' (SP LW 1). She noted that the service held directories of local services which had 'literally thousands' of smaller community groups across the district. It was a similar picture at another service where they had recorded signposting 'hundreds and hundreds' of community organisations to people (Commissioner 2). There were a variety of ways of finding information on these community groups such as checking the internet, asking organisations for further information and staff passing on information via a WhatsApp group.

> Our community connectors are out and about in the community every day, so they are finding out up-to-date timetables of different places. (SP LW 2)

There was emphasis within the services for all of the Link Workers to 'pool' and share their knowledge with each other on what was happening in the community:

> …it's that real team effort to keep up-to-date with what's going on in the community, what's available, we update the directory at least every six months, but if we know there's a change we update it immediately, and the team take real pride in it. (SP LW 1)

However, this was more difficult for individual Link Workers based at GP surgeries: one Link Worker had investigated the local community groups when she had started in her role but in the end, she had "…neglected it massively after a while" because she simply did not have time (SP LW 7). Time was also an issue for another Link Worker who explained that her surgeries expected her to see four to six people a day "…which is actually quite a lot" (SP LW 5). The issue of GP expectations and awareness of the Link Worker role was raised by one of the social prescribing service managers:

> when we first started working with some of the surgeries I think they had an expectation that…the link workers would be in their surgery all day, seeing patients back to back, and not understanding that actually being a link worker is a lot more than just seeing people, it is connecting with what is going on out there and that there's sometimes quite a lot of work that you have to do outside of appointments for people. (SP LW 3)

In some cases, the Link Workers had help from others such as community development officers to organise and collate information on local assets (SP LW 3 & SP LW 7). One of the social prescribing services had plans to have a network role to complement the social prescribing role:

> it will be their role to link in with the organisations, groups and activities, nature-based organisations, and really map out what is going on, have a look at where the gaps are and help develop bringing those up. (SP LW 2)

Working in partnership with the umbrella body for the voluntary and community sector in the area, enabled one of the social prescribing services to tap into its directory of voluntary and community sector organisations.

One of the challenges in maintaining up-to-date information on community groups was linked to the "…fluid situation in terms of funding…and what is available at different times of the year" (SP LW2). One Link Worker felt that it was 'almost impossible to know everything' that was going on and impossible to create an up-to-date directory because of funding:

> Directories are really difficult because very often with the organisations they are funded through pots of money and of course, funding is always time-restricted, so by the time a group is set up very often the funding will stop and it sort of fizzles out…it would be so great

> if the funding was there indefinitely, and you knew the organisation was going to always be there. (SP LW 5)

Value of nature and nature-based providers

Many of the Link workers recognised the value of nature and its link with wellbeing.

> I think getting out and about in nature is paramount to people's positive mental health and definitely a huge benefit to it. (SP LW 2)

> I think anecdotally there's definitely something about being outdoors for people, particularly with mental health. There's something about…growing things, I think, that's good for people to get involved with. (SP LW 1)

A social prescribing co-ordinator felt that it was for the Link Worker to convey that knowledge on the positive link between the outdoors and health to people, and encourage them to consider it as option to support their mental health (SP LW4). One of the Link Workers described how she did try to do that:

> And one of the things I tend to do in my conversations is find out whether people actually already have the ability to go outside and just marvel at…the shape of a leaf or the shape of a tree or just take pleasure in what's already out there. And some people don't, just can't even see that…outside is outside, indoors is indoors, it's as black and white as that. So, actually, when you stop and you say 'Look at the spring flowers that are coming up…doesn't that fill your heart with joy'…I mean you can't say that with some people 'cos they will look at you as if you are a nutter! (SP LW 5)

She concluded that some people 'completely understand' and 'other people really don't'. Overall, the link workers felt that they would recommend nature and the outdoors but at the same time, said

> we are very much guided by what they are interested in…so if they tell us that they are looking to get out and about then we absolutely would find as many opportunities as what we can, to do that. (SP LW 2)

The Link Workers also recognised that there were barriers to people accessing the outdoors such as poor weather and poor mobility and tried to minimise those barriers by finding groups that could accommodate people's needs. Others barriers included money and transport, particularly in rural locations. Despite being in a rural county with many natural areas - coast and moorland - accessing some of those places could be difficult because of infrequent bus services and

> most community transport services are run with volunteers, and the volunteer isn't necessarily going to commit every week…and then in the smaller communities, finding enough volunteers to be able to run that service is restrictive. (SP LW 5)

A few of the Link Workers that were working in urban areas with high levels of deprivation pointed out that people had pressing issues relating to housing, finances and benefits that required support and felt that they did not often recommend nature-based activities:

> so if somebody's being threatened with eviction, but they're really looking forward to going and doing a gardening group, we'll advise them that they might be better off trying to prioritise this. (SP LW 6)

> I think if they come quite troubled and anxious about finances and about needing mental health services, then I think sometimes it's a challenge to spend a lot of time looking at

> those kind of things [nature-based activities], when they've got other pressing needs. (SP LW 2)

Arguably, at a later point some people could be 'ready' to participate in nature-based activities:

> But just to get them to make those next steps in the right direction, and that can come later. And we've had referrals that have come back six months later, twelve months later…ready for the next steps – 'are you able to support them in getting out' – they now want to go to a group, they now want to access something further. (SP LW 2)

There was a perception that nature-based projects were well represented in the directories and that there had been a rise in demand (SP LW 1). However, one of the social prescribing managers thought that it could be easy for small nature-based projects to 'slip under the radar':

> for some of the small ones to be linked in with social prescribing service in their area and to make themselves known, because some of the very small ones, unless they're well publicised and unless we can find them easily on the internet by searching, they may, on some occasions, go unnoticed by the social prescribers. (SP LW 2)

In one social prescribing service, the manager explained how the Community Development Officer had been actively seeking out nature-based community organisations in the city and its environs:

> a member of our team…who's fantastic and very passionate about nature-based interventions and green spaces and encouraging people to do things outside, went out and collected all this information for us, which has been really, really valuable, and she comes to our team meetings every month and shares with people. (SP LW 3)

Support for community groups

> My worry is that NHS England are funding GP practices to deliver it [social prescribing] and that really concerns me because it doesn't always mean that they understand and want to work with voluntary sector and community organisations. (Commissioner 3)

A number of the social prescribing service managers discussed funding for community development activities, noting that "…funding for social prescribing is stopping at link workers and is not necessarily filtering down to the community organisations that are providing the prescriptions" (SP LW 3). There was a strong interest in how to support community groups receiving referrals and some had funds to support community development:

> so if there is a need in that area to set up a small group, they do have pots of funding to do that. But they do tend to try and link into services that are already there to try and sustain a community group that's actually there. (Commissioner 3)

One social prescribing service in particular, had a 'small grants fund' that was funded by the council specifically for third sector organisations, who were eligible to apply for up to £8,000. This could be used either to start a new group or extend existing work. The Link Workers could identify gaps in a particular locale and flag that up with the manager, and then when the funding rounds opened, there would be themes for the applications that would seek to fill identified gaps. Community groups were also welcome to present their ideas and there had been grant applications for nature-based activities. The importance of sustainable funding for community organisations was summed up well by the social prescribing co-ordinator:

> just hope the funding continues to grow…that's funding for the VCSE sector or sustainable funding to allow them to put on activities, allow us to have more options to refer clients

> to…And I think with clients, what they need is long-term services, long-term groups. If they've only got funding for twelve weeks, 'we'd like you to go to this but we don't know if it will continue after'…that's probably going to be a barrier straight away and that person might not go…a solidly funded VCSE…would be ideal growth for social prescribing. (SP LW 4)

Providers

The community providers of nature-based activities are clearly vital in the delivery of nature-based activities and this section explores their beliefs in nature promoting wellbeing, their skills and capacity to design a nature-based activity, their access to natural environments and knowledge of social prescribing.

Personal beliefs in nature promoting wellbeing

Many of the providers were passionate and had strong personal beliefs in the value of nature promoting wellbeing and improving mental health, and spoke about it from their own experiences. However these views may not reflect some of the barriers and more nuanced views of the challenges reflected in the previous sections about health professional and link worker perspectives:

> I strongly believe in the healing capacity…holistic improvements and mental health improvements of being out in nature…we are part of nature…and for myself nature has always been my solace, it helps me to keep my mental health wellbeing and keep well enough in myself. (Community 5, Devon)

> I, personally, I benefit greatly in my own mental health and my own physical health and wellbeing from being outside, working outside. (Community 3, Newcastle)

> I know it instinctively in myself, so there's just a completely anecdotal, unsupported, un-evidenced, unexplainable…I feel better when I'm outdoors. (Community 15, Newcastle)

A few of the providers made it clear that nature and connecting people with nature was the ethos of their organisations:

> the whole ethos [of] what we are trying to do here is to connect people with nature and introduce practices of mindfulness to support people's health and wellbeing. (Community 1, Devon)

One nature-based activity provider who lived on an organic farm, described how his therapeutic work brought together his interests in nature and child mental health:

> I've always been interested in working with nature…I was always very concerned about…organic food and sustainability generally…our strapline is 'Cultivating sustainability in lives and land'. (Community 6, Devon)

Interestingly, he pointed out that the agency referring young people did not support nature-based therapies and therefore, his offer was based upon a therapeutic approach and 'nature's not the feature':

> you can do attachment-based work in nature, you can do sensory work in nature…there's no kind of conflict particularly, but we can't sell it on the basis of nature-based therapy. (Community 6, Devon)

This provides some context as to why these nature-based providers were committed to providing activities to help improve the wellbeing of those with mental ill health. However, some may be

better able to recognise and adapt to the concerns of people in other parts of the social prescribing system.

Skills and capacity for designing a social prescribing offer

All of those delivering nature-based activities sspoke of their skills and outlined the training that they had undertaken to enable them to deliver their programmes. Some of the training was nature-based and examples include Forest School training, training with the Association of Nature and Forest Therapy Guides, eco-psychology training, and training for Health and Wellbeing Walks. Other training mentioned was counselling, Mental Health First Aid Training, and one nature-based activity provider had taken a university course, *Mental Health Still Matters*. Some were professionals – teachers and psychotherapist – with many years of experience of working with specific groups of people. Many of them also spoke of their 'passion' for what they were doing and their 'love' for nature:

> we feel very passionate about supporting young people to succeed…in their lives. We both share a passion for the outdoors and recognise its significance. (Community 2, Bradford)

In terms of mental health expertise, some were keen to point out that their expertise did not extend to dealing with severe mental health issues:

> we're not qualified to treat people with severe depression or severe or complex issues. (Community 8, Bradford)

> we're looking at more mild mental health issues, we really aren't trained to have people who have really high needs. (Community 10, Bradford)

Many of the providers were small organisations with one or two people delivering the programmes which could also mean that they could not provide the appropriate levels of support for some people. This potentially indicates a lack of fit between the people Link Workers (and others in the system) are seeing and referring, and those the providers feel able to support. One woman, who worked with one other colleague, explained:

> we won't work with anyone who is of harm to others, unless that's something that we can talk through with some other agency, and with the person themselves, to be sure that's not something which would be a possible risk to them or others. (Community 5, Devon)

The capacity to deliver an 'individual kind of intervention' was discussed by one of the leaders at a community garden, who, with two other colleagues, could be working with between 12 and 20 volunteers at the garden on one day. Thus there was little possibility of running smaller, even one-to-one sessions, and they often relied on other longer-term volunteers to help support others.

> it's hard with our funding model and the way that we work to increase our staffing levels so we can offer more – a higher level of support to those that need it and smaller groups. (Community 3, Newcastle)

Access to Natural Environment

All of the community providers had access to the natural environment and these included a diverse range of green spaces including public parks, allotments, farms, forest/woodlands and community gardens. Some of those delivering nature-based activities reported very positively on their access to the natural environment; for example, one provider had a licence with a farm estate and an agreement with the Woodland Trust to use certain woodlands (Community 14, Devon). Others had less positive experiences and one found that the Council had not delivered on the promised

community asset transfer and were considering building on the community garden site. This had resulted in a difficult situation for the organisation, particularly in relation to securing funding (Community 13, Newcastle).

Knowledge of social prescribing

There was a wide variation in knowledge of social prescribing among those delivering nature-based activities, from little or no awareness of what it was to being part of a social prescribing system. There were also those who were aware but were not connected to Link Workers or Community Connectors and felt that they did not need it. One nature-based activity provider described how her local town had a 'strong social prescribing ethos' and how her organisation was linked with the community connectors who were aware of the courses. She was actively promoting the course to all GP surgeries in the area and to different health professionals and practitioners and was networking at local forums such as the Local Nature Partnership. While it was "easy to understand the links and where it all joins up' in one part of the county, it was not the same for another area that she was planning to target:

> social prescribing in that area hasn't quite taken off yet, it's quite difficult to figure out what GPs are really taking this on board, what ones are linking in with community connectors, so that's one's a little more challenging. (Community 1, Devon)

Some of the providers described how there had been unsuccessful attempts to be part of a social prescribing system in the past. One of those delivering nature-based activities spoke of a project specifically for people with mental health support needs which had been commissioned by a local Clinical Commissioning Group (CCG) but there had not been many referrals and he felt that that there "was a real problem getting through to the actual GPs...who were supposed to be doing the prescribing" (Community 3, Newcastle). Another had been successful in a tender with the city council but had never had any referrals, and when she met with the commissioners "…they said it would be very unlikely that we would have any referrals due to cuts in funding" (Community 5, Devon).

A number of those delivering nature-based activities described how they had attempted to contact GPs directly to promote their nature-based projects and felt that they had little success. Some tried 'putting leaflets out to GPs' (Community 5, Devon) and one described how she had gone to a GP surgery but had still found it difficult to recruit:

> we worked in a local doctor's surgery on a Friday afternoon in the waiting room and talking to people there and encouraging them to join a woodland wellbeing group that we had running on a Friday afternoon. (Community 8, Bradford)

For her, the problems in linking with health professionals was because 'we're not speaking the same language':

> they're busy doing their medical stuff and we're busy doing our community based stuff and we're not speaking the same language, they're not coming out to meet us. They're not showing an interest in what we do, you know, they *say* they want to encourage their patients to get out more and…be more active outdoors, to ease the strain, the burden on the health service, but it's just talk, it's not happening. (Community 8, Bradford)

Unfamiliarity with the nature-based activity provider's offer was a challenge experienced by one woman who did forest bathing. She had participated in a pilot social prescribing project but she did

not have GP referrals and found that she was unable to put promotional leaflets in GP surgeries. She believed that this was because it had not 'got an NHS stamp on it':

> it's that they weren't sure about it and so they're not going to send people out on it. Yeah, we come back to that old chestnut, it's like, what's this weird thing, hippies hugging trees in the wood. Whereas, you know, things like Tai Chi are a little bit more, they're known, aren't they, now. When they first started everybody was like "What?" (Community 14, Devon)

Another nature-based provider who had also tried to work with GPs believed that "…they're just so very, very busy" and that it was "…too complicated liaising" with different organisations (Community 9, West Yorkshire & Harrogate).

A few of the providers were not clear what social prescribing actually involved:

> I attended some social prescribing forums and discussion groups…and everyone is saying 'Yeah, this is a great idea' and then it doesn't seem to have the traction or it doesn't seem to know where to go…*I kind of know what it is*, and I suppose from my position without fully knowing about it, I get concerned in a way that social prescribing could be a sort of catch-all for anyone who could offer any activity for young people's wellbeing, you know what I mean?" (Community 6, Devon)

> that term has been bandied around so much from the moment we got started…people were saying 'Oh social prescribing, social prescribing', and to begin with we were like 'Yeah, yeah, that's great' and we kept investigating it and not getting anywhere and it was really unclear what people meant and what that meant in terms of the practicality of – we want to work with these people, to work with them in this way and we need this much money to be able to do that. And it's only just started to come to light that it's really vague to everybody! (Community 15, Newcastle)

There were those who were excited about the idea of social prescribing and thought it would bring increased recognition of the benefits of their projects:

> I know and recognise the benefits of projects such as what we offer…and I think it would be wonderful if, as I believe is happening, that more and more of those will be the things of the present and the future. (Community 5, Devon)

Some could see that a Link Worker would solve their problems of communicating with health professionals, as put by this nature-based provider, "…we don't quite know what the GPs are wanting so a link worker would, they would understand what we could do and understand what the GPs needs, so that would really help" (Community 9, West Yorkshire & Harrogate).

Others indicated that since self-referrals were working well for them, being part of social prescribing system was not a current priority for them:

> it's maybe something to think about but at the moment the promotion and communications that we're doing to the local community seems to be sufficient really (Community 4, Bradford);

and another nature-based activity provider, who was part of a social prescribing system, noted that self-referral was still acceptable:

> we've tried not to medicalise what recovery is, so it can be anyone that self-identifies as having mental health challenges…and that's OK, for us, we don't need a referral from a GP

> or a psychiatrist or anything…it can literally be anyone that presents themselves who are saying 'Yeah, I experience anxiety, I get really anxious' or 'I experience depression' and that's OK for us without medical backing. (Community 1, Devon)

Social prescribing activities

Types of activities

The types of nature-based activities provided by the community organisations in this study were horticultural therapy, community and allotment gardening, forest and woodland therapy, and conservation and habitat management.

Nature as a 'different' space

Many of the providers saw nature as a 'space' in which therapeutic activities could take place. It simply could be a 'different' space, opening up new possibilities:

> there is something about doing some work in a very, very different setting to what they are used to…I think taking a group of girls away from a familiar setting and placing them in a different setting creates a newness and expectancy for doing something different and working together in a different way. (Community 2, Bradford)

> and actually you can find a lot about yourself in what's going on around you, or find a lot about your place, because suddenly you're this small person in amongst these tall trees or these big open spaces…and you feel very different – we're creating this space where people can feel very different about themselves. (Community 10, Bradford)

Nature could be the 'other' space where people could 'let go' of everything and 'be in the moment' and 'be away', coming back with a 'new' and wider perspective on life. (Community 14, Devon)

Others regarded nature as offering a 'talking space'

> there's something very much about being in the outdoors, doing something, be it seeding or planting or cutting stuff back…or sometimes just sitting with a cuppa…where a person might *talk through their experience* and it's almost like that space and being in nature then, holds them and holds that in a way, that they can then move through that and then continue with what they're doing…it's a *very good space for talking therapy***.** (Community 5, Devon)

The notion of 'holding' was echoed by others and links to the idea of a 'protective space' and a 'safe space'. There was also the notion of 'letting go' and using nature metaphorically to let go:

> there's a lovely stream that goes down through the woods…and we all looked at it and how it goes along and thought about the fact that…all flowing water goes out to the sea, and how that can take away things. And then we thought of something that we wanted to get rid of and we picked a stick, just a small twig, and each of us tried to put the thing that we wanted to get rid of in that stick and then we dropped it and we thought…[it] was on its way out to the sea. (Community 10, Bradford)

Many spoke of the natural environments as a 'sensory space' and one referred to the 'sensory gym'; nature "invites movements" and "invites the senses" and "…it's unique in that [it] has all those levels of sense, bodily work and movement…and engages the whole person in a different way" (Community 6, Devon). This resonated with one nature-based activity provider's observation that people with mental ill health can be out of touch with nature and that "…they get out of touch with their body and they get out of touch with the wider world" (Community 12, Newcastle).

What is it about nature and wellbeing?

Not surprisingly, the providers were convinced that nature and the outdoor environment provided something unique for enhancing wellbeing for those with mental ill health. Many drew out different facets that – for them explained why nature was so effective for enhancing an individual's wellbeing. Some highlighted the nurturing and caring involved in gardening and horticulture:

> I think it's being outdoors, and it's the nurturing side of what horticulture is, that is helpful for somebody's wellbeing…you plant this dot of a seed, which looks like nothing, and within weeks it's a beautiful pink flower or purple flower…and you care for it…you've helped it to survive. Not only have you survived but *you've helped something else survive and thrive*." (Community 4, Bradford)

Perhaps taking this a step further, one woman spoke about how growth in the garden could reflect back to individuals their own personal growth:

> So that the garden that they helped to grow and their part within it, *almost that garden somewhere is a reflection of themselves*, all that beauty and growth, and people will often say that it feels like, it feels very homely, almost like that's where their family is. And that to me is an expression of…belonging." (Community 5, Devon)

Another felt that nature with its flow, cycles and rhythms could help individuals see themselves in a different way:

> I see people as more like nature…they are flowing and moving and shifting and some of the mental health difficulties are where people get stuck and fixed in an experience. So there is *an opportunity to learn from nature*, to kind of flow with our personal states*…nature is cyclical, rhythmical…you can relate to those natural rhythms and learn about yourself in a different way* – particularly, I think when people are driven by 'I should be this, I should look like this…I'm not good enough, I'm not 'this' enough' – those kind of pressures." (Community 6, Devon)

The constancy of nature was another facet of nature that a participant highlighted:

> what we are trying to do here is to find nature to be an ally, something *that's solid that you can rely on*…[for] people with mental health challenges…life is so up and down, day-to-day, hour-to-hour, and also people around you can blow in and out of your life in various capacities, mental health services, all of these things can come in and out and things can feel really unstable for people. So having nature as something to relate to, *it's a constant, it's always there.* (Community 1, Devon)

For another, it was the constancy of nature, with its patterns and processes that generated a sense of connectedness and ultimately, a sense of belonging:

> I think part of mental ill health can come from feeling very disconnected…and nature just doesn't have that…it's so accepting and ruthless and relentless in its kind of belonging, everything has a place. And I think people find that when they connect with nature, there's those sort of patterns and processes that go on regardless, that you just have to fit in and it does generate a sense of connectedness…seeds will germinate and grow, the seasons will come and the daylight will fade and those processes are massively reassuring and do remind you that you're part of it. (Community 15, Newcastle)

Approach to mental ill health and knowledge of people's health

As already discussed, some providers offered projects that were specifically targeted at mental ill health which could be explicit in the name such as 'Mental Health Improvement Project', and was advertised to organisations that worked and engaged with mental ill health. One of those delivering nature-based activities explained that the Mindful in Nature project at her organisation was developed to fill a gap in mental health services:

> there's low level and then there's very high level and then there's that bit in between, where people fall through the net of services, because they're not quite qualifying for the higher level stuff, the lower level stuff might not meet their needs, so they need something else…but then they're sort of left to their own devices…these people…still need something but maybe can't rely on NHS services because they're in demand and so overrun. (Community 1, Devon)

The majority of providers preferred not to be explicit that their offer was about improving mental ill health and did not highlight it during the activities:

> we call ourselves *a wellbeing approach, rather than mental health*, we're trying to move a little bit away from the kind of *clinical concepts of mental illness…but the labels*, I mean, there are so many people struggling with many, many levels of mental distress or emotional, social difficulties, and a lot of them don't fall into the essential categories of mental illness, particularly with children, there are many…difficulties which often…don't register as mental ill health, but are still huge challenges. (Community 6, Devon)

> we emphasise that the project is there to support them, to enable them to feel more positive about their lives and situations…*we don't generally mention mental health*, actually to the girls themselves…the work that we do…is partly around supporting them in their mental health journey, but we certainly don't emphasise that when we are speaking with the girls who want to take part. (Community 2, Bradford)

Language was important to many of the providers and they were keen to avoid 'labels' of mental ill health as "it might put people off" (Community 3, Newcastle). Having separate sessions solely for people with mental health support needs could introduce stigma and at a community garden, every effort was made not to "spell out to people" why they were there.

> everyone's a volunteer, we don't use the word 'service user' or 'client'…it's not supported volunteering, everyone is a volunteer…*if everyone is a volunteer then we don't need to…ask them exactly why they're coming,* or we don't need to say to someone 'You're coming here for your own benefit', it's as much for our benefit and helping the community…we find that *more empowering* in a way for people…and what we try and create within the group is a real feeling of mutual support…we ask volunteers to support other volunteers…so there's a *real feeling of reciprocity*. (Community 3, Newcastle)

Suitable activities targeted to need/demand

Different nature-based providers had different approaches to the delivery of their programmes and interventions. Some emphasised the need to be flexible and relaxed when working with people with mental ill health. One spoke of the importance of avoiding the need to achieve:

> it's very, very based on there being no pressure to do. So, for instance, on all our projects…participants arrive daily, like all of us, it's a continuum, isn't it, how we feel and people feel differently on the day or differently throughout the day, so…my job really

> importantly is to have that sense and understanding and listen to how a person is, the first thing we always do is, like, 'Hi, how are you, have a cup of tea' and then we suss out…what the person is feeling like on the day and what they want to do, what's helpful and what might not be…so there's never pressure to do. (Community 5, Devon).

In a similar vein, another nature-based activity provider described the flexible approach they had adopted at the community garden:

> we do take a very *flexible approach*. I've worked in other places where the day's much more rigid and that doesn't suit everybody. I find just being able to have a very flexible approach, people can arrive, they don't have to arrive at half nine on the dot. While we try and stick to…break times, people…stop and have a cup of tea whenever they want. It's sort of getting the balance between having real, meaningful work and structure and also then *giving people the flexibility to get what they need out of the day* and sort of fit in with that as well. (Community 3, Newcastle)

If a project was time-bounded – for example, the Mindfulness in Nature course was offered three times a year for nine weeks - then flexibility was perhaps less likely. Indeed, one nature-based activity provider described how flexibility could create problems and she believed that a 'need for boundaries' could help both those delivering nature-based activities and the participants:

> and the staff that we've had…have been flexible in other ways as well. For example, *people have come late and stayed late or come early and gone early*, but they've not necessarily had to put boundaries down around that. And I think sometimes *when so much of the session is flexible it's hard to then maintain some boundaries…we all need boundaries*, it's what helps us stay safe and to feel safe…if you don't have boundaries around that stuff what happens is in the afternoon session you've got people who came late in the morning, they end up staying and they want to stay for the afternoon, but then you've got afternoon people coming in and you end up over your numbers from a health and safety perspective" (Community 4, Bradford)

Funding issues for those delivering nature-based activities

There was a wide range of funders listed by those delivering nature-based activities and some examples include the National Lottery Reaching Communities, Greggs Environmental Fund, Garfield Weston Trust, Leaf Community Foundation Trust, Lloyds Bank Foundation, Adoption Support Fund and the Henry Smith Charity. Applying for funding was onerous and time-consuming for small providers:

> I have to, well, my evenings…keep applying for funding, so out of all the projects I run, they're all run on different funding streams, I apply for them in my own voluntary time. (Community 5, Devon);

and there were some that operated without funding:

> I find that whole paperwork thing – yeah, one level too far! (Community 14, Devon)

Others described how they had delivered their interventions at times for free:

> we've done it for free…at different points. So, we'll do the beginning of that and then look for funding…doing like a one-off session and then looking at whether we can fund something further. (Community 2, Bradford)

Some of those delivering nature-based activities had long term funders which could be both positive and negative for them:

> we're currently in the fourth year…and that's been great to have a…long-term funder who really…understands what we do and we can work with them and they can see what we're doing and how we're developing the project. (Community 3, Newcastle)

> …we're sort of at the end of the line with them [funder], 'cos they've funded it for so long that they probably can't fund it for ever and a day. (Community 4, Bradford)

Not surprisingly, a key challenge was that funding was often short term and impacted sustainability as noted by a commissioner:

> the voluntary and community sector struggle to keep the funding going, and they bid for small pots of funding, so sometimes a community group can last for six weeks or a certain specific period of time and then the funding's pulled. So the community group is not there anymore…they haven't got the continuation. (Commissioner 2)

When a nature-based activity provider could not sustain a particular project because of funding this could then impact on the mental health of the participants. An example was a project specifically for men with mental health issues who spent an all-day session on conservation work, doing practical tasks such as digging ponds and making terrestrial habitats for amphibians and reptiles. They explained that "it worked really well, it was very popular and we were having good numbers…people just stayed and stayed." However, the project ended after two years:

> purely because of funding. It was really gutting, actually, 'cos we did do what we could to get further funding and it just died because of funding. And…one of the issues that we've experienced in doing this work, is that people become quite reliant on it, and it becomes their thing to do…every Wednesday, it was part of their life…and they become attached to the other participants and the project leader and it's quite important for them emotionally and socially and we lose funding and they're left in the lurch. So, I think that's our only concern about starting, doing more projects like this is we do need long-term funding 'cos it's just not fair on the participants if we haven't got that. (Community 9, West Yorkshire & Harrogate)

> If the health service want this [social prescribing] to happen, they need to put some of their money behind it in order to support the organisations who will actually deliver it. (Community 8, Bradford)

Benefit

> we do have success, it maybe doesn't work for everyone but the people that we do work with, it really does, we do see great benefits both in people's wellbeing and confidence, self-esteem, all these things which we try to measure. (Community 3, Newcastle)

All of those interviewed believed that the social prescribing of nature-based projects benefited those with mental ill health. How each thought about 'benefit' depended on their perspective. For example, one GP focused on cost effectiveness:

> because our social prescriber can see somebody for an hour and obviously that would be really expensive if that was a GP doing that; (GP 1)

but they also reflected:

> I did see at least one person who was presenting quite a lot and went into the social prescribing service and their symptoms resolved, basically through social interaction. You know chronic pain and that kind of thing. (GP 1)

Another GP agreed that it had reduced the impact of returning patients in their practice:

> I think it's an opportunity to reduce the recurrently coming back to see a GP with minor ailments for people who don't really know how to communicate with others or haven't trusted the system or don't know where else to go. (GP 2)

A number of the interview participants discussed the attempts to measure the beneficial outcomes of social prescribing. In particular, commissioners were concerned about demonstrating benefit and from an external evaluation of the social prescribing service in the CCG, a commissioner enthusiastically said:

> absolutely we have seen huge improvements in mental wellbeing scores using the Warwick Edinburgh scale, we've seen improvements in anxiety and managing self-care, we've seen improvements in our nationally validated isolation tools, that we've measured with people. (Commissioner 3)

Another commissioner noted that in evaluating the social prescribing service there were challenges and that it had been challenging to link the data to primary care data and hospital admissions:

> The initial idea was to link the data together to see if they had less admissions after intervention or they were actually managing the long term conditions better, but because of data protection…we couldn't track the patient through. (Commissioner 2)

The nature-based providers discussed the challenges they encountered in evaluating the benefits of what they do. Some of these were related to the mental ill health of the participants. For example, people may not complete a course and "…sometimes it's their mental health just deteriorates and they're just unable to come on the course and maybe they need more of a medicalised intervention" (Community 1, Devon). It may take some considerable time before providers see evidence of progression:

> progression is something that we aim for people, but some people – we do find it can take a real long time, sometimes to work – for someone to really benefit from coming here…I know other organisations move people on more quickly than we do. *We certainly work with people over many years sometimes, and some of our volunteers that I'm working with now have been here…five, six years…*we find we have the best kind of input or success with people when they come for a longer time. (Community 3, Newcastle)

However, the lack of 'progression' can be an issue for some providers

> historically we've had the *same people coming over and over again,* and the funding does dictate…a unique individual, so…although you might have a full session every week…*if it was the same people coming every single week,* it wouldn't give value for money…we only have six to eight people in one session. And we've only got two sessions a day so, it's difficult…you often feel stuck between *a rock and a hard place*. On the one hand, you've got to satisfy the *funders* and make it something they want to fund…but on the other hand, you're trying to satisfy the *client.* (Community 4, Bradford)

One of the commissioners found case studies very powerful – 'mind blowing' – and in the interviews there were stories that illustrated how social prescribing could work for individuals:

I see case studies of people who've really benefited from different activities. I know about one gentleman in particular had been very isolated for a very long time and it's actually quite a long case study but we supported him to get some fishing tackle, we supported him to get a membership to a fishing group and then he went back and done [sic] fishing that he'd not done for over ten years, and he just said he found it was amazing, really supported him with his mental health, really supported him just to get back on top. But without something like a social prescribing service he wouldn't have found the money for the equipment or the fishing tackle, he wouldn't have known where to start and he wouldn't have been able to afford the membership, so just getting him to where he needed to be was really helpful. (SP LW 2)

Key pointers for successful nature-based social prescribing

Drawing on these interview findings, the following key aspects may be important if nature-based social prescribing is to be successful: agency of the person; appropriateness of referrals; accessibility of interventions for those in need; link worker access to patient records; peer-support for link workers; and the availability of information about the nature-based activity. These are summarised below.

1. The **agency of the person** (in some cases the patient) was considered key by GPs, Link Workers and nature-based providers. It is important that the person is active in the social prescribing process and not a 'passive recipient of a prescription'. The person referred should want the service and both the Link Workers and nature-based providers noted that the time has to be right for the person, in order for the referral to be successful.

2. GP referrals to Link Workers should be **appropriate**. Link Workers described inappropriate GP referrals as often involving complex mental health issues such as psychosis and suicidal ideation. This issue was recognised by some GPs, Link Workers and managers of the social prescribing service, and various strategies had been developed to deal with it. One social prescribing service created a guidance sheet for GP practices, describing social prescribing, how to refer and for whom the service is suitable. In a GP practice, one of the GPs designed a leaflet using a 'traffic light' approach of red, amber and green to indicate levels of mental ill health and the appropriate actions to recommend. The Link Worker had used this with patients and felt that it helped her deal with the issue of inappropriate referrals.

3. Social prescriptions should be **accessible** to those in need. Both GPs and Link Workers agreed that the benefits of social prescriptions should not just be available through the GP practice. In one social prescribing service, referral to the Link Workers could be via a professional (e.g. nurse or a social worker) and also via self-referral. In those localities where social prescribing activities and services were already well established before the introduction of Primary Care Networks (PCNs), and where there had been integration, Link Workers believed that they had been able to extend their social prescription service and work with PCNs to receive more referrals from primary care.

4. There remain a number of models for how Link Workers (and other Community Connectors) are employed, their job description and role. The newly created Link Worker posts tend to be on lower grades and their job descriptions are quite generic, and adaptable by PCNs locally, potentially leading to uneven provision within and between case studies areas. Where there are Link Workers were employed before the recent Long Term Plan, these may

be paid at different grades and may have different skills and experience. Link Worker **access to existing patient record systems** ensured a smoother and more efficient social prescribing system. Those Link Workers employed by PCNs are NHS employers so do have this access, whilst others may not, depending on local agreements. Where Link Workers could not access patient notes and information meant that they did not have the 'full picture' that led to the referral and were unable to share information with the GPs in 'real time'. Timely feedback to GPs was clearly important but Link Workers noted that this added to the increased administrative burden, requiring emails to doctors with updates and then the administration team to update patient notes.

5. Link Workers, whether based in GP practices or in the community, all emphasised the importance of **peer support**. For those Link Workers that were part of a social prescribing service and could work from a range of bases, regular team meetings and 'little conversations' enabled peer support and information sharing. For those Link Workers based at GP surgeries, it could be more difficult to feel part of the practice team but peer support was still important and in one locality, the Link Workers had set up a virtual support group to 'bounce ideas around'.

6. Nature-based providers should ensure that **details of their provision** is known to the Link Workers. Many reported that they often found it challenging to understand the social prescribing system and were unclear on who they should communicate with in their localities. It is important that they understand that GPs have little knowledge of the nature-based providers in the community and on how to access them. Link Workers can also find it difficult to be up-to-date on community provision and without good promotion and internet presence, it is easy for small nature-based providers to 'slip under the radar'.

7. The expansion and funding of social prescribing by NHS England highlights the importance of **sustainable funding** for community organisations. Many of the nature-based providers found applying for funding onerous and time-consuming and when secured, it was often short term. The ending of a project could often have a detrimental impact on the mental health of the participants. Both the Link Workers and nature-based providers agreed that long term funding was essential for the continued growth of social prescribing.

6. Work Stream 4. Bringing insights together

In this section we bring together the findings from the different strands of this study to examine what we know about the:

- what social prescribing is and how it is practiced
- nature and extent of nature-based social prescribing
- the status of nature-based social prescribing
- the utility and effectiveness of nature-based social prescribing
- how, and how well, the current nature-based social prescribing system is working, including
    - the systems and processes of nature-based social prescribing
    - the degree and nature of information availability within the nature-based social prescribing system
    - funding and support for nature-based social prescribing
    - leadership and coordination of nature-based social prescribing
    - skills and roles in nature-based social prescribing
- the future of nature-based social prescribing
- evidence needs

Throughout the project, the ECEHH project team met weekly with each other and those working on the parallel MRC funded project on Nature on Prescription, to discuss updates, pick out and document notable themes and align ongoing work. In addition to curating a database of relevant projects and activities accessible to the project team for future dissemination (including all those who have contributed information to the project), the team have met with relevant researchers across the University of Exeter and have built links across the wider South West to this end.

This chapter represents a synthesis of the results of the previous Work Streams.

What is social prescribing and nature-based social prescribing?

As defined earlier social prescribing consists of a process of linking individuals from primary care and other services, both public, 3rd sector and direct self-referral to social or community based activities or resources which have the potential to improve health and wellbeing. These pathways expand the options available to individuals who have complex social needs as well as medical, by connecting people to community resources, information and social activities, as well as linking people to a range of statutory and non-statutory agencies.

Given social prescribing requires multiple organisations, and its implementation is dependent on local contexts and systems, placing firm boundaries around the components or pathways is often unhelpful. Terminology is mixed, roles are titled differently and the whole landscape is rapidly expanding and developing. As such, we have used the definition above to capture what would be considered social prescribing in most instances, and we define our terms below for clarity.

- Pathway – the network of relationships that form the experience of the individual as they go through services, from initial conversations through to whatever activity they undertake.
- Activity – the 'intervention', 'organisation activity', or simply the 'thing' that is prescribed; this could be debt advice, art therapy, exercise, or for this project nature-based activities.
- Social Prescribing – this term is widely used, and different groups and organisations differentially use it refer to either, or both of the things above. In this report we use it to mean both the pathway and activity.
- Referrer – often a GP, but can also be other health professional, VCSE representative, or sometimes the individual themselves (self-referral).

- Link worker – These roles 'link' people from the referrer to activity, and have different names but we use link worker for any role that performs that function (i.e. not necessarily the PCN-funded posts).

As noted in Chapter 2, social prescribing is typically described as linear process of a patient passing via a referral from a health care specialist to a link worker and then to an activity or resource in the community, of which nature-based social prescribing is one option available in some areas. However, this study has demonstrated that social prescribing, and nature-based social prescribing within that process, is far more complex with many interdependent actors, systems, processes and events. Social prescribing should be considered an umbrella term, under which a great variety of different approaches, new and pre-existing activities, and intentions have gathered. We have found that there are a greater number of actors and institutions who make the 'referral'. In addition to primary or secondary care, these include social care, educational institutions and 3rd sector organisations. It is not always the case that a link worker is the intermediary, though typical in the cases we reviewed. The individual may also join, or self-refer, themselves to an Nature-based social prescribingactivity. The activities offered are similarly varied, delivered by a range of different organisations, for different purposes and using a variety of different approaches, some of which are specifically therapeutic, others are used with the aim of develop skills, resilience or to provide respite.

Figure ***8*** (p. 124) is a basic and simplified illustration of the four key pathways found in the majority of the social prescribing process we encountered (the ordering does not suggest frequency of use).

- Patient pathway A: Primary care or another service, usually public or 3rd sector refers an individual to a link worker, community connector or similar role. The link worker works with the individual to identify a suitable community-based resource. The individual receives a referral to the community resource. The relationship between the link worker and individual may be on-going in some models.
- Individual pathway B: Primary care or another service, usually public or 3rd sector, refers an individual to a directory of social prescribing opportunities available. The individual, potentially supported by the health professional, accesses a suitable community-based resource. The individual receives a referral to the community resource.
- Individual pathway C: The individual accesses the social prescribing system through direct contact with a link worker, community connector or similar role, bypassing the health or other professional referral. The link worker works with the individual to identify a suitable community-based resource. The individual receives a referral to the community resource. The relationship between the link worker and individual may be on-going in some models. There are ambitions for a greater number of people to reach link workers directly without going through the health or other services.
- Individual pathway D: The individual accesses the community-based resource directly with no direct referral through the health system or via a link worker community connector or similar role. There are ambitions for a greater number of people to reach the types of activities referred to through social prescribing without going through the health or other services.

Typically the key actors are the 1) the individual; 2) GP, primary care, other health and care professional or institution; 3) the link workers, community connectors etc. or those providing services to assist that function (Elemental, Simply Connect); 4) social prescribing delivery providers; and 5) the intermediary organisations (e.g. LNPS, VCSO coordination bodies). The green arrows represent key communication pathways between actors within the system.

This study has demonstrated that, for social prescribing to be effective, a wider number of systems and processes, and infrastructures are likely to need to be present and functioning. Figure 9 (p. 125) illustrates some of the varied factors which contribute to effective social prescribing and nature-based social prescribing specifically.

We return to Figure 9 later in this section, when we consider factors supporting successful and effective social prescribing and, specifically, nature-based social prescribing.

Figure 8: Basic model of the nature-based social prescribing for mental health system

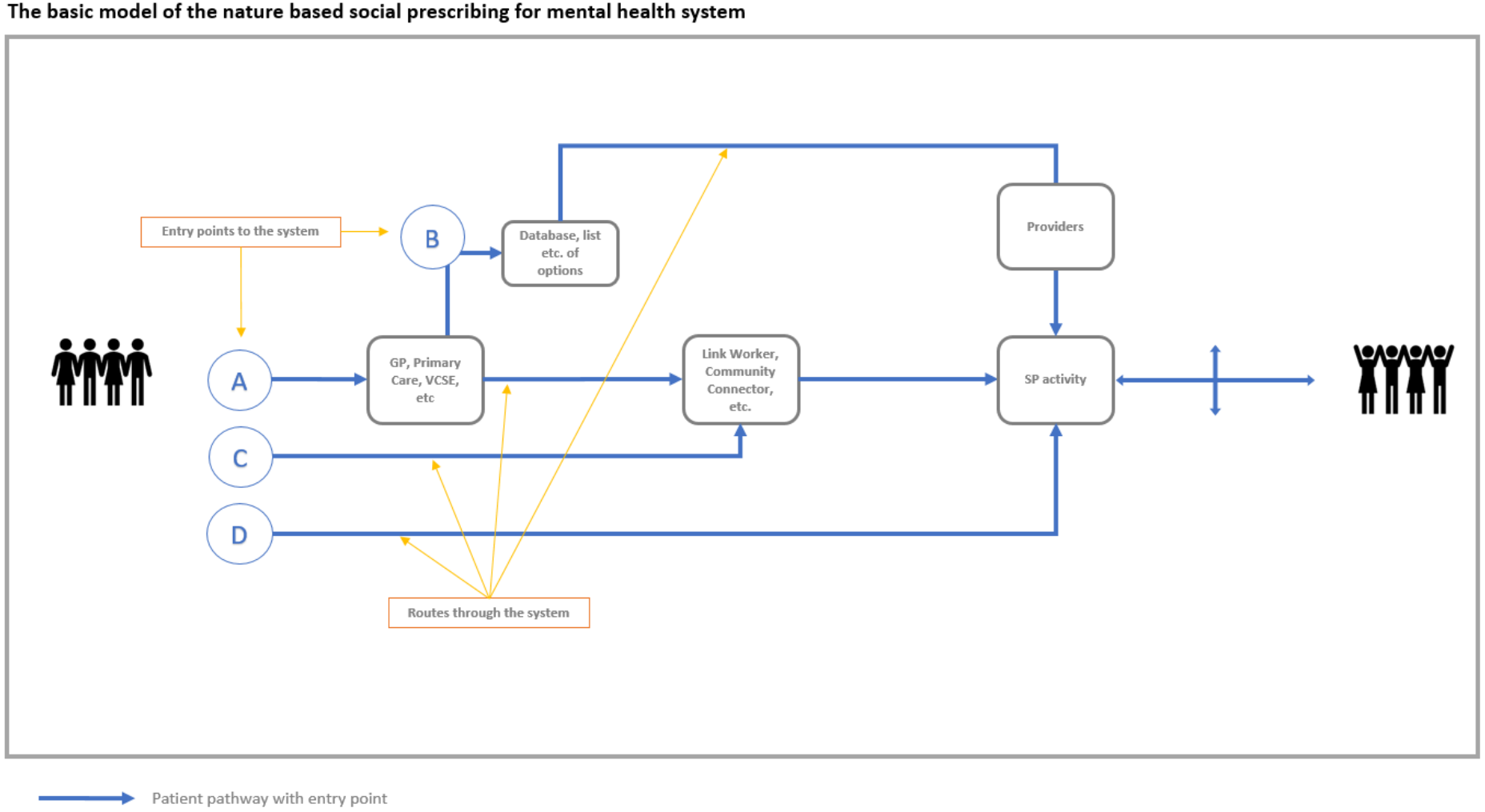
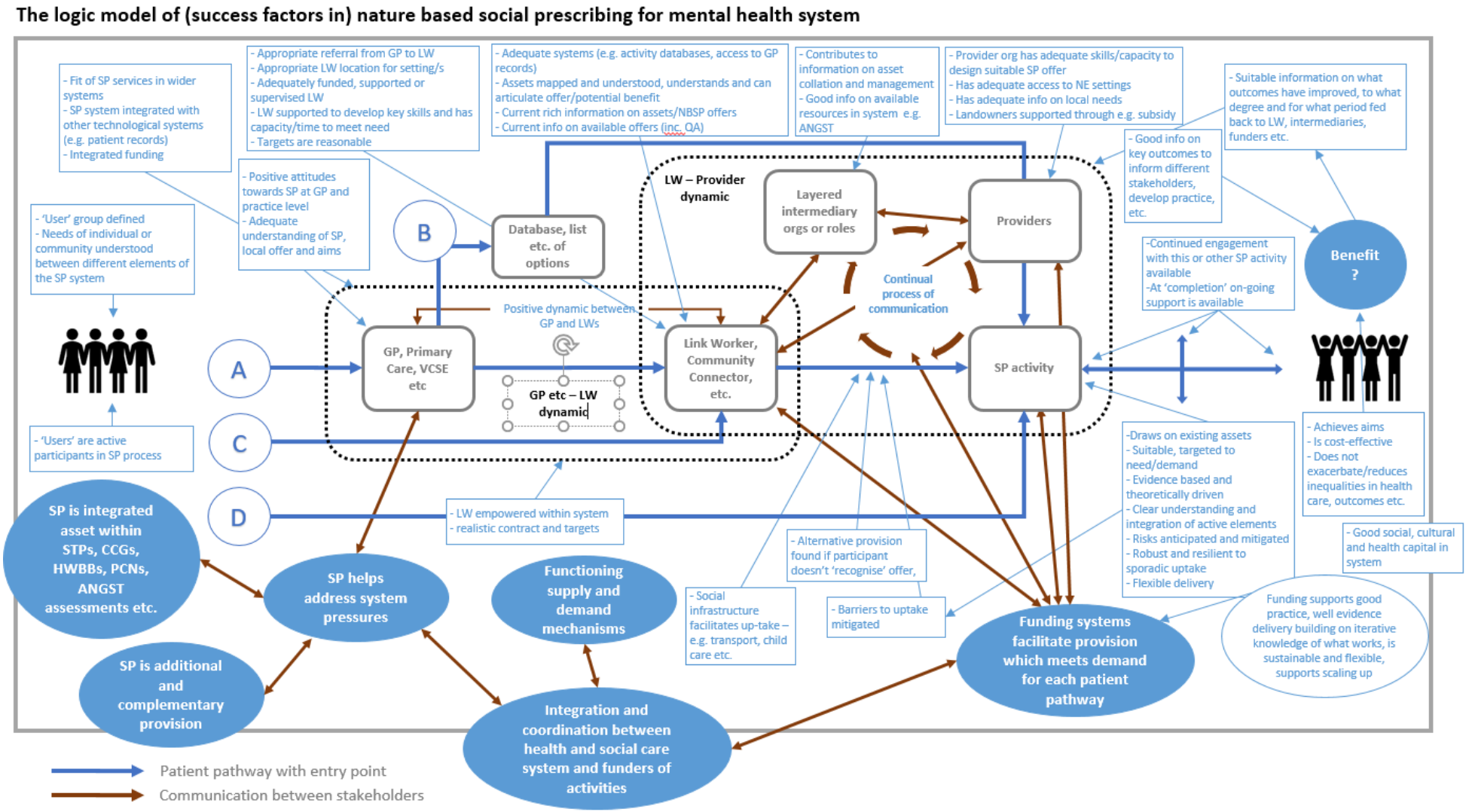


Figure 9: Logic model of (success factors in) nature-based social prescribing for mental health system.



The extent and nature of nature-based social prescribing delivery

Gaining a reliable picture of the extent of Nature-based social prescribing across multiple areas is challenging. There is no registry or nationwide coordinating body that collates such information. The plurality of funders and delivery bodies further complicates efforts to gauge current levels of activity. Despite the multiple strategies we used to collate this information we are likely to have only captured a partial snapshot of provision.

Accounting for the fact that we were unable to systematically assess provision between our four case study areas we found what appears to be wide variation in the amount and nature of delivery. Some areas, such as rural Devon appear to have better provision, than other areas such as in the North East appear have lower levels of provision. Across our four areas, we found that:

- Nature-based social prescribing referral bodies include primary care, mental health services, social care, and self-referral as well as education, housing organisations and job centres.
- Nature-based social prescribing providers are broad and include (but are not limited to) mental health and environmental NGOs, social enterprises, community interest companies (CICs), local councils, NHS trusts, and private therapists. Often projects are collaborative between multiple organizations.
- Most nature-based social prescribing activities are targeted at adults.
- Some nature-based social prescribing are designed as therapeutic, others to promote resilience, while others are to provide enjoyable experiences for people with such mental health conditions. Some nature-based social prescribing include therapeutic aspects such as formal counselling or therapy, others include other intervention components, such as skills learning or creative activities.
- The mental health conditions that the nature-based social prescribing target depression, anxiety and other common mental health disorders. Some programmes are non-specific in the terms of the mental health conditions to which they relate.
- Some providers offered projects that were specifically targeted at mental ill-health which could be explicit in the name such as ‘Mental Health Improvement Project’, and was advertised to organisations that worked and engaged with mental ill health. The majority of providers preferred not to be explicit that their offer was about improving mental ill health and did not highlight it during the activities. Language was important to many of the providers and they were keen to avoid ‘labels’ of mental ill health as “it might put people off”.
- Nature-based social prescribing tended to be offered to people experiencing social isolation, loneliness and anxiety. However, link workers report that they will take referrals for people with any need. Many referrals had levels of complex need. The providers of nature-based social prescribing were more focused on providing services for people with mental health challenges and to address general wellbeing.
- Whilst it is not always clear, it isn’t universal for environment-focused NGOs to formally include mental health professionals within project structures and vice-versa (Section 4). Many nature-based social prescribing programmes are not necessarily informed by professional mental health practice (Section 5).
- The natural environment could be used instrumentally within the programmes or it could be a setting or context.

- Most nature-based social prescribing interventions are short term, supported by project funding from bodies such as Big Lottery, Heritage Lottery Find, People's Postcode Lottery. There was some evidence of commissioned models, however these are hampered by a lack of clarity regarding the likely/expected outcomes and the time frame any outcomes might manifest.

How well is the nature-based social prescribing system working?

Is nature-based social prescribing recognised as a legitimate offer?

The attitudes of GPs we interviewed towards to social prescribing were generally positive. However, it should be noted we were able to talk to a relatively small number, potentially those more motivated to discuss social prescribing because of those positive attitudes. We were told that positive attitudes are not universal and some GPs do not see the value of social prescribing, do not think it's the right approach to address complex health, social and/or material challenges and do not want to refer their patients. Even the GPs we talked to argued that that what makes a difference to people's quality of life and their health outcomes is their social situation and their mental health, which in turn helps them manage their condition and keep themselves healthy. Social prescribing, and specifically nature-based social prescribing activities, were considered to *contribute* to achieving this and were not considered a panacea.

Like all social prescribing offers, there is some evidence that the public do not consider it to be a legitimate medical referral. This may be especially the case in the context of chronic underfunding of mental health services, with a non-medical referral perceived to be a 'cop-out' and failure to provide more accepted treatment options. This is likely to affect both uptake of referral but also the effectiveness of the programme itself. However, we were unable to identify much evidence that revealed patient or user perspectives.

The individual (in some cases the patient) is at the heart of the social prescribing system and can access the social prescribing activity by means of a referral from a health professional such as a GP to a Link Worker (or Community Connector), by self-referral to the Link Worker, or self referral directly to those delivering nature-based activities. Despite the variety of pathways, we heard, from both link workers and the nature-based providers, that the time has to be right for the individual and, for the referral to be accepted and successful, they must have agency and be engaged with the process. The presentation of the referral is also considered to be important; one GP discussed how he avoided using the word 'prescription' and stressed the importance of working with the individual and understanding their needs.

What is the demand for nature-based social prescribing?

There appears to be significant demand for nature-based activities offered through social prescribing systems. The use of nature is referenced in many high-level policy and strategy documents. A number of large-scale funders have and currently are supporting nature-based activities, 3rd sector orgs have made explicit reference to integrating nature-based social prescribing into their core activities, and we heard that link workers are keen to refer people to nature-based social prescribing. Many (but not all) of the providers we spoke to reported that there is clear demand for nature-based social prescribing. However, interest at the referral body and link worker level is patchy and differs between areas, with greater demand in some areas, such as Devon and the South West, perhaps where provision and demand have developed in tandem.

What is the capacity within the nature-based social prescribing system?

Due to the lack of coordination, fragmented funding system, and challenges of communicating with the diffuse system we were unable to gain a complete understanding of the capacity of the nature-based social prescribing system. As noted on p.126 above in the section detailing the extent and nature of nature-based social prescribing delivery there is a huge variety in the number of actors and approaches and between areas. Despite this there appears to be significant amounts of delivery underway, or at least available.

The level of demand appears to pose challenges at multiple points in the social prescribing system. In one practice it was clear that the GPs referred so many patients to the Link Worker that she was overwhelmed with referrals. The demand was also challenging for delivery organisations. Many of the providers were small organisations with one or two people delivering the programmes which could also mean that they could not provide the appropriate levels of support for some people. The capacity to deliver an 'individual kind of intervention', the ideal, was discussed by one of the leaders at a community garden, who along with two other colleagues, could be working with between 12 and 20 volunteers at the garden on one day. Thus, there was little possibility of running smaller, even one-to-one sessions. The level of demand also meant that some organisations reported relying on long-term volunteers to help support others.

Coordination of supply and demand

We found that currently there does not appear to be a process through which demand (e.g. for services relating to particular mental health need) can be matched to supply (e.g. nature-based social prescribing offers). We found that there is only local, ad hoc, coordination of demand and supply in the social prescribing system as a whole, with specific evidence for dysfunction relating to nature-based social prescribing (see interviews in Section 5). In the interviews, we heard that some small-scale providers struggled to identify what provision is required by the system.

In particular we found little evidence of coordination of demand and supply in social prescribing via the funding system, other than at a very high level (e.g. that there was an apparent demand for the provision of nature-based activities that were intended to promote better health (including mental health, in particular populations to which funders responded). The reliance on 3rd party funders with potentially different goals to the health system (see Section 6) is a key challenge for the coordination of demand and supply in social prescribing, including nature-based social prescribing. This potentially creates disconnects between the needs of the health systems and the ability of the providers to anticipate and delver what is required.

There is some evidence at a (very) local level of interaction between, for example, Clinical Commissioning Groups and nature-based social prescribing delivery bodies to provide commissioned services for particular needs, including through small grants (see Section 6). However, in general the process is disjointed and ad hoc, in some cases relying on the perceptions of need from third party funders to drive supply (see Sections 4 and 6).

The mis-match between supply and demand may have contributed to low uptake of some funded services and, in some cases, conflict within the system. With, for example, new social prescribing offers duplicating and undermining established Occupational Therapy provision.

Whilst we are aware of efforts in some areas to coordinate nature-based social prescribing, such as the West of England Nature Partnership, in other areas there appears to be little capacity for coordination of nature-based social prescribing. The plurality and flux of the supply of nature-based social prescribing posed further challenges. In the interviews we heard that GPs indicated that they

can't keep up with local social prescribing offers (including nature-based social prescribing) in the community. Link workers also reported that they were challenged by the fluidity and amount of nature-based social prescribing on offer, as well as other forms of social prescribing, and that they struggled to maintain up-to-date information or what was or was not available at any given time. Significant time and resource is devoted to maintaining this information.

Leadership

At a national level the government, through the NHS and Defra have provided support for social prescribing and nature-based social prescribing respectively. The NHS is planning to fund link worker roles in PCNs, Defra has provided some support for the development of nature-based social prescribing (of which this project is a part). Natural England has also supported various aspects of nature-based social prescribing. At a regional level the NHS through CCGs and Local Authorities through Health and Wellbeing Boards and other bodies have supported social prescribing and nature-based social prescribing. From the no-governmental sector, as noted in the funding section, a variety of environmental and health NGOs have been vocal in their support for nature-based social prescribing and have integrated the practice into their strategy.

However, there is no recognised authoritative voice providing specific guidance on nature-based social prescribing at a national level. The Conservation Volunteers have taken an early lead in some aspects of nature-based social prescribing and in some local areas there are there is leadership developing (for example it the West of England Nature Partnership) but as of yet there is no single point of contact at a high level to coordinate activity.

Information availability and sharing

The mechanisms through which information is shared on individual nature-based social prescribing specifics (e.g. target population, mental health need suitability, details on delivery including frequency, duration and progression, and key expected outcomes) with the referral body (e.g. the link worker) could be patchy, *ad hoc* and in some cases may be insufficient to allow the link worker to make informed decisions about referrals (see interviews). Through the review of activity (Sections 5 and 7), we found that referral pathways were often not made obvious on project websites or materials and the articulation of the specifics of the nature-based social prescribing was very variable. There is currently no standardized way to describe the activity which includes information such as any active therapeutic elements, who it is suitable for, and intended outcomes. Without this information the link worker is making referrals without adequate information as to whether the activity is suitable. This may potentially result in appropriate referrals.

We also did not hear about any formal process or system for information sharing on the outcomes of nature-based social prescribing.

The interviews revealed that health professionals and link workers struggle to access and maintain knowledge of what nature-based social prescribing is available in their area (Section 5). Collating information on the activities available within an area was a significant part of the link workers role. One link worker reported having 'thousands of small community groups' in their directory (see Section 5). GPs indicated that they can't keep up with the range and flux of local social prescribing offers in the community. They also struggled with how to access local groups.

In one social prescribing service, the manager explained that they had a person working in a community development role connecting with community organisations and mapping what was available. In one area the social prescribing services went further and had funds to help supporting community development activities. In some areas there are developing systems of support, where

information on the availability of nature-based social prescribing offers is pro-actively shared with link workers. This appears to be associated with successful delivery of nature-based social prescribing. In other areas, the apparent lack of a supportive information sharing system may have contributed to the very low levels of nature-based social prescribing identified (see mapping of interventions).

The providers reported struggling to identify who to communicate with. These challenges can be compounded by 'not speaking the same language', lines of communication that are poorly developed, and by the plurality of different referral services within areas. We heard that providers of nature-based social prescribing wrongly targeting GPs in areas GPs delegated the receipt and collation of information on nature-based social prescribing to link workers.

The nature-based social prescribing referral setting and process

The context of the social prescribing actors (e.g. the link worker) was also found to be influential. Where link workers are situated – some are based in surgeries, some are on split sites, others are in the community – appeared to influence the functioning of the social prescribing system. Being situated in a primary are setting, for instance employed through and based in a GP surgery meant greater accessibility to the GP and the referred individual, and access to health records where employed by the NHS. In other cases, being based in the community was beneficial and appeared to have enhanced the likelihood of the individual coming directly to the link worker. Wherever they were based, easy accessibility of the link worker for the referred individual was emphasised to be key.

However, the rapid roll out and plurality of different referral actors, and even the different titling of ostensibly the same role created confusion and may have led to loss of opportunity. For instance, one GP was unclear as to how many Link Workers actually worked at his practices because of how the situation had changed since the introduction of the Primary Care Networks (PCNs).

However, in general the GPs described the referral process for social prescribing as being quite simple in practice with the completion of a referral form which was then sent electronically to the Link Worker or centrally to the social prescribing service "and then they will make sure they divvy them out to the correct Link Worker" (GP 3).

The experiences of the Nature-based social prescribing delivery bodies

Navigating the health and social prescribing system

Navigating the health system for non-health organisations and those delivering nature-based social prescribing is complex – often the systems are opaque, language difficult and entry points unclear. We heard in the interviews that there was a wide variation in the knowledge of social prescribing among those delivering nature-based activities, from little or no awareness of what it was to being part of a social prescribing system (see Section 5). There were also those who were aware but were not connected to Link Workers of or Community Connectors and felt that they did not need it. A number of providers described how they had attempted to contact GPs directly to promote their nature-based projects and felt that they had little success.

Further challenges arose for nature-based providers working across different health areas. Often different systems are in place with different points of contact and expectations. Even for those confident to engage with the social prescribing system it was "…easy to understand the links and where it all joins up" in one part of the county, it may not be the same for another area.

Establishing and delivering Nature-based social prescribing

We found that small scale providers struggle to gain a foothold in the social prescribing system. In addition to challenges of navigating the system, funding, the poor coordination of what is needed in terms of delivery, we heard that some providers 'slip under the radar' (Section 5) and fail to gain referrals. We heard in the interviews that a number of providers described how they had attempted to contact GPs directly to promote their nature-based projects and felt that they had little success.

Availability of resources

All of the community providers reported that they had adequate access to the natural environment and these included a diverse range of green spaces from public parks, allotments, farms, forest/woodlands and community gardens.

As noted in the introduction to this section, social prescribing is a system the success of which is dependent, to some degree, on wider infrastructure and on the resources of the participants themselves. In some areas the setting for nature-based social prescribing was remote from the communities they were serving, necessitating the provision of mini-buses as public transport was insufficient. We also heard that some nature-based social prescribing providers had had to purchase protective outdoor clothing as referees had no suitable shoes or clothing.

The funding system

As noted above there are a variety of different funding processes used to support nature-based social prescribing. These include project funding from bodies such as the Lottery funds, charitable funders, corporate funds (e.g. SITA) and some direct commissioning. Often local authority funding is considered to be piloting and is not designed to be sustained with commissioned activities in the longer term.

A key challenge for social prescribing, including nature-based social prescribing, is the reliance on 3rd party funders whose goals loosely align with national level priorities of the health system (e.g. the focus on better mental health) but not necessarily with local needs (see Section 5). As noted in the supply and demand section, this potentially creates disconnects between the needs of the health systems and the nature-based social prescribing provided.

Commissioned, results oriented models are hampered by a lack of understanding of what nature-based social prescribing is 'for', what the outcomes are likely to be, and in what time frame any outcomes might manifest.

The current model of funding also leads to short termism, has a focus on innovation, and allows for few opportunities to build capacity and scale up good practice. The repetitive and competitive project-based funding model is a considerable burden on nature-based social prescribing providers.

Despite the clear willingness of funders to support nature-based social prescribing activities some voluntary/ NGOs have struggled in the current austerity climate, and this has led to closures. Applying for funding was reported to be onerous and time consuming for small providers. We heard about some providers who, daunted by the paperwork, provided some services without funding. Whilst some providers had long terms funding others were reliant on short term funding which impacted sustainability. When a nature-based activity provider could not sustain a particular project because of funding this could then impact on the mental health of the participants.

The majority of health system funds for social prescribing are to provide link workers, very little is used to support delivery. There is some evidence that some health system delivery funders, including local commissioners, may not perceive of nature-based social prescribing as core (see

interviews). On the other hand, there is anecdotal evidence that those funders that were receptive have begun to suggest that it is not sufficiently novel (see interview data).

Skills and roles in social prescribing

We found varied levels of formal training in delivery of programmes and support for mental health issues. Some of the training was nature-based and examples included that offered by the Association of Nature and Forest Therapy Guides or eco-psychology training. Other training mentioned was counselling or Mental Health First Aid Training. Some of the providers were professionals – teachers and psychotherapist – with many years of experience of working with specific groups of people. However, in terms of mental health expertise, some were keen to point out that their expertise did not extend to dealing with severe mental health issues.

Through the review of activity, we found that, whilst it is not always clear, it isn't universal for environment-focused NGOs to formally include mental health professionals within project structures and vice-versa (Section 3). The interviews with delivery organisations also highlighted that many projects are not necessarily informed by professional practice (Section 5).

The interviews (Section 5) revealed that many of the providers were taking advantage of training opportunities relating to their practice. However, there was concern that current skill sets were not necessarily enough to deal with referrals with more complex health conditions.

State of current evidence, availability and use

The utility and effectiveness of nature-based social prescribing

In our review of the evidence we included 37 quantitative and 30 qualitative studies in the review from 57 papers (10 were mixed methods studies that reported both quantitative and qualitative studies of the same intervention) and one systematic review. The studies varied widely in terms of population (age, type of mental health condition and whether the sample was drawn from general populations, or people referred from health services, or in residential Mental Health units), interventions (type, duration and intensity) and type of greenspace used (forests, farms, mountains, gardens, the sea). Most evidence was about therapeutic gardening, wilderness therapy and care farms. A wide range of outcomes were also measures assessing wellbeing, quality of life, various psychological and behavioral outcomes, physiological and return to work.

Despite a large amount of research effort in this area, the quantitative evidence synthesis demonstrated that there is little robust evidence of effectiveness of nature-based interventions that could be offered through social prescribing, with, for example, few high quality, reliable RCTs available. There is limited evidence that nature-based activities can positively impact on depression, anxiety, mood and feelings of hope. The evidence base is limited by the plurality of different nature-based social prescribing. Whilst most activities can be classified as one of the key models of nature-based social prescribing (e.g. therapeutic gardening, care farming, conservation activities, walking/talking therapies, green gyms), within each of those models is considerable variation. Participants also varied in terms of mental health needs. Further, participants reach the programmes through a variety of different routes, not always recorded, factors we considered to be active in whether or not positive outcomes are achieved (see Figure 11 p. 139). This plurality has diluted the available evidence.

The lack of quantitative evidence may be due to a number of factors:

- Challenges of doing RCTs of complex interventions
- The activities are not effective in bring about change in mental health

- The ‘wrong’ outcomes were assessed
- The outcomes were assessed at an inappropriate time, either missing positive outcomes or assessing them too early
- A poor understanding of what the active ingredients of nature-based social prescribing are (e.g. whether it is the link worker or the nature-based activity, or both)

The qualitative evidence synthesis showed broad and wide-reaching perceived impacts from participants, including: increased knowledge and a sense of achievement with what they were doing, enjoying being physically active, and event tired out by taking part. The groups were important, generating a sense of belonging. Nature itself provided quietness and calm, away from the usual day to day living environments. Participants also found solace in nature as a “patient receiver” of their needs and symbolically in the rhythms of growth and renewal.

All of those interviewed believed that the social prescribing of nature-based projects benefited those with mental ill health. How each thought about ‘benefit’ depended on their perspectives. A number of the interview participants discussed the attempts to measure the beneficial outcomes of social prescribing. In particular, commissioners were concerned about demonstrating benefit. One commissioner noted that in evaluating the social prescribing service that there were challenges in linking the outcomes data to primary care data and hospital admissions. Providers were concerned about the burden of evaluation and suggested that it may take some considerable time before providers see evidence of progression.

Some of the providers we spoke to had strong personal beliefs in the value of nature promoting wellbeing and improving mental health, and spoke about it from their own experiences. Some of the providers were convinced that nature and the outdoor environment provided something unique for enhancing wellbeing for those with mental ill health. Nature was considered to be a safe space, talking space, different space. However, in some situations the role of ‘nature’ was minimised; one of those delivering nature-based activities reported that the agency referring young people did not support nature-based therapies and therefore, his offer was based upon a therapeutic approach and ‘nature’s not the feature’

Short term funding may reduce the likelihood of achieving positive outcomes to mental health. We heard in the interviews (Section 5) there is a risk that where providers could not sustain a particular project because of funding this could impact on the mental health of the participants.

The implications of the state of the evidence base

A poor understanding of the active array of ingredients of nature-based social prescribing is preventing the further development of effective practice. Similarly, a poor understanding of the value of value of nature-based social prescribing prevents meaningful comparison with other treatment or delivery options, and prevents full understanding of the value of environmental spaces used for nature-based social prescribing.

We heard in the interviews that recently increased interest in social prescribing may also have led to “research fatigue” in some quarters. This poses a challenge to meaningful interaction between academia and the practice community.

Continuing some of the points made in the Information Availability section on p. 129, we heard in the interviews that there is poor information availability on the effectiveness of different types of nature-based social prescribing available and how different forms of nature-based activity may ‘work’ and be beneficial. This paucity of information may also be hampering uptake and further development of good practice.

What is effective nature-based social prescribing practice?

By bringing together the information gathered for this study we are able to begin to better understand components of effective nature-based social prescribing practice at a system level (Figure 9 p. 125). We are also able to identify some of the fail points in a nature-based social prescribing system (Figure 10 p. 136). As has been noted elsewhere in this document social prescribing and nature-based social prescribing are complex, made up of arrays of interconnected and interdependent actors, processes and events, each element may have an effect on a) a successful process of referral and b) on mental health. By bringing together the evidence from the different strands of this study we have also indicated potentially active ingredients of the nature-based social prescribing process to facilitate the participant pathway (Figure 11 p.139). Further nature-based social prescribing, like any mental health intervention is not without risk and has the potential to do harm, understanding thus is crucial. We have therefore identified potential risks of nature-based social prescribing in Figure 12 (p.141).

The logic model of (success factors in) nature-based social prescribing for mental health system

Figure 9 (p. 125) is a logic model of success factors identified through this present research and drawing on other associated work (e.g. the MRC project, realist review (Husk et al. 2020)), in nature-based social prescribing for mental health system. The logic model illustrates the factors which contribute to successful process and outcomes.

It is structured using the simplified flow of a social prescribing process (see Figure ***8***) and includes the four primary pathways present in current social prescribing practice (see p. 124). The blue boxes and ellipses describe key factors and their implications.

We identified the following key factors which are likely to contribute to effective Nature-based social prescribing processes and outcomes:

- Coordination of social prescribing and nature-based social prescribing within wider systems of health/care/social provision, funding/commissioning meets wider system needs, nature-based social prescribing is additional and complementary to other services, nature-based social prescribing helps reduce/address wider system pressures
- Integration of nature-based social prescribing with other health/care/social information systems, for instance ability of link workers to access patient records
- Positive and receptive context, institutionally and societally – supportive and functional health/care/social context, patient recognition of option
- Appropriate referral from GP to link worker and onwards to nature-based social prescribing, referee supported throughout process
- Adequate information availability between stakeholders: link workers, for example, are adequately informed on the range and specifics of different nature-based social prescribing options available
- Clarity in aim and process of the nature-based social prescribing, of the beneficiary groups, and of ways in which they may benefit and how
- Nature-based social prescribing activity is evidence based and theoretically driven, clear understanding and integration of active elements, risks anticipated and mitigated, robust and resilient to sporadic uptake and potentially flexible delivery
- Provider organisation has adequate skills/capacity to design and deliver suitable nature-based social prescribing offer, has adequate access to natural environment settings, info on local needs, landowners supported to offer land through e.g. subsidy

- Flexible and sustainable funding options for nature-based social prescribing
- Adequate and functioning wider infrastructure enables access to nature-based social prescribing.

The dys-logic model of (failures in) nature-based social prescribing for mental health system

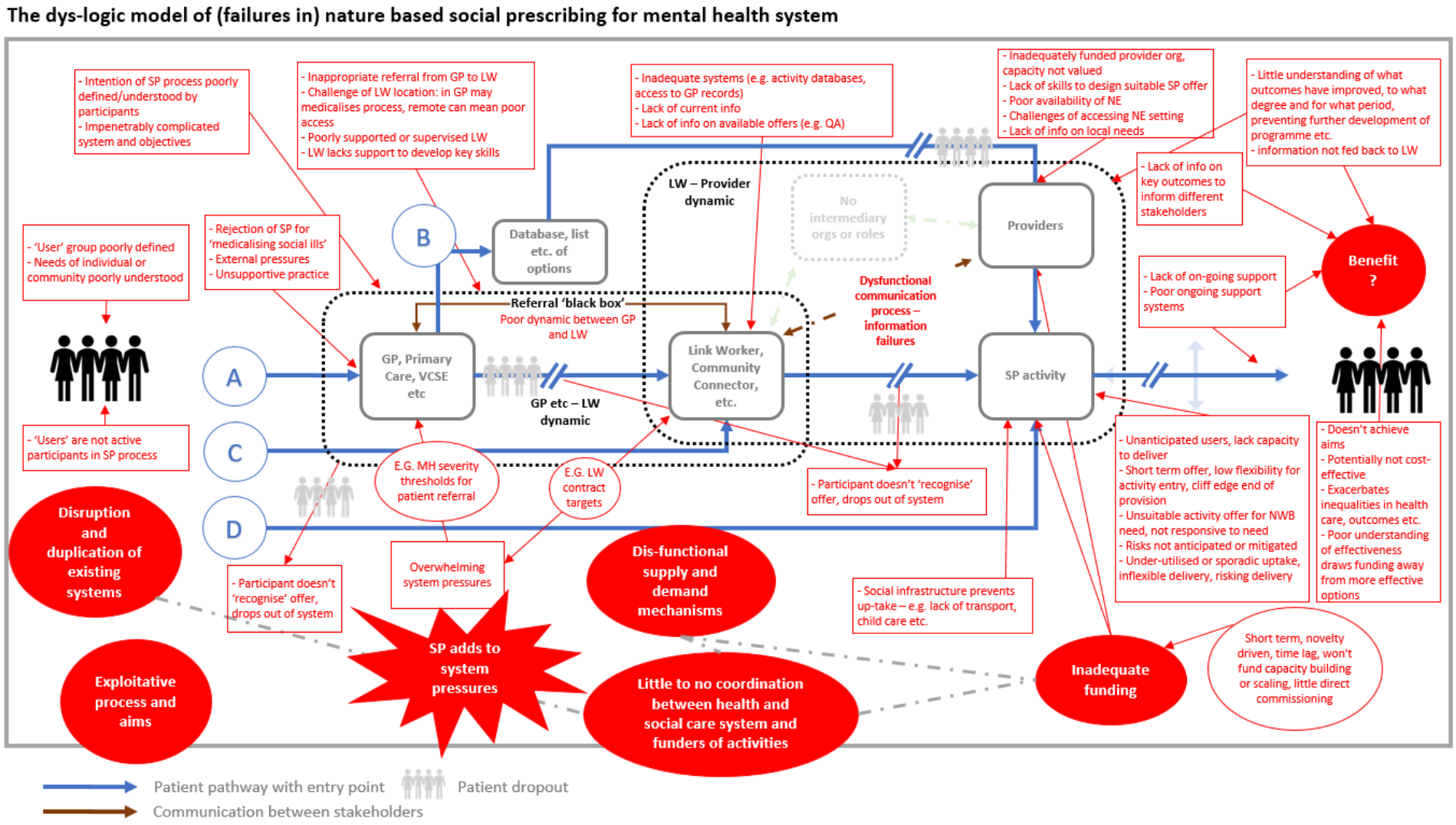
Figure 10 (p. 136) other associated work by the team (e.g. MRC project, realist review (Husk et al. 2020)), in the nature-based social prescribing for mental health system. A dys-logic model illustrates factors which prevent a system from functioning effectively. It is structured using the simplified flow of a social prescribing process (see Figure ***8***) and includes the four primary pathways present in current social prescribing practice (see p. 124).

The red boxes, star and ellipses describe key factors and their implications. The greyed-out figures represent key points in the system where users could drop out. The breaks in the blue pathway arrows indicate where the flow of the system could break down.

We identified the following key factors which are likely to contribute to failure in nature-based social prescribing processes and outcomes:

- Social prescribing and Nature-based social prescribing not recognised as legitimate offer by stakeholders
- Social prescribing adds to service burden, disrupts and/or duplicates provision or existing systems
- Inappropriate referral to link worker, poorly supported link workers, link workers lack key skills for referral, referee poorly supported through social prescribing process and drops out
- Dysfunctional communication between referral bodies and providers, inadequate information sharing on Nature-based social prescribing available in area, poor information to inform referral
- Poorly designed nature-based social prescribing, risks not anticipated or mitigated
- Unanticipated users, delivery organisation lack capacity to deliver, short term offer, low flexibility for activity entry, cliff edge end of provision, provision is under-utilised or sporadic uptake, inflexible delivery
- Dis-functional demand and supply system leads to over/under supply of specific offers
- Inadequate, short term, insufficient, difficult to access funding and providers exploited.

Figure 10: Dys-logic model of (failures in) the nature-based social prescribing for mental health system



The logic model of active ingredients of effective nature-based social prescribing for mental health

Figure 11 (p.139) illustrates likely active ingredients of effective nature-based social prescribing for mental health which are manifest at key points in the system. These factors were identified from across the evidence collated for this report. The model uses the structure of the simplified flow of a pathway A of the social prescribing process (see Figure ***8***, p.124). It is recognised and argued elsewhere in this report that, despite this figure being based on the simplified model, nature-based social prescribing is a system not a single linear process and that active elements are likely interactive and to some degree mutually dependent. Instead of factors being considered in isolation it is likely that 'arrays' of active ingredients contribute to effective practice.

Drawing on the current project findings as well as the results of the linked MRC project and the outcomes of a previous review by members of team about what works in social prescribing (Husk et al., 2020) we have identified some plausible factors which may be active ingredients (e.g. those that bring about change or are central to the functional process) of nature-based social prescribing within a social prescribing system. These include:

At the community level:

- Positive societal/ community perceptions of non-medical referral options

At the point of interaction with the GP or other initial referral body:

- Positive interaction between GP and patient where reason for social prescribing referral given and understood / accepted
- Additional support to address root causes or other health challenges provided

At the stage of interaction with the link worker:

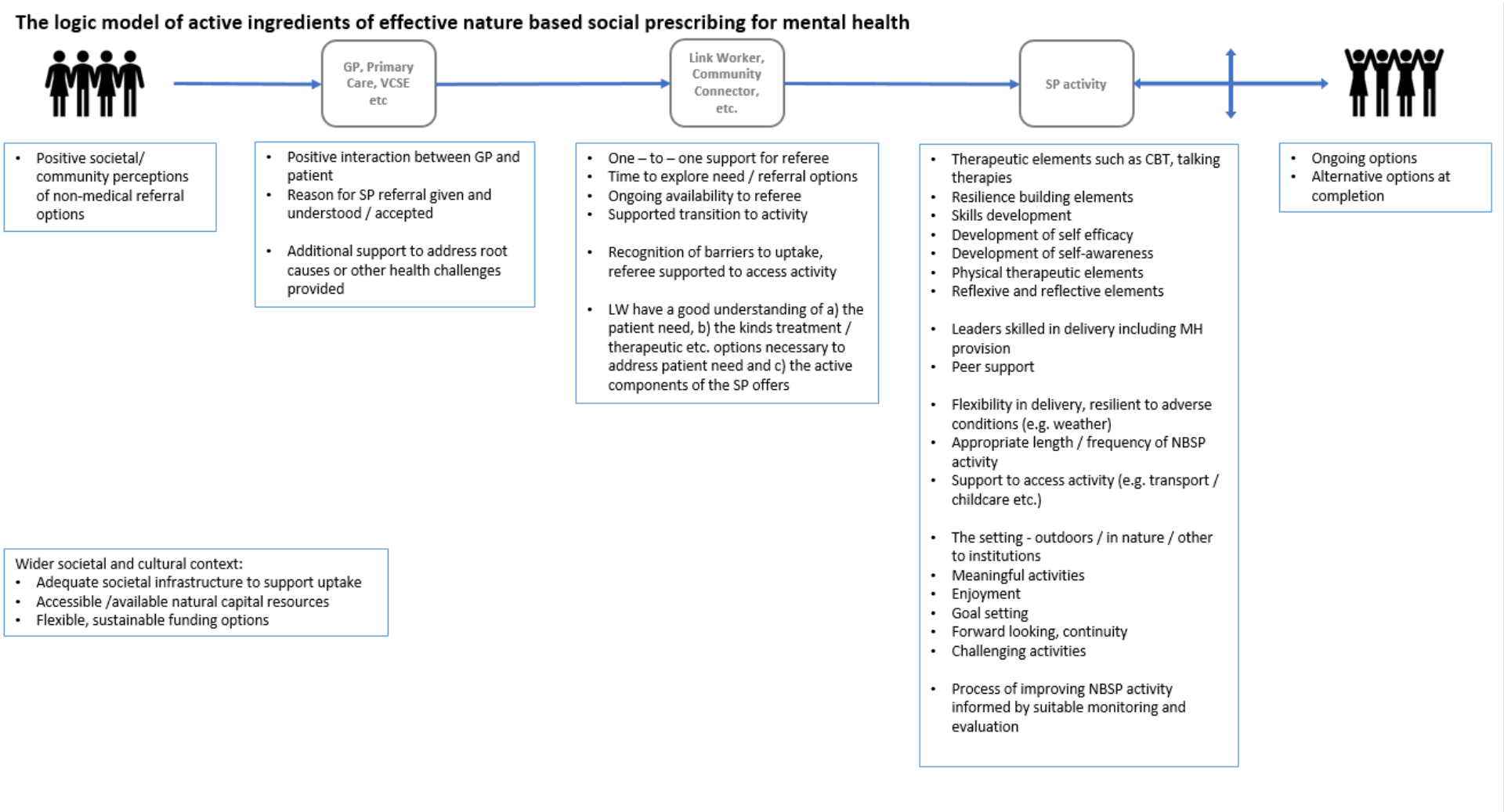
- Link Workers have a good understanding of a) the patient need, b) the kinds treatment / therapeutic etc. options necessary to address patient need and c) the active components of the social prescribing offer
- Ongoing availability to referee
- Supported transition to activity
- Recognition of barriers to uptake, referee supported to access activity

At the point of engaging with and taking part in a nature-based social prescribing activity:

- Programmes may incorporate therapeutic elements such as CBT, talking therapies, resilience building elements, skills development, development of self-efficacy and self-awareness
- Physical therapeutic elements
- Reflexive and reflective elements
- Leaders skilled in delivery including mental health provision
- Peer support
- Flexibility in delivery, resilient to adverse conditions (e.g. weather), appropriate length / frequency of nature-based social prescribing activity

- Support to access activity (e.g. transport / childcare etc.)
- The setting - outdoors / in nature / other to institutions
- Meaningful activities, that are enjoyable, facilitate goal setting, are forward looking, continuity and incorporate challenging activities
- Process of improving nature-based social prescribing activity informed by suitable monitoring and evaluation.

Figure 11: Logic model of active ingredients in nature-based social prescribing



The dark logic model of nature-based social prescribing for mental health

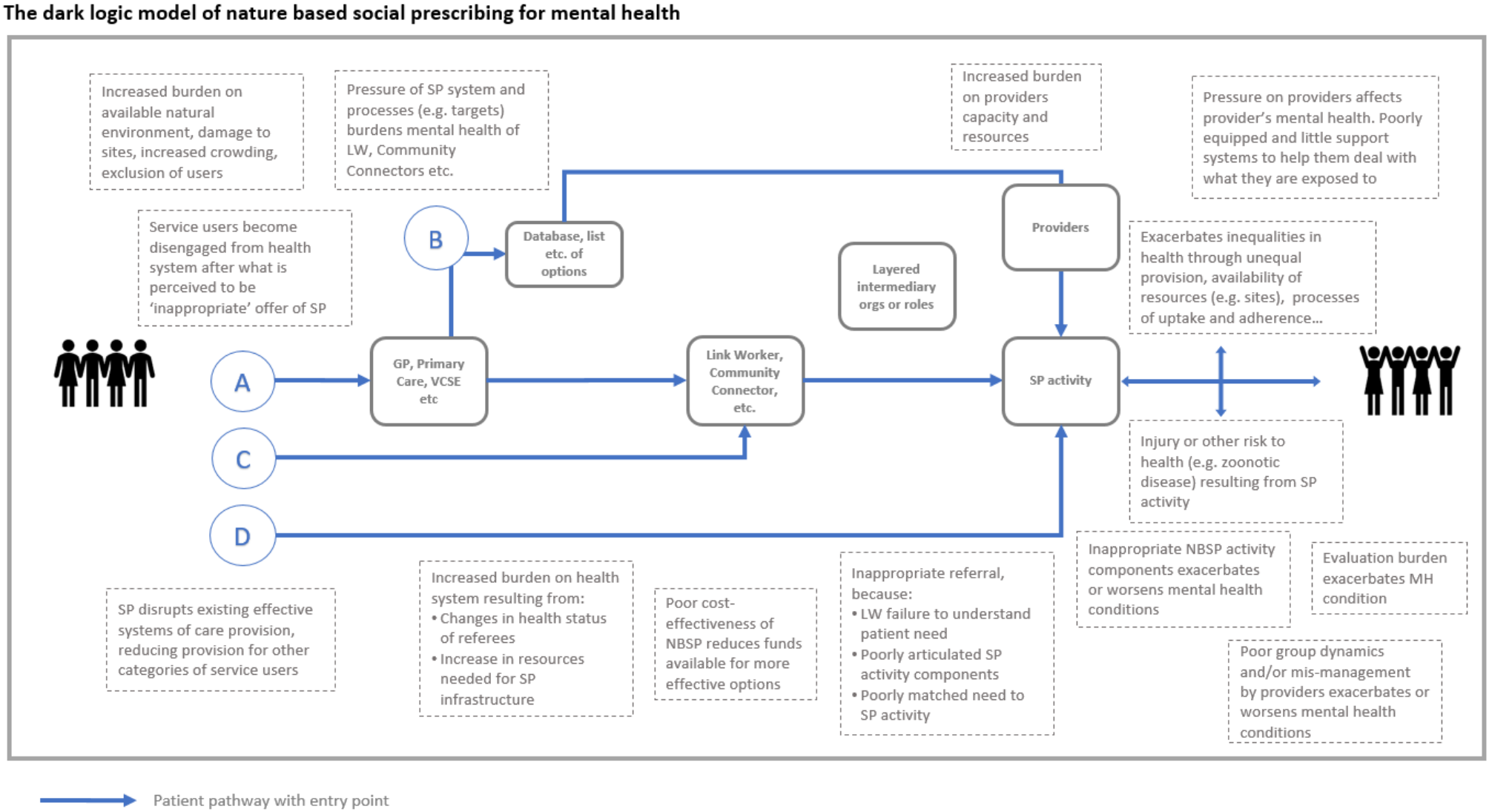
Nature-based social prescribing is not without risk – to the participants and the delivery bodies, as well as in terms of poor value for money and societally. Understanding and acting on potential risks is crucial. Figure 12 is a 'dark logic' model of nature-based social prescribing for mental health. Dark logic models specifically describe the potential or evidenced negative consequences of the subject (Bonell et al., 2015). Dark logic models can also be used to help identify adverse outcomes and unintended consequences.

The dark logic model of nature-based social prescribing for mental health is structured using the simplified flow of a social prescribing process (see Figure ***8***) and includes the four primary pathways present in current social prescribing practice (see p.124).

Potential risks include:

- Harm to the individual going through the nature-based social prescribing process, including alienation from the health system to injury or other risk to health (e.g. zoonotic disease) resulting from social prescribing activity. Inappropriate nature-based social prescribing activity components, or group dynamics exacerbates or worsens mental health conditions
- Increased burden on the health, social or care system, disruption of existing effective systems of care provision, reducing provision for other categories of service users
- Increased burden on particular natural environments, damage to sites, increased crowding, exclusion of users
- Pressure on nature-based activity providers affects provider's mental health. Poorly equipped and little support systems to help them deal with what they are exposed to
- Exacerbates inequalities in health through unequal provision, availability of resources (e.g. sites), processes of uptake and adherence.

Figure 12: The dark logic model of risks of nature-based social prescribing



Assessing value for money

Understanding the value for money of nature-based social prescribing, and therefore making a case to fund it, requires specific data to demonstrate whether it is worthwhile. This can be done either in cost-effectiveness analysis (CEA) or cost-benefit analysis (CBA) comparing to other health spending options or in comparison to other uses of public funding.

Both CEA and CBA require data on the costs of providing the nature-based social prescribing activities. These costs are known within the system shown in the logic models. However, collating them may not be straightforward, as they may be spread across different organisations (for the link worker, nature-based activity provider, and for the nature-based location, for example), each with different financial management arrangements in terms of timescales of funding and accounting structures. The actual nature of equipment, transport and, in some cases, residential facilities is not clear in many of the evaluated interventions and neither is it know where the funding for these elements is derived.

Understanding the benefits is even more complex, for a number of reasons:

- People who access nature-based social prescribing may have a wide range of mental health conditions, and may have complex and/or multiple health needs.

- People can enter the nature-based social prescribing activity from different starting points (e.g. in terms of mental health state and preceding treatment, if any).

- Their likely health state without the nature-based social prescribing activity (i.e. the counterfactual) is hard to know, making several of the benefits of nature-based social prescribing hard to detect, including:

    - Avoided alternative treatment costs for current problems
    - Avoided ongoing costs in the health system while other treatments pending
    - Avoided further treatment costs due to deteriorations of/ development of other linked, conditions
    - Avoided costs to society outside the health system (e.g. to crime and justice and education systems, and from anti-social behaviour).

- Monitoring and recording benefits may be counterproductive to the activity itself, conflicting with the benefit provided by being in a non-medical nature-based setting.

- The nature-based social prescribing activity may not be set up to monitor outcomes during participation in nature-based social prescribing activity or, where they are doing this, it may be for other purposes, such as reporting to a funder, rather than for evaluating effectiveness and service use.

- The nature-based social prescribing activity is unlikely to be set up to monitor outcomes post-activity. This may be because the activity is itself temporary (or uncertain as to future funding), and has responsibility for the participant only during participation in the activity. Some evaluations do include longer term follow up for research purposes, but loss to follow up can be high.

This contrasts to some other forms of medical treatment, particularly those that stay within the conventional system, where clinicians can regularly review a drug prescription. Therefore monitoring of outcomes from nature-based social prescribing activity needs to sit with an organisation that has a permanent long-term responsibility for, and therefore can hold long-term data on, the participant in the nature-based social prescribing activity. Ensuring the system monitors outcomes across care pathways long term is therefore essential if nature-based social prescribing activity is to be accurately compared to other mental health treatment options. At the moment, monitoring and

reporting about social prescribing is done at two levels, one is to NHS England for the Primary Care Networks and records basic numbers and amount of contact with services patients have through link workers. There are also national evaluators of programmes which record numbers of patients, link worker contacts, and, where possible, outcomes. However the activity to which the link-worker refers a person is not well recorded, so it is not currently possible to know how many people are referred to a nature-based activity, let alone the impact of that. There is now a primary care SNOMED code for social prescribing (SNOMED provides structured clinical vocabulary for use in electronic health records) which can record social prescribing offered, and if it was accepted or declined. But these are not well used. In short, most monitoring and reporting is done in an ad hoc, by different teams for different reasons and is unlikely to capture use of nature-based activities.

These long-term monitoring and funding issues are linked to the actual operation of the system shown in our logic models in terms of onwards referrals from nature-based social prescribing activities groups. This may require better links from the nature-based social prescribing activity to other existing community/ environment activities, or the creation of such activities where they are not available. These activities could take the form with self- or lower- supervision (e.g. 'friends of parks' or community garden groups), and may be more effective when they provide continuation of engagement in the same or similar environmental spaces to those used by the nature-based social prescribing activity.

Having this subsequent step in terms of activities to move on to is potentially very important for cost-effectiveness of nature-based social prescribing, especially where it involves more intensive interventions. Without it, the nature-based social prescribing activities will be unable to move on existing participants (i.e. discharge them) in a responsible manner, and therefore be full and unable to accept new participants.

Without good understanding of costs, and monitoring of benefits, nature-based social prescribing will struggle to demonstrate its worth within the mainly economics-based resource allocations processes used for public funding. This can create a vicious cycle, with funders not committing beyond the short-term due to a lack of evidence, leaving a fragmented system that cannot collate the data to demonstrate the effectiveness of outcomes in the manner needed to secure long term funding. It is unclear how recent enthusiasm for social prescribing generally will impact on this.

7. Work Stream 5: Recommendations for expanding nature-based social prescribing

Recommendation 1:	Advocacy for nature-based social prescribing across systems
Recommendation 2:	Identifying mechanisms to facilitate coordination of supply and demand in nature-based social prescribing at a strategic level
Recommendation 3:	Enhance knowledge sharing, peer support and advocacy through a network and one-stop shop for nature-based social prescribing
Recommendation 4:	Enhance capacity of local coordinating bodies
Recommendation 5:	Improve the funding system
Recommendation 6:	Support the development of skills in nature-based social prescribing
Recommendation 7:	Enhance the usability of information on nature-based social prescribing
Recommendation 8:	Improve understanding of what works, how and for whom

These are summarized in Table 4 and discussed in more detail below.

Table 4: Recommendations summary table

Recommendation	Key actors					Level of difficulty	Progress	Key actions
	National government	**Local government**	**3rd sector**	**Private sector**	**Other**			
1: *Advocacy for nature-based social prescribing*	Defra, Department of Health and Social Care, DCLG	Public health teams; education and families;	Provider organisations; VCSE coordinating organisations	For-profit providers; app/tech support for SP	Individual health and environment professionals with reach	Achievable (if buy in gained)	Ad hoc progress	• Clarify/unify terminology on nature-based social prescribing. • At a national/regional level identify key networks, decision making points/systems – key representatives to join/participate. • Participate in existing networks: for instance, the National social prescribing network has special interest groups; the National Academy for Social, Prescribing which has an advisory board; or NHS England's Personalised Care Team, which has a board too. All of which need representation. • Marketing/promotional campaign targeted to key audiences within the system including medical professionals, link workers and the public.
2: Identifying mechanisms to facilitate coordination of supply and demand in nature-based social prescribing	Defra and its agencies; Department of Health and Social Care; Funders of activity	CCGs; Primary care networks; local public health; referral organisations; Funders of activity	Provider organisations; VCSE coordinating organisations; referral organisations; Funders	For-profit providers		Challenging	Ad hoc progress locally, little coordinated action	• Identify whether similar systems exist for other forms of SP or non-medical referral • Clarify at what scale more coherent systems of supply and demand is needed. • Work with key actors, including VCSEs, Primary Care Networks, Clinical Commissioning Groups, and Sustainability and Transformation Partnerships, to develop system.
3: Enhance knowledge sharing and peer support through a network for nature-based social prescribing	Funders;		Funders; Providers - VCSE	For-profit providers; app/tech support for SP	Researchers	Achievable	Ad hoc progress locally, little coordinated action	• Identify whether there is a network in development, or one which could be used to host this resource/activity. • Outline key job roles/titles in a single glossary of terms. • Work with the community of nature-based social prescribing stakeholders to identify what is needed and in what formats. • Provide resources to initiate/adapt the network.
4: Enhance capacity of local coordinating bodies	Natural England		Providers – VCSE; Network and umbrella organisations such as LNPs;		Landowners	Achievable	Ad hoc progress locally, little coordinated action	• Support existing local coordinating bodies and help replicate in areas where there currently is no local coordination. • Identify key actors with capacity to take on role. • Work with the stakeholders to identify what is needed in each area. • Make access to the natural environment through activities designed to deliver health benefits in general, and social-prescribing in particular, an explicit objective of the 25 year environment plan. Also make explicit the ability for ELM to fund (at least in part) the provision of such facilities on farmland/ other qualifying land uses. • Encourage funding of maintenance of the locations used by nature-based social prescribing activities from different sources..
5: Improve the funding system	Defra and its agencies; Department of	CCGs; Primary care networks; local public	Provider organisations; VCSE	For-profit providers		Challenging	Some small-scale	• Work with a range of different types of funders to understand their funding priorities.

Recommendation	Key actors					Level of difficulty	Progress	Key actions
	National government	**Local government**	**3rd sector**	**Private sector**	**Other**			
	Health and Social Care; Funders of activity	health; referral organisations; Funders of activity	coordinating organisations; referral organisations; Funders				initiatives to reform system	• Work with delivery bodies to further identify funding needs and challenges. • Work with researchers to further clarify outcomes suitable to be used in results-based commissioning models. • Look at developing joint-funding models where pots can be created to meet all aims in conjunction, with nature-based social prescribing/SP bidding into these pots.
6: Support the development of skills in nature-based social prescribing	Education sector;	referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations; funders	Universities and educational bodies;		Achievable	Some progress locally but nothing at scale	• Identify whether CPD accreditation etc. would enhance perceived reliability of nature-based social prescribing amongst link workers, health professionals etc. • Work with a range of different types of delivery bodies to understand their training needs. • Work with training delivery bodies to further identify capacity to provide training, costs and so on. • Work with researchers to identify mechanism through which new knowledge of what works can be integrated into training and CPD.
7: Enhance the usability of information on nature-based social prescribing		CCGs; Primary care networks; local public health; referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations;	For-profit providers		Achievable	Unknown	• A framework should be developed for appropriate/possible information needed to inform suitable referral options. • Regular discussions about appropriate outcomes, measuring impact across the system and to what purpose (i.e. taking action where data show it would be useful).
8: Improve understanding of what works, how and for whom	Defra and its agencies; Department of Health and Social Care; Research funders	CCGs; Primary care networks; local public health; referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations;	Universities and research organisations		Achievable	Some progress	• Work with funders, for example UKRI, the larger charitable funders and others to identify opportunities to fund research into the mechanisms of different forms of nature-based social prescribing. • Work with coordinating bodies and others to disseminate evidence of what works to key stakeholders.
The impact of COVID-19[5]	*All*	*All*	*All*	*All*	*Particularly l/w roles are affected*	*Complex and wide ranging*	*Limited but growing significantly with time*	*Modify l/w roles and interactions through technology;* *Protect staff and patients through new social distancing and isolation;* *Etc.*

[5] We are not in position to make firm recommendations about COVID-19 and the impact on social prescribing due to lack of current data; however as an emerging and significant situation affecting SP delivery we note it here for further discussion.

Recommendation 1: Advocacy for nature-based social prescribing across systems

Challenge

- There is no high-level lead responsible for nature-based social prescribing
- Nature-based social prescribing has variable levels of support across multiple organisations in the system
- There is some evidence that the public do not consider it to be a legitimate medical referral
- Some funders, while supportive, have begun to suggest that it is not sufficiently novel
- There is some evidence of the challenges of coordination in social prescribing across systems; meaning individual elements (incl. nature-based social prescribing) need strong and consistent advocacy

Why this action is important

Whilst there are still many questions about what works, where and for whom, and especially regards cost-effectiveness, there is a growing body of evidence suggesting the approach does have value (see Sections 4 and 5). The evidence demonstrates effectiveness for some groups with some activities although may not be strong enough to offer clear recommendations, and high-quality qualitative evidence describing the ways in which participation can lead to often positive impacts (see Section 4). A programme of (consistent, honest and transparent) advocacy would raise the profile of the practice at a national level, increase legitimacy, increase provision, and help drive interest from link workers in including nature-based social prescribing in their portfolios. Government-department led advocacy could also help increase perception of the potential contribution of non-medical referrals, especially environmental options, amongst the general public and could help clarify that nature-based social prescribing is supplementary and complimentary to other forms of care. More effective collaboration between parts of the system will help address some of the key issues such as funding challenges (see Recommendation 2) and in relation to more effective demand-supply.

Key actors

National government	**Local government**	**3rd sector**	**Private sector**	**Other**
Defra, Department of Health and Social Care, DCLG	Public health teams; education and families;	Provider organisations; VCSE coordinating organisations	For-profit providers; app/tech support for SP	Individual health and environment professionals with reach

What needs to be done

Defra could, working with Department of Health and Social Care, and its network and key delivery representatives, build on the stated aims in the 25 Year Plan regarding nature-based social prescribing and pursue an advocacy role with the aim of ensuring that the environment, and use of nature-based social prescribing is understood, recognised as legitimate, and is integrated into health strategy and practice. This may involve joining/working with key coordination groups at high level such as the Universal Personalised Care group, the National Academy for Social Prescribing which has an advisory board, or NHS England's Personalised Care Team. Defra, and its agencies, need to identify which health bodies and service delivery agencies it needs to interact with. For example, a significant portion of 'new' social prescribing is delivered through Primary Care Networks, and so understanding the needs and ways of working of these organisations is central to embedding the nature-based offer.

Working with NICE to integrate nature-based social prescribing, where the evidence is supportive, into treatment recommendations including as an initial treatment option, or adjunct to other therapy and medication. This could be positioned as a part of the offer in developing personalised health care frameworks. In parallel, a public facing promotional campaign could be used to heighten understanding, awareness and perceptions of legitimacy amongst the public. Further steps include clarify/unify terminology on nature-based social prescribing.

Link to other actions

Recommendation 2: Identifying mechanisms to facilitate coordination of supply and demand in nature-based social prescribing at a strategic level

Recommendation 5: Improve the funding system

Recommendation 8: Improve understanding of what works, how and for whom.

Recommendation 2: Identifying mechanisms to facilitate coordination of supply and demand in nature-based social prescribing at a strategic level both nationally and locally

Challenge

- We found only local, ad hoc, coordination of demand and supply in the social prescribing system as a whole, with specific evidence for dysfunction relating to nature-based social prescribing.
- Funding applies only to components of the SP pathway (link-worker, equipment, travel to activities) but often not the activities themselves.
- Some evidence of local level interaction between, for example, Clinical Commissioning Groups and nature-based social prescribing delivery bodies, however, in general the process is disjointed and ad hoc, in many cases relying on need from third party funders to drive supply.
- Small-scale providers struggled to identify what provision is required by the system.
- May have contributed to low uptake of funded services and, in some cases, conflict and duplication within the system.

Key actors

National government	**Local government**	**3rd sector**	**Private sector**	**Other**
Defra and its agencies; Department of Health and Social Care; Funders of activity	CCGs; Primary care networks; local public health; referral organisations; Funders of activity	Provider organisations; VCSE coordinating organisations; referral organisations; Funders	For-profit providers	

Why this action is important

Without functioning processes of the articulation of demand, systematic funding and provision of supply the system may fail to match provision with need. This leads to redundancy, wasted funding and conflict. If delivery groups can't provide sufficient and appropriate types of activities as needed and if people get caught in the system then the whole social prescribing project may be thought to 'fail' and be defunded in future spending reviews and funding rounds.

What needs to be done

A key step is to identify mechanisms that facilitate coordination of the nature-based social prescribing supply and demand. This likely to include processes of:

- developing a clear articulation of strategy and need to both suppliers and funders;
- identifying and integrating mechanisms of communications between national and local levels of the different actors involved, clarify at what scale more coherent systems of supply and demand is needed;
- explore the potential for co-commissioning activities as part of an SP pathway, for example in collaboration with PCN-funded link-workers (who can fund transport, equipment, but not activities);
- collaborative funding processes where those with the need are included in the process;
- enhance the links between Voluntary Community and Social Enterprise (VCSE) umbrella organisations, NHS England Primary Care Networks, Public Health etc. through regular contact and information sharing and to design and deliver nature-based social prescribing (potential role for the coordinating organisations – see Recommendation 4); and
- ensure that new offers are not duplicating existing provision

There is some evidence that some aspects of 'systematising' the supply of social prescribing offers to meet demand are beginning to be coordinated at a Primary Care Network level. This could be built upon and developed further. Greater coordination may be considered as commissioning via the backdoor.

There may be a challenge of 'additionality' for some of the bigger funders such as the Lottery. *'Lottery funding is distinct from Government funding and adds value. Although it does not substitute for Exchequer expenditure, where appropriate it complements Government and other programmes, policies and funding'* (www.gov.uk). This would need to be considered and addressed potentially through a review of funding mechanisms.

Link to other actions

Recommendation 1:	Advocacy for nature-based social prescribing across systems
Recommendation 3:	Enhance knowledge sharing, peer support and advocacy through a network and one-stop shop for nature-based social prescribing
Recommendation 4:	Enhance capacity of local coordinating bodies
Recommendation 5:	Improve the funding system
Recommendation 8:	Improve understanding of what works, how and for whom

Recommendation 3: Enhance knowledge sharing, peer support and advocacy through a network and one-stop shop for nature-based social prescribing

Challenge

- The sharing of knowledge between stakeholders appears to be patchy and ad hoc.

- Navigating the health system is complex – often the systems are opaque, language difficult and entry points unclear, there are specific challenges for providers working across different health areas.
- There is no one stop shop for those interested in the theory and practice of nature-based social prescribing to go to. Accessing evidence on what works for whom and in what contexts in difficult.
- There is no recognised authoritative voice providing and hosting specific guidance on nature-based social prescribing at a national level.

Key actors

National government	Local government	3rd sector	Private sector	Other
Funders; Departmental leadership (Defra, DHSE)		Funders; Providers - VCSE	For-profit providers; app/tech support for SP	

Why this action is important

Nature-based social prescribing practice could be enhanced through collaborative development and sharing of good practice. To do this there need to be mechanisms through which evidence based good practice is shared. Currently nature-based social prescribing is very varied with a variety of different methodologies and practices. A knowledge sharing network could bring some coherence to the field. It could provide both guidance for practitioners, as well as information for link workers and health professionals regarding the details of nature-based social prescribing activities available to them (how therapeutic gardening may help someone with depression for example).

A further consequence of the plurality of the nature-based social prescribing field is that there is no one representative to advocate for the approach. There is potentially a need for an organisation to act as a recognised voice for the sector, to, for example, help negotiate with funders and in regards to supply-demand issues. A recognised coordinator of nature-based social prescribing at scale may help provide legitimacy to nature-based social prescribing. A network may help develop the community of nature-based social prescribing interested link workers and drive the further uptake of nature-based social prescribing.

What needs to be done

Work with the community to develop and support a national network, with regional representation, for nature-based social prescribing. Learn from and build on examples of successful networks such as the Ecosystems Knowledge Network https://ecosystemsknowledge.net/. In health, The Social Prescribing Collaboration Platform hosted by NHSE is widely used and good for (a) disseminating knowledge and information, but also (b) hosting and promoting discussion between link workers, providers and others; therefore, it works at varying system levels. Other examples include local Social Prescribing Networks, which are regional, and county level forums; or VCSE umbrella organisations (such as the Wolseley Trust or Volunteer Cornwall in the SW, see below). There are also local hubs that support and promote wellbeing generally (such as Exeter CoLab or the Newcastle Ways to Wellness). It is likely that some funding would be needed to support an effective network and appropriate resource hub. Defra could consider building on its sponsorship of Ecosystems Knowledge Network and its support for other

networks such as the Local Nature Partnerships to develop the network for nature-based social prescribing, although we note that LNP activity is highly variable.

Link to other actions

Recommendation 4: Enhance capacity of local coordinating bodies

Recommendation 6: Support the development of skills in nature-based social prescribing

Recommendation 7: Enhance the usability of information on nature-based social

Recommendation 8: Improve understanding of what works, how and for whom

Recommendation 4: Enhance capacity of local coordinating bodies

Challenge

- Health professionals and link workers struggle to access and maintain knowledge of what nature-based social prescribing is available in their area. The providers similarly struggle to identify who to communicate with.
- The plurality of different link worker, community builder etc. roles is reflected in a huge variety of different nature-based social prescribing providers and activities (see mapping of interventions and interviews). Additionally, even similar roles may be titled differently across areas or funding structures (see interviews).
- Small scale providers struggle to gain a foothold. Some 'slip under the radar' (Section 5) and fail to gain referrals.
- Currently the process of sharing information on available nature-based social prescribing options within an area is disjointed and patchy.

Key actors

National government	**Local government**	**3rd sector**	**Private sector**	**Other**
Defra; Natural England and NDPBs; Funders	Local authorities;	Providers – VCSE; Network and umbrella organisations such as LNPs; Funders	Funders	Landowners

Why this action is important

Coordinating bodies can provide a crucial conduit between the variety of link worker roles and the variety of delivery bodies. There is some evidence, and we heard in the interviews (see Section 5) that in areas with functioning coordinating bodies, for example the West of England, there is better 'join up' between different parts of the system. Further, where capacity had been devoted to gathering information on what is available, the nature-based social prescribing system appeared to be working well. Collaboration across the health and environment sectors should also be encouraged to support the development and delivery of robust interventions.

A coordinating body provides a service to both the link workers, in supplying information on what is available, as well as for the delivery bodies, supplying information on what is needed by the health

system. A coordinating body could provide the crucial translational and information sharing role that could help establish activity in areas where there is little referral to nature-based social prescribing, scale up activity in areas where is it establishing, and provide ongoing support in areas where nature-based social prescribing is well established.

What needs to be done

There is a need to work with stakeholders to strengthen the capacity of the organising and coordination bodies, some of which have developed out of the Local Nature Partnerships, to act as crucial conduits between social prescribing Link Workers and therapeutic nature activity providers. These 'umbrella' organisations (such as Volunteer Cornwall) are VCSE bodies that provide a structure for multiple provider organisations to come together and operate in a more joined up way, and would benefit from more input (guidance, structures, funding).

Consider clarifying what worked well where coordinating bodies have provided this service and replicate elsewhere. It may also be valuable to identify where other, non-social prescribing systems are working well that nature-based social prescribing could be integrated with.

Support and facilitate landowners and land managers to connect with nature-based social prescribing delivery bodies. Consider producing a simple guide clarifying who owns and manages land, how to access natural environments, using the national estate etc. for nature-based social prescribing providers. Also make explicit the ability for ELM to fund (at least in part) the provision of such facilities on farmland/ other qualifying land uses. Defra, working with partners such as MHCLG and DHSE at a high level, and their equivalents at a regional level, should encourage funding of maintenance of the locations used by nature-based social prescribing activities. For example, a suitable source of long-term community funding is the monies businesses can allocate from the plastic bag levy in England. These and other sustainable funding sources need to be identified and encouraged, including by providing them with evidence of the returns from such funding, and by enabling co-funding (e.g. between private sources and public funding such as under ELM in rural and urban edge locations.

Link to other actions

Recommendation 3:	Enhance knowledge sharing, peer support and advocacy through a network and one-stop shop for nature-based social prescribing
Recommendation 5:	Improve the funding system
Recommendation 6:	Support the development of skills in nature-based social prescribing
Recommendation 7:	Enhance the usability of information on nature-based social
Recommendation 8:	Improve understanding of what works, how and for whom

Recommendation 5: Improve the funding system

Challenge

- Reliance on 3rd party funders with potentially different goals to the health system (see Section 5). Contributes to disconnects between the needs of the health systems, the aims of the funders and therefore the ability to provide by nature-based social prescribing delivery bodies.
- Currently there does not appear to be a process through which demand can be matched to supply via the funding system.

- Current models of funding lead to short termism, has a focus on innovation, allows for few opportunities to build capacity and scale up good practice, and places significant burden on nature-based social prescribing providers.
- Short term funding may reduce the likelihood of achieving positive outcomes to mental health.
- Commissioned, results oriented models are hampered by a lack of understanding of what nature-based social prescribing is 'for', what the outcomes are likely to be, and in what time frame any outcomes might manifest.

Key actors

National government	Local government	3rd sector	Private sector	Other
Defra and its agencies NDPBs; DHSE; MCHLG Funders of activity	CCGs; Primary care networks; local public health; referral organisations; Funders of activity	Provider organisations; VCSE coordinating organisations; referral organisations; Funders	For-profit providers	

Why this action is important

Lack of (appropriate) funding has been identified as one of the key challenges facing nature-based social prescribing.

What needs to be done

Defra could consider working in coalition with key funding bodies to identify mechanisms through which nature-based social prescribing could be made more sustainable in the medium to long term, with potential to scale up successful activities. Key activities include clarifying outcomes suitable to be used in results-based commissioning models. There is also a need to work with delivery bodies to further identify funding needs and challenges. This could usefully focus on capacity within nature-based social prescribing providers, understanding of alternatives to short term project funding and other system level challenges.

Link to other actions

Recommendation 1: Advocacy for nature-based social prescribing across systems

Recommendation 2: Identifying mechanisms to facilitate coordination of supply and demand in nature-based social prescribing at a strategic level

Recommendation 8: Improve understanding of what works, how and for whom

Recommendation 6: Support the development of skills in nature-based social prescribing

Challenge

- Some delivery organisations find it difficult to access training and guidance to develop and improve their practice.
- It isn't universal for environment-focused NGOs to formally include mental health professionals within project structures and vice-versa (Section 5).

- There is concern that current skill sets are not necessarily enough to deal with referrals with more complex health conditions.

Key actors

National government	Local government	3rd sector	Private sector	Other
Education sector;	referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations; funders	Universities and educational bodies;	

Why this action is important

Accessible, evidence-based training and guidance could help delivery organisations develop and improve their practice. Achievement of CPD modules could provide some level of quality assurance for link workers and primary care. Adoption of evidence-based practice could help ensure positive outcomes and avoid unintended consequences and harms.

For nature-based social prescribing to become a mainstream offer greater coherency and reliability of the delivery may be needed. Accredited training and continuing professional development (CPD) could help meet this need.

What needs to be done

Defra could consider working with partners such as NHSE (and it's delivery through the Social Prescribing Platform), further education colleges, universities or other organisations offering relevant training to develop nature-based social prescribing, Continuing Professional Development (CPD) or short course modules. Separate CPD modules could be aimed at different actors in the system such as primary care, link workers and/or therapeutic nature activity providers. These could be used to strengthen understanding of current evidence on mental health, current needs for mental health delivery within health systems, and effective nature-based social prescribing practice. An early step would be to work with a range of different types of delivery bodies to understand their training needs.

Link to other actions

Recommendation 3: Enhance knowledge sharing, peer support and advocacy through a network and one-stop shop for nature-based social prescribing

Recommendation 4: Enhance capacity of local coordinating bodies

Recommendation 8: Improve understanding of what works, how and for whom

Recommendation 7: Enhance the usability of information on nature-based social prescribing

Challenge

- The mechanisms through which information is shared on individual nature-based social prescribing specifics with the referral body (e.g. the link worker) could be patchy, *ad hoc* and in some cases may be insufficient to allow the link worker to make informed decisions about referrals (see interviews).
- There is poor information availability on the different types of nature-based social prescribing available and in relation to how different forms of nature-based activity may 'work' and be beneficial.
- There is no commonly recognised way in which to communicate the nature of the programme, who it might benefit, the conditions it is most beneficial for and the ways in which the activity work. Without this information the link worker is making referrals without adequate information as to whether the activity is suitable; this risks inappropriate referrals.

Key actors

National government	Local government	3rd sector	Private sector	Other
	CCGs; Primary care networks; local public health; referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations;	For-profit providers	

Why this action is important

Poor information availability and exchange reduces the likelihood of successful nature-based social prescribing systems. Reliable referrals can only take place where there is sufficient understanding of referral opportunities, the specific needs of the patient, and in regards to the specifics of the activity. Currently this may not be the case in all referrals.

More systematised information sharing may enhance uptake of the nature-based social prescribing through increasing link workers' and health professionals' understanding of how the activity may be beneficial and who may benefit.

What needs to be done

Work with Link Workers and therapeutic nature activity providers to identify the ways in which information on the specifics of the nature-based social prescribing activity can be categorised, described and shared between stakeholders.

Key information could include target population, mental health need suitability, details on delivery including frequency, duration and progression, and key expected outcomes.

Link to other actions

Recommendation 3: Enhance knowledge sharing, peer support and advocacy through a network and one-stop shop for nature-based social prescribing

Recommendation 4: Enhance capacity of local coordinating bodies

Recommendation 8: Improve understanding of what works, how and for whom

Challenge

- Currently we have a patchy understanding of what works in relation to different forms of nature-based social prescribing (see Section 4). Much of the quantitative evidence identified was characterised as weak (see Section 4).
- There is significant variety of practice, delivery and intended outcome. Whilst most activities can be classified as one of the key models of nature-based social prescribing (e.g. therapeutic gardening, care farming, conservation activities, walking/talking therapies, green gyms), within each of those models is considerable variation. Further, participants reach the programmes through a variety of different routes, factors we considered to be active in whether or not positive outcomes are achieved (see Figure 9, p.125). A poor understanding of the active array of ingredients of Nature-based social prescribing is preventing the further development of effective practice.
- A poor understanding of the value of value of nature-based social prescribing prevents meaningful comparison with other treatment or delivery options, and prevents full understanding of the value of environmental spaces used for nature-based social prescribing.

Key actors

National government	**Local government**	**3rd sector**	**Private sector**	**Other**
Defra and its agencies; Department of Health and Social Care; Research funders	CCGs; Primary care networks; local public health; referral organisations;	Provider organisations; VCSE coordinating organisations; referral organisations;	Universities and research organisations	

Why this action is important

More information on what works, for whom and in what contexts would enhance the availability and referral to suitable and effective nature-based social prescribing. Further research would help clarify what types of outcomes could be expected for particular delivery models. It could also help clarify the cost savings etc. that could be achieved through nature-based social prescribing to different parts of the health and social care system. There is some evidence that social prescribing may not, in fact, relieve pressure on the health and social care system, further research could help identify why this is and how to address the challenge.

A greater understanding of what types of nature-based social prescribing are effective, and in what ways, would inform how to develop and deliver nature-based social prescribing effectively without increasing pressure on the system.

As improved understanding of nature-based social prescribing outcomes develop, they can be better recognised in economic appraisal that supports decision-making. Framing them as a service delivered by natural and social capital assets (see below), means they could be included in Defra's ENCA guide. This

can recognise the type of benefit the environment can support through nature-based social prescribing, and it may be possible to identify values for these activities in terms of health outcomes supported. Values may be constructed in terms of the health benefits to participants, and/or the avoided costs due to them not requiring subsequent treatment (either because their condition improves or does not deteriorate in the manner expected).

What needs to be done

Support and fund research into the mechanisms of action in different forms of nature-based social prescribing. Research should consider the contribution of the system of social prescribing, as well as of the Nature-based social prescribing itself.

Identify key questions. These could include:

- for what duration and at what frequency is nature-based social prescribed activities most effective?
- how do different population groups understand and experience nature-based social prescribing?
- who or what group benefits from nature-based social prescribing activities?
- what is the impact of the group on outcomes?
- what activity components are most effective in bringing about change for specific outcomes?
- how long do any observed benefits last and how can longer term outcomes be maximized?

There is also a need to identify relative economic values of nature-based social prescribing within different systems. For the environmental sector a market value may exist where an activity pays the provider for the environmental locations they use. This will give a useful indication of value, but may not capture all the benefits (i.e. the total economic value) of the environment through its role in the health benefits delivered. Determining these values may face challenges in distinguishing between the role of the natural environment (the locations for nature-based activity) and the role of the providers of the activities undertaken. As a first step values may be identified for the overall benefits of the activity. These can be attributed to the natural environment in the sense that they are enabled – or are dependent on the natural environment to take place. As evidence is developed, it may be possible to attribute values between the natural environment locations and providers. A medium-term aim should be to add such values to Defra's ENCA services databook. Different valuation methodologies and outputs are typically required by the health sector and as such further work on cost effectiveness analysis, cost benefit analysis and/or other work to determine values of nature-based social prescribing is needed.

Link to other actions

Recommendation 1:	Advocacy for nature-based social prescribing across systems
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Recommendation 5:	Improve the funding system

Recommendation 6: Support the development of skills in nature-based social prescribing

Recommendation 7: Enhance the usability of information on nature-based social prescribing.

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8. Appendix 1: Case Study profiles

Devon

Geography and natural assets

Figure 13: Geographic range case study site 1

Source: http://map.devon.gov.uk/dccViewer/Boundaries/

Devon is a largely rural country in the South West of England consisting of eight local authority districts: East Devon, Exeter, Mid Devon, North Devon, South Hams, Teignbridge, Torridge and West Devon. It contains two National Parks – Exmoor to the north, extending into Dorset, and Dartmoor in the south west, as well as extensive Areas of Outstanding Natural Beauty, largely on the coasts and river valleys.

Natural England describe six National Character Area Profiles in Devon (see Table 5) some of which extend into neighboring countries. See here for map locations: http://publications.naturalengland.org.uk/map?category=587130

Table 5: National Character Area profile case study site 1

NCA profile	Detail
145 Exmoor	Exmoor NCA is predominantly a landscape of upland plateaux of Devonian sandstones and slates terminating in the north at the Bristol Channel with a spectacular cliff coastline. It lies across the counties of Devon and Somerset. The Devonian geological time period was first described and recorded in association with this area. To the west the area terminates at Barnstaple/Bideford Bay and the Taw and Torridge Estuary and to the east at the Vale of Taunton Deane. The Exmoor area contains sparse settlement with centres at Braunton, Ilfracombe, Lynton and the western edges of Minehead, all associated with the coast, and inland at Barnstaple, Dunster, Dulverton and Bampton
147 The Blackdowns	Long, dark ridges, deep valleys and dynamic cliffs are the essence of the Blackdowns National Character Area (NCA). The ridges create prominent backdrops from afar and offer far-reaching views. Flat plateaux, large, regular fields and long, straight roads create a sense of openness and uniformity on the ridges. Beech hedgerows and avenues enclose the grazed landscape,although areas of remnant common, lowland heath and scrub still exist, providing open access. Woodland, much of semi-natural origin, dominates the steep valley tops, creating sinuous dark edges to the ridges; some conifer plantations also exist and intrude onto the plateaux. Below the wooded edge pastoral valleys feature with a medieval field pattern of small, irregular fields bounded by dense species-rich hedgebanks and hedgerow trees, creating an enclosed, tranquil setting. A myriad of springs and streams flow south through the valleys and can often be traced by semi-natural habitats: springline mires, rush pasture and carr woodland. Some valley floors widen and provide an opportunity for arable production, notably the Axe Valley which is characterised by a much wider flood plain. The entire River Axe within the NCA is designated for its biodiversity value, notably lamprey and bullhead fish.
148 Devon Redlands	The Devon Redlands National Character Area (NCA) has a very strong, unified character. The underlying red sandstone and consequent red soil dominate the landscape through ploughed fields, cliffs and exposures, and are visually evident in the traditional stone and cob farmsteads, hamlets and villages that are scattered across the area. Not only does the soil visually characterise the area but its fertility also makes it the agricultural heart of Devon. Mixed agriculture has shaped this landscape since medieval times, an era that left a dense pattern of deep and narrow lanes imprinted in the landscape. The gently rolling hills that feature across the NCA support a network of hedgerows enclosing relatively small fields that are either grazed or under arable cultivation. Hedgerow trees and small copses often give a wooded appearance to the hills. The valleys in between are flat bottomed and open into extensive flood plains across the central part of the Redlands. Here, more 'shrubby' hedgerows or fences enclose larger arable or grazed fields
149 The Culm	The rolling ridges and plateaux of the Culm extend across north-west Devon and north-east Cornwall, reaching from the foot of Dartmoor in the southwest and the edge of the Cornish Killas in the west, to the spectacular Atlantic coast of cliffs and sandy beaches in the north. North-eastwards they meet the Exmoor landscape and stand high above

NCA profile	Detail
	the Devon Redlands. The open, often treeless, ridges are separated by an intricate pattern of small valleys forming the catchments of the Rivers Taw, Torridge and Mole. This is largely a remote and sparsely populated landscape.
150 Dartmoor	Dartmoor's extensive upland moorland core rises above the surrounding small-scale, enclosed, predominantly pastoral landscape. Granite unites and characterises the entire National Character Area (NCA). On the moors the distinctive tors create key landscape features, interrupting otherwise unbroken skylines and ridges, and provide focal points for visitors. Isolated farmsteads and scattered villages utilise granite for buildings and walls; and the area's strong time depth and rich cultural heritage are visually evident because of the granite, which includes the largest concentration of prehistoric stone rows in Britain. The high moors are overlaid with thick deposits of peat and support internationally important blanket bogs surrounded by large expanses of upland heathland and grass moorland. The bogs and valley mires absorb and store significant amounts of water, as well as carbon, released into the 16 rivers and 8 reservoirs that supply the surrounding urban and rural populations and industry. As rivers leave the high moor they flow through deep-cut valleys steeped in woodland – both semi-natural broadleaved and coniferous plantation. The fast-flowing rivers, strewn with granite boulders, are popular for recreation, both passive and active.
151 South Devon	South Devon NCA is predominantly a plateau, dissected by steep valleys and rivers, most rising on the adjoining Dartmoor NCA. Towards the coast the often wooded valleys and rias are remote and hard to access from the land. The majority of the area consists of mixed farming, with fields flanked by Devon hedgebanks and narrow winding lanes. The south of the area contains many internationally important coastal and estuarine habitats.

(Source: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles#ncas-in-south-west-england)

Service Organisation

Since April 2019, services in Devon are coordinated by a single, county wide Clinical Commissioning Group (CCG). The Devon Health and Wellbeing Board joint strategy 2016-2019 identified Life Long Mental health as one of five priority areas for improving health and health equity across the county. Mental health is also a priority area in the Devon Sustainability and Transformation plan.

Demographics

In 2018 the Devon population was estimated to be 1.194 million with 263,100 people living in the city of Plymouth and 130,423 in the city of Exeter (ONS.gov.uk). According to the 2011 census, the vast majority of the Devon population have a White British ethnic background (95%), higher than England generally (almost 80%). The largest minority ethnic group are White Other, who tend to be European (n=15,799), and the next largest groups much smaller: White Irish (n=3195) and Asian Chinese (n=3130).

Compared to the nation as a whole, Devon has an older population. There are fewer people aged under 40, and aged under 16 (16.3% vs 19.0%), than the national average. In addition, there is a higher proportion of people aged 65 to 84 (20.4% vs 15.0% nationally), with larger concentrations of older people in the South Hams and East Devon. Exeter has a population more similar to the national average, with more young people in their twenties due to the University student population.

Employment rates in the South West are higher than average (80.8% vs 76.1% in the UK), but the mean gross weekly wage is £451.90 compared to £547 for England.

Wellbeing

Generally, people in Devon report good levels of wellbeing – with significantly fewer people reporting low happiness on the Self-Reported Wellbeing score, (7.2% compared to 8.5% in England overall) (Devon County Council, 2019). However, there are significant inequalities. Social Connectedness is reported by 42.8% compared to 46% nationally (Devon County Council, 2019). Plymouth reports lower levels of Happiness (7.32) than Devon (7.47), and also England as a whole (7.35), and a similar pattern is seen when rating whether people feel that their activities are Worthwhile (Plymouth 7.68; Devon 7.89; England 7.73). Life satisfaction in Plymouth is higher than in England as a whole (7.55; 7.49) but lower than in Devon (7.69). Anxiety (experienced yesterday) is similar in Plymouth (2.97) and England as a whole (2.96) but lower in Devon (2.85). (ONS.gov.uk)

Mental health

Devon experiences average levels of depression – at 1.6% (QOF incidence aggregated from smaller geographical areas), this is the same as the average for England. GP Patient survey levels of depression and anxiety are similar to those for England (14% vs 13.7%) whilst more people report long term mental health problems. Comparative data for Devon as a whole about common mental health conditions and new cases of psychosis are not currently available for due to the recent Devon CCG merger (Figure 14).

Indicator	Period	Devon			NHS region -local office	England	England		
		Recent Trend	Count	Value	Value	Value	Worst	Range	Best
Estimated prevalence of common mental disorders: % of population aged 16 & over	2017	–	-	-	-	16.9*	24.0		12.0
Estimated prevalence of common mental disorders: % of population aged 65 & over	2017	–	-	-	-	10.2*	14.7		7.6
Depression: QOF incidence (18+) - new diagnosis New data	2017/18	↑	15,685	1.6%*	1.7%	1.6%	3.0%		0.6%
Depression and anxiety prevalence (GP Patient Survey): % of respondents aged 18+	2016/17	↑	2,305	14.0%*	-	13.7%	21.3%		9.2%
Depression: Recorded prevalence (aged 18+) New data	2017/18	↑	106,194	10.6%*	10.3%	9.9%	15.9%		5.4%
Long-term mental health problems (GP Patient Survey): % of respondents (aged 16+)	2018/19	–	1,638	11.2%	-	9.9%	15.2%		5.6%
New cases of psychosis: estimated incidence rate per 100,000 population aged 16-64	2011	–	-	-	17.5*	18.1*	69.4		15.7

Figure 14: Key mental health statistics: Devon CCG

Source: (Public Health England, 2019a). (https://fingertips.phe.org.uk/profile-group/mental-health/profile/mh-jsna/data#page/1/gid/1938132922/pat/46/par/E39000044/ati/165/are/E38000230/iid/92621/age/204/sex/4)

Suicide rates in Devon are higher than average (10.46% vs 9.57% nationally) and more people with poor mental health are unemployed than the national average (Gap in employment rate for mental health clients 73.2% vs 67.2% nationally) (Devon Public Health Annual Report 2018-2019).

Bradford and districts

Bradford and surrounding districts contain a range of different types of settings with different characteristics, some with areas of significant deprivation as well as more affluent rural areas and market towns. The relationship between various parts of the health and social care system in Case Site 2 and 3 (Bradford and West Yorkshire) is complex. The Bradford unitary local authority, and corresponding Public Health area, covers Bradford city and areas to the northwest, including Shipley, Bingley and Keighley and their surrounds (see Figure 15). The related CCGs are Bradford City CCG and Bradford Districts CCG - which does not extend as far as Keighley (see Figure 16).

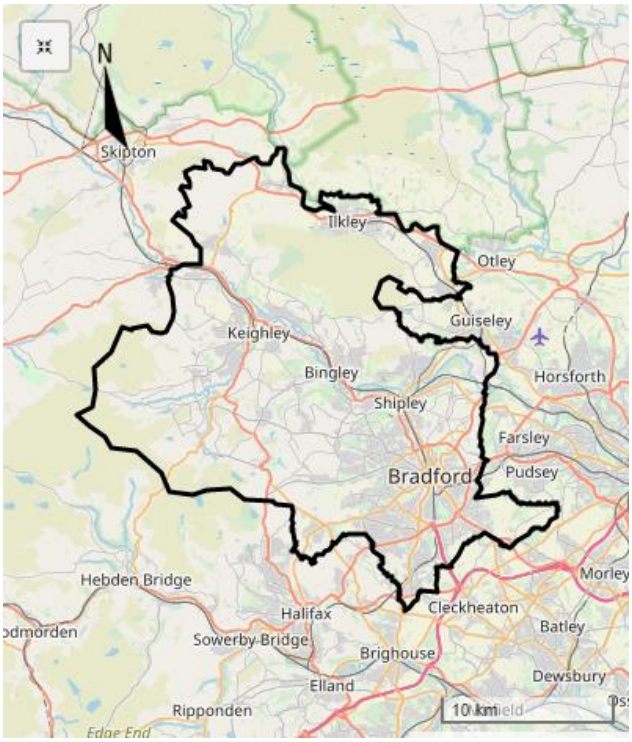


Figure 15: Geographic range case study site 2 (Local Authority)

Source:(Public Health England, 2019a) https://fingertips.phe.org.uk/static-reports/health-profiles/2019/e08000032.html?area-name=bradford

Figure 16: CCG areas for Bradford City and Bradford Districts

Source: https://www.pindarcreative.co.uk/map-of-clinical-commissioning-groups-ccg.html

Geography and natural assets

Bradford contains 44 public parks and green spaces, covering over 615 hectares overall. Whilst managed by the council's Parks and Landscape services, many also have active friend's groups. Bradford district also looks after 850 hectares of woodland open to the public (https://bradforddistrictparks.org). In addition to these urban greenspaces, there are notable natural landscapes to the north and west (see Table 6).

Table 6: National Character Area profile case study site 2

NCA profile	Detail
21 Yorkshire Dales	The Yorkshire Dales National Character Area (NCA), situated in the Pennine uplands, is a landscape of high, exposed moorland dissected by sheltered valleys or dales, each with their own character. Geologically, the south-west of the area is considered to be outstanding for its 'karst' (limestone) landforms, cave systems and exposures of Carboniferous rocks. Over two-thirds of the area falls within the Yorkshire Dales National Park and 17 per cent of the area falls within the Nidderdale Area of Outstanding Natural Beauty. The landscape is characterised by contrasts, especially between the dales below and the moors above. In the dales the environment is more sheltered and there are intricate patterns of walled fields, containing meadow grasses and wild flowers. Small villages and farmsteads, built of local stone, are tucked into sheltered corners, often with clumps of trees protecting them from the worst of the elements. On the dale sides, the network of walls continues with scattered stone field barns often appearing as distinctive features. The steepest slopes are frequently marked by the presence of sparse woodlands or sometimes open rock scree. There are large areas of actively managed grouse moorlands in the north and the east of the NCA. This enterprise makes a significant contribution to the local landscape character of areas such as Nidderdale and Swaledale.

NCA profile	Detail
36 Southern Pennines	The Southern Pennines are part of the Pennine ridge of hills, lying between the Peak District National Park and Yorkshire Dales National Park. This is a landscape of large-scale sweeping moorlands, pastures enclosed by drystone walls, and gritstone settlements contained within narrow valleys. The area contains internationally important mosaics of moorland habitats which support rare birds such as merlin, short-eared owl and twite.

Demographics

An estimated 534,300 people live in the Bradford District Council area (ONS, 2017) making it the fifth largest metropolitan district in England. It has a relatively young demographic, with 30.2% of the population aged less than 20. Around 64% are of White British ethnic origin, while 20% are of Pakistani ethnic origin and nearly a quarter of the population are Muslim. There are lower than average rates of employment in Yorkshire and Humber compared to the UK (74.0% vs 76.1%). Weekly gross wages are lower than average in England (£462.40 vs £547.00) (ONS, 2017)

Bradford is in the 20% most deprived districts in England. Life expectancy in Bradford is lower than the average in England and there are also large health inequalities within district – with life expectancy differences between the most and least deprived areas being 9.1 years men, and 7.8 years for women (Public Health England, 2018b).

Organisation

There are a number of ongoing partnerships in the local area, as well as planned changes. Bradford is a partner in West Yorkshire and Harrogate Health and Care Partnership, a large strategic partnership between Bradford City and Bradford Districts CCGs and North Yorkshire. This partnership covers eleven CCGs (Airedale, Wharfedale and Craven; Bradford City; Bradford Districts; Calderdale; Greater Huddersfield; Harrogate and Rural District; Leeds North; Leeds West; Leeds South & East; North Kirklees; Wakefield), six hospital trusts and eight corresponding city and county councils (Figure 17).

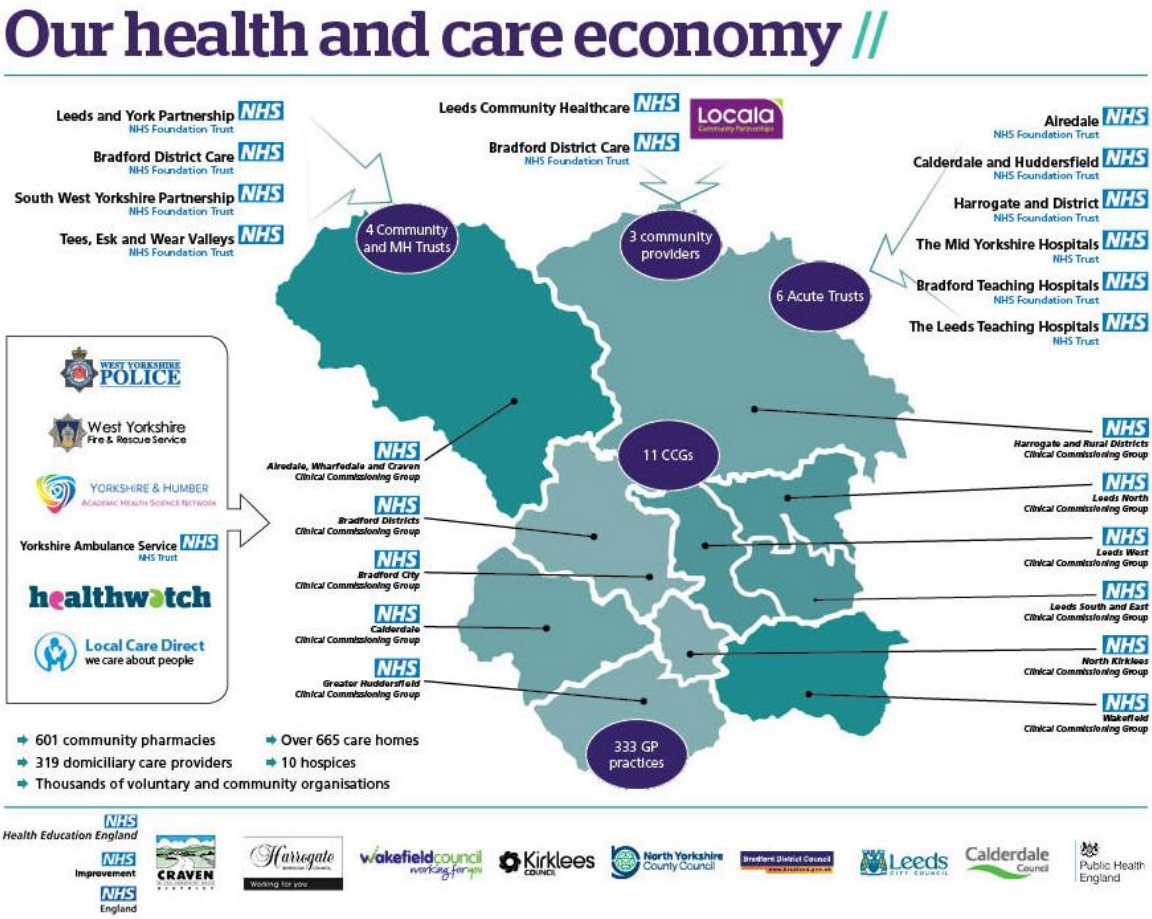


Figure 17: West Yorkshire and Harrogate Health and Care partnership

Source: https://www.wakefieldccg.nhs.uk/fileadmin/STP/images/STP_Area_Slide_CM1810.12.jpg

A joint Sustainability and Transformation Plan (STP) has been produced for the partnership. Social prescribing is only explicitly listed as a key part of the strategic plans for two CCGs in the joint STP: Bradford and District & Craven and Harrogate and District. A goal of close working with voluntary and community sectors is found in the overall progamme goals however to support joined up care (Wakefield CCG, 2016) Social prescribing is not named in the current *Mental wellbeing in Bradford district and Craven: a strategy 2016-2021* document, although access to green space is recognized as an asset (City of Bradford MDC, 2016).

Wellbeing

Wellbeing in Bradford is similar to the national average: Happiness 7.34 (Bradford) vs 7.35 (England); Life satisfaction 7.47 vs 7.49 and feeling life is Worthwhile 7.73 vs 7.73; while reported anxiety is higher at 3.16 vs 2.96 (ONS, 2017).

Mental health

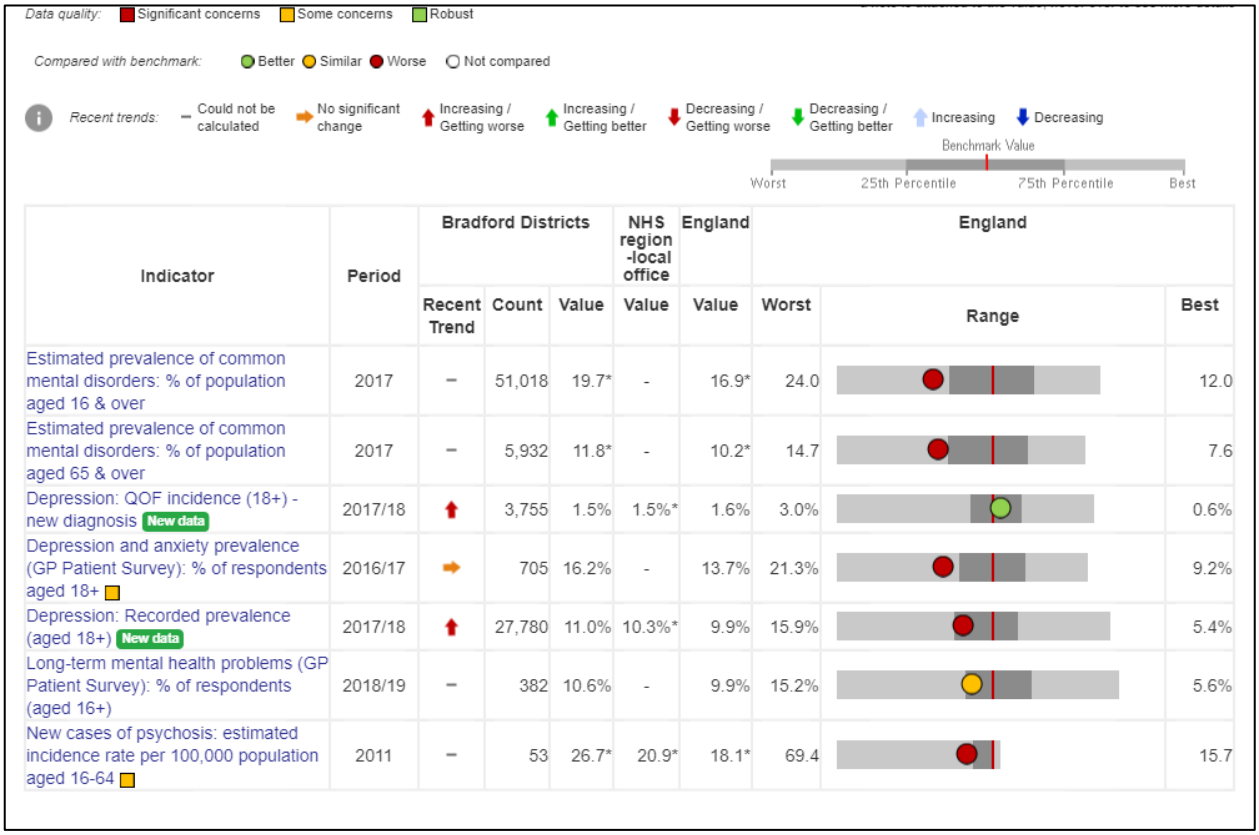
People living in Bradford City have high levels of mental ill health compared to elsewhere in the country (see Figure 18 and Figure 19). Comparative data on the prevalence of common mental health conditions shows that Bradford City CCG has third highest rates in England: 23.7% compared to 16.9% in England.

Bradford Districts CCG is also higher than the national average (19.7%). Incidence rates per 100,000 for new cases of psychosis are also high in Bradford (26.8) and Bradford Districts (26.7) compared to England (18.1) Rates for depression and anxiety and long term mental health are similar to the national average in Bradford, while Bradford districts shows slightly higher levels.

Indicator	Period	Bradford City			NHS region -local office	England	England		
		Recent Trend	Count	Value	Value	Value	Worst	Range	Best
Estimated prevalence of common mental disorders: % of population aged 16 & over	2017	–	14,487	23.7*	-	16.9*	24.0		12.0
Estimated prevalence of common mental disorders: % of population aged 65 & over	2017	–	853	14.7*	-	10.2*	14.7		7.6
Depression: QOF incidence (18+) - new diagnosis New data	2017/18	↓	1,328	1.4%	1.5%*	1.6%	3.0%		0.6%
Depression and anxiety prevalence (GP Patient Survey): % of respondents aged 18+	2016/17	→	196	13.6%	-	13.7%	21.3%		9.2%
Depression: Recorded prevalence (aged 18+) New data	2017/18	↑	8,872	9.1%	10.3%*	9.9%	15.9%		5.4%
Long-term mental health problems (GP Patient Survey): % of respondents (aged 16+)	2018/19	–	133	8.6%	-	9.9%	15.2%		5.6%
New cases of psychosis: estimated incidence rate per 100,000 population aged 16-64	2011	–	19	26.8*	20.9*	18.1*	69.4		15.7

Figure 18: Key mental health statistics Bradford City CCG

Source: (Public Health England, 2019a). https://fingertips.phe.org.uk/profile-group/mental-health/profile/



Indicator	Period	Bradford Districts			NHS region -local office	England	England		
		Recent Trend	Count	Value	Value	Value	Worst	Range	Best
Estimated prevalence of common mental disorders: % of population aged 16 & over	2017	–	51,018	19.7*	-	16.9*	24.0		12.0
Estimated prevalence of common mental disorders: % of population aged 65 & over	2017	–	5,932	11.8*	-	10.2*	14.7		7.6
Depression: QOF incidence (18+) - new diagnosis New data	2017/18	↑	3,755	1.5%	1.5%*	1.6%	3.0%		0.6%
Depression and anxiety prevalence (GP Patient Survey): % of respondents aged 18+	2016/17	→	705	16.2%	-	13.7%	21.3%		9.2%
Depression: Recorded prevalence (aged 18+) New data	2017/18	↑	27,780	11.0%	10.3%*	9.9%	15.9%		5.4%
Long-term mental health problems (GP Patient Survey): % of respondents (aged 16+)	2018/19	–	382	10.6%	-	9.9%	15.2%		5.6%
New cases of psychosis: estimated incidence rate per 100,000 population aged 16-64	2011	–	53	26.7*	20.9*	18.1*	69.4		15.7

Figure 19: Key mental health statistics Bradford Districts CCG

Source: (Public Health England, 2019a). https://fingertips.phe.org.uk/profile-group/mental-health/profile/

Bradford and districts has a similar suicide rate to the average: 9.0 deaths per 100,000, compared to 9.6 in England (2015-17). Self-harm hospital admissions are higher than for England at 216 per 100,000 population (Public Health England, 2018b).

West Yorkshire

West Yorkshire includes CCG areas for Greater Huddersfield; Calderdale; Airedale, Wharfedale and Craven (see Figure 20). Relevant partnerships are the similar for West Yorkshire as describe above for Bradford. We focus on Craven and Calderdale as indicative in the descriptors below.

Geography and natural assets

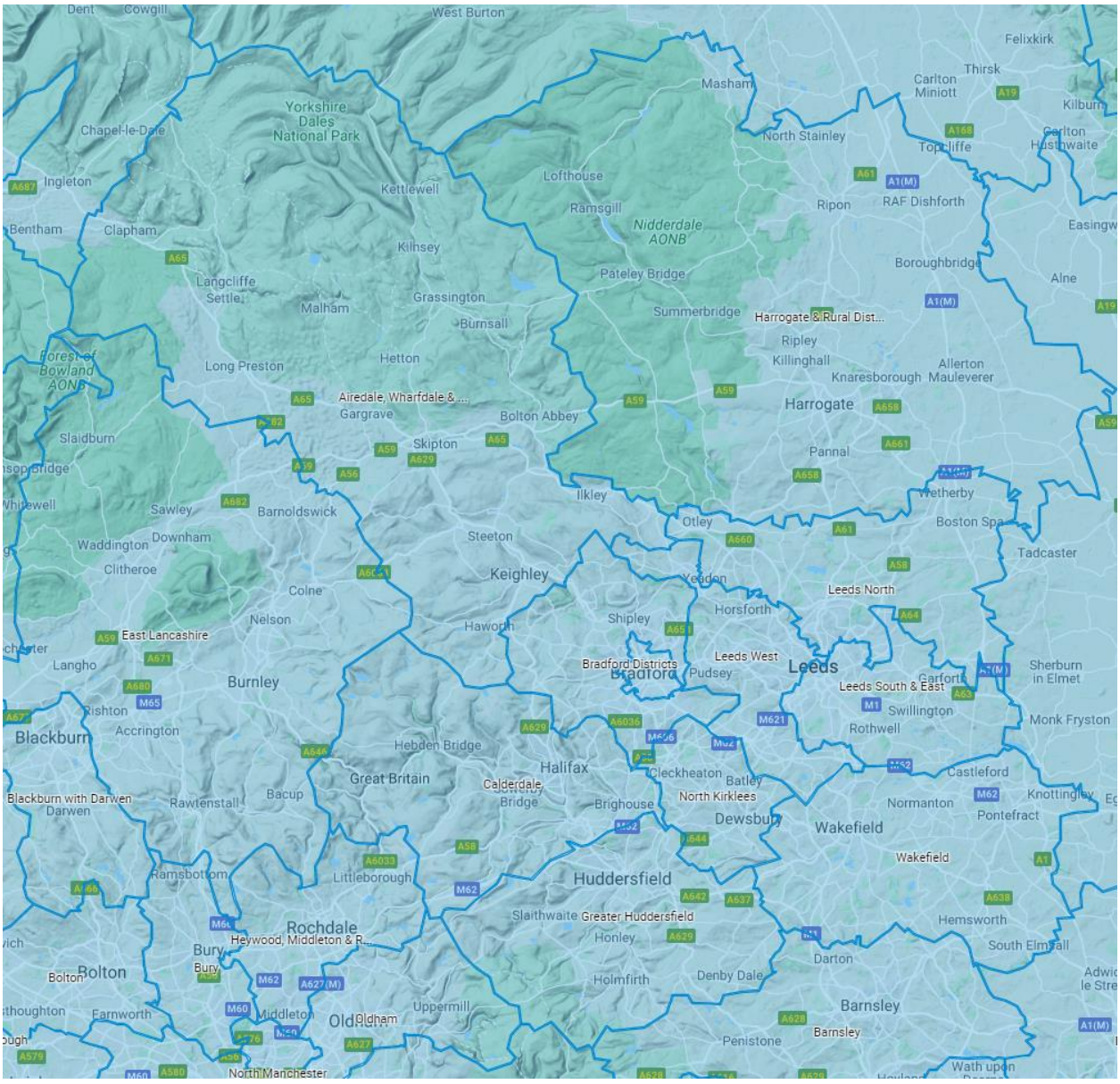


Figure 20: Geographic range case study site 3

In addition to the Southern Pennines and the Yorkshire Dales (shown in Table 6) the National Character Areas shown in Table 7 are relevant natural assets for West Yorkshire populations.

Table 7: National Character Area profile case study site 3

NCA profile	Detail
22 Pennine Dales Fringe	The Pennine Dales Fringe National Character Area (NCA) lies between the uplands of the Pennines to the west, and the Magnesian Limestone ridge and arable lowlands to the east. The land has a varied topography of exposed upland moorland fringes and plateaux dropping to lower foothills, separated by major river valleys and incised by numerous minor tributary valleys. It is underlain by Yoredale rocks in the north (limestone, sandstone and mudstone) and Millstone Grit in the south. It is a transitional landscape between upland and lowland. Drystone walls are common in the west while hedges, often thick and tall with frequent hedgerow trees, are more prevalent at lower elevations in the east. Broad valleys, widening to the east, with their more fertile soils support arable crops, while steeper, higher land in the west supports predominantly livestock farming. Broadleaved woodlands (many of them of ancient origin), coniferous and mixed plantations, and numerous small woods and hedgerow trees all contribute to the well-wooded character of the area. Hamlets, villages and small market towns are particularly distinctive, with strong visual unity, being built in local Millstone Grit Group and Yoredale Group stone in the west and Magnesian Limestone in the east.
30 Southern Magnesian Limestone	The Southern Magnesian Limestone National Character Area (NCA) is mainly defined by the underlying Permian Zechstein Group, formerly known as the Magnesian Limestone. It creates a very long and thin NCA that stretches from Thornborough in the north down through north Derbyshire to the outskirts of Nottingham further south. The limestone creates a ridge, or narrow belt of elevated land, running north–south through the NCA, forming a prominent landscape feature. The geology has influenced many aspects of the landscape, from use of its limestone resource as a local building material to the specialised limestone grasslands associated with limestone areas. The presence of the ridge, and the drift deposits covering much of it, has produced light, fertile soils that have attracted settlement for more than 13,000 years. The important archaeological evidence and mammal fossils found at Creswell Crags and the impressive barrows and henge monuments at Thornborough Henges (three intact henges) are nationally important geological and archaeological features that provide a historic link to the story of human settlement and society within the area and beyond. Opportunities to maintain the landscape setting of these important sites and increase access to and engagement with them need to continue to be secured.
33 Bowland Fringe and Pendle Hill	The Bowland Fringe and Pendle Hill National Character Area (NCA) is a transitional landscape that wraps around the dramatic upland core of the Bowland Fells, underpinned by Carboniferous geology. Over half of this NCA, along with the Bowland Fells, makes up the Forest of Bowland Area of Outstanding Natural Beauty. This is a diverse landscape of herb-rich hay meadows – several of which are nationally and internationally designated – lush pastures, broadleaved woodland, parkland and waterbodies (including rivers and streams supporting nationally and internationally protected species). The numerous river valleys and associated woodlands are a major component of the area. To the west, this NCA includes part of the Bowland Fells Special Protection Area (SPA), designated for its important populations of hen harrier, merlin

	and lesser black-backed gull. The influence of human habitation and activity, and the area's long farming history, contribute significantly to its character. In contrast to the predominantly rural feel of the area, this NCA includes several relatively urban areas including Clitheroe, Bentham and Longridge.

Demographics

Craven has a population of nearly 57,000 (2018), with a higher proportion of older people (all age groups over 50 years) than average regionally, or nationally. Calderdale contains around 210,000 people with a similar age profile to the national average (ONS.gov.uk).

In Craven, life expectancy is higher than average, but there are wide inequalities, with men in the least deprived areas living 9.3 years longer on average than those in the most deprived. For women the difference is 7.5 years. Life expectancy in Calderdale is lower than the average for England. Again, there are also significant health inequalities, with life expectancy 9.2 years lower for men, and 10.0 years lower for women, in the most deprived areas of Calderdale compared to the least deprived areas.

Organisation

As described above, there are a number of ongoing partnerships in the local area, as well as planned changes. With Bradford, Calderdale and Airedale, Wharfedale and Craven are partners in the large West Yorkshire and Harrogate Health and Care Partnership, a large strategic partnership between Bradford City and Bradford Districts CCGs and North Yorkshire. Calderdale Public Health has recently committed to tackling mental health issues in the area as a signatory on the *Prevention Concordat for Better Mental Health* (Public Health England, 2019b). The Calderdale Public Health Annual Report (2017/18) also highlights the potential of social prescribing to connect people to voluntary and social organisations to support wellbeing through a social prescribing hub.

Wellbeing

West Yorkshire encompasses communities with a range of wellbeing characteristics. For example, Calderdale has good wellbeing overall compared to England, with Happiness (7.44 vs 7.35); Life Satisfaction (7.57 vs 7.49) and sense of activities as Worthwhile (7.83 vs 7.73) all higher than average while anxiety is lower (2.89 vs 2.96). Kirklees is the opposite, with lower rates than average for measures of wellbeing, and more anxiety (7.25; 7.44; 7.68 and 3.05 respectively) (ONS,2017). Rates for Craven were not available.

Mental health profile

Common mental health problems are seen in similar numbers of adults in Calderdale to the average (17.6% vs 16.9%), and there are fewer new diagnosis of psychosis (18.5 new diagnosis per 100,000 population compared to 24.2 in England as a whole). Craven has better mental health than average – with 13.5% of adults experiencing common mental health problems and 14.9 new cases of psychosis diagnosed per 100,000 population (see Figure 21 and Figure 22).

Indicator	Period	Calderdale			Region	England	England		
		Recent Trend	Count	Value	Value	Value	Worst	Range	Best
Estimated prevalence of mental health disorders in children and young people: % population aged 5-16	2015	–	2,807	9.3%*	9.6%*	9.2%*	11.0%		7.0%
Estimated prevalence of common mental disorders: % of population aged 16 & over	2017	–	29,214	17.4*	17.6*	16.9*	24.4		11.1
Estimated prevalence of common mental disorders: % of population aged 65 & over	2017	–	4,108	10.7*	10.7*	10.2*	14.6		7.1
New cases of psychosis: estimated incidence rate per 100,000 population aged 16-64	2011	–	24	18.5*	21.4*	24.2*	71.9		14.7
ESA claimants for mental and behavioural disorders: rate per 1,000 working age population	2018	–	3,730	29.3*	31.4*	27.3*	64.0		9.7

Figure 21: Key mental health statistics Calderdale

Indicator	Period	Craven			Region	England	England		
		Recent Trend	Count	Value	Value	Value	Worst	Range	Best
Estimated prevalence of mental health disorders in children and young people: % population aged 5-16	2015	–	602	8.4%*	9.6%*	9.2%*	11.0%		7.0%
Estimated prevalence of common mental disorders: % of population aged 16 & over	2017	–	6,433	13.5*	17.6*	16.9*	24.4		11.1
Estimated prevalence of common mental disorders: % of population aged 65 & over	2017	–	1,318	8.9*	10.7*	10.2*	14.6		7.1
New cases of psychosis: estimated incidence rate per 100,000 population aged 16-64	2011	–	5	14.9*	21.4*	24.2*	71.9		14.7
ESA claimants for mental and behavioural disorders: rate per 1,000 working age population	2018	↑	470	14.6*	31.4*	27.3*	64.0		9.7

Figure 22: Key mental health statistics Craven

Source: (Public Health England, 2019a). https://fingertips.phe.org.uk/profile-group/mental-health/profile/

Suicide rates per 100,000 in Calderdale and in Craven are higher than the English average (12.5 and 12.4 vs 9.6). Hospital admissions for self-harm are also higher than average in Craven (256.1 per 100,000) than in England (185.5), although in Calderdale rates are similar 192.6.

Newcastle

Newcastle City Council covers Newcastle and Gateshead CCG as well as North Tyneside and South Tyneside.

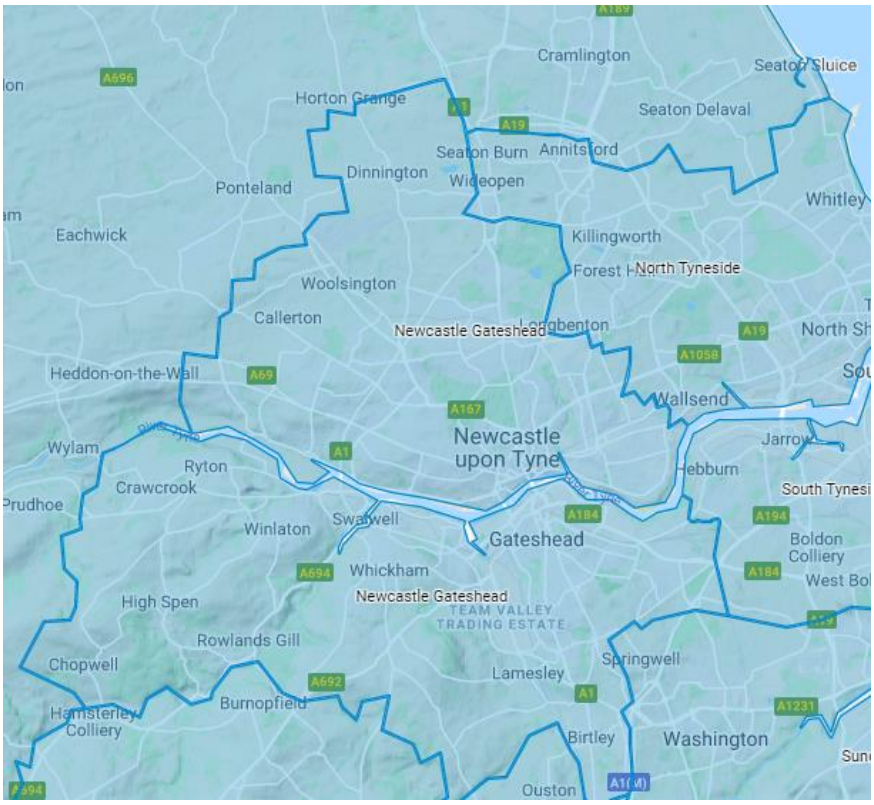


Figure 23: Geographic range Case study site 4

Geography and natural assets

Newcastle's traditional industrial bedrocks such as coal mining, ship building and other heavy industry collapsed over a number of decades. Despite recent regeneration of the city centre and quayside, Newcastle is ranked the 40th most deprived local authority and 72,000 of its 300,000 population live in the most deprived areas of the UK, and there remain high levels of unemployment (15.6% of population of the working age). In addition, average salaries are below the national average.

There are 33 urban parks in Newcastle, from riverside country parks to recreation grounds. These are managed by Urban Green Newcastle.

Beyond the urban boundaries there are a range of natural environments including AONBs like the North Pennines about 40 miles away, and the Northumberland Coast (Table 8).

Table 8: National Character Area profile case study site 4

NCA profile	Detail
10 North Pennines	The North Pennines National Character Area (NCA), at the northern end of the Pennine ridge, has a distinct identity, with its remote upland moorlands divided by quiet dales. It is characterised by a sense of remoteness, with few settlements, slow change and cultural continuity. It comprises some of the highest and most exposed moorland summits in England, with several major rivers, including the South Tyne, Wear and Tees, draining out to the north,east and south-east. It is bordered to the west by the Eden valley, to the north by the Tyne valley, to the east by the Durham lowlands and to the south by the Yorkshire Dales. There are dramatic and panoramic views both across the moorlands and outwards, especially towards the west. The area's natural beauty is reflected in the fact that 88 per cent of it has been designated as the North Pennines Area of Outstanding Natural Beauty (AONB).
11 Tyne Gap & Hadrian's Wall	This narrow, distinctive corridor centred on the River Tyne separates the uplands of the North Pennines National Character Area (NCA) from the Border Moors and Forests NCA. Westwards are views of pastoral landscapes of the Solway Basin and Eden Valley NCAs and eastwards a more urban character prevails with views of the conurbation of Newcastle in the Tyne and Wear Lowlands NCA. The Tyne valley is underlain by sedimentary Carboniferous rocks comprising a repetitive succession of limestones, sandstones, shales and intrusion of horizontal, igneous rock dolerite. Also, the prominent, intruded igneous Whin Sill formation forms a dramatic escarpment on which Hadrian's Wall is built. A mosaic of arable and pasture land, conifer plantations and well-wooded valley sides occur, along with the fertile lowland corridor of the river flood plain. Here, flat, arable fields contrast with the larger-scale upper slopes of valleys. In the west, cattle and sheep graze large areas of rough pasture, divided by walls and fences, merging to mixed and arable land in the east. A well-wooded mosaic of deciduous, mixed and coniferous woodland provides habitat for priority species – red squirrel and woodland birds. Broadleaved woodland on steeper slopes lines the rivers.
13 South East Northumberland Coastal Plain	The South East Northumberland Coastal Plain is a flat, low-lying strip along the coast of the North Sea, extending from north Tyneside in the south to Amble and the Coquet Estuary in the north. It is largely urbanised in the south and more rural to the north, with large fields, restored and active open cast coal mines and a coast of rocky headlands and wide, sandy bays. Rural areas support mixed farming, with fields divided by low, often gappy hedgerows and few trees. The underlying geology has had a significant effect on the character of the area. Its accessible seams of coal which have been mined from the 13th century to the present day are of great economic importance to the area. The coast supports a wide diversity of habitats including sand dunes, maritime cliffs and slopes, coastal and flood plain grazing marsh and mudflats. Parts of the coast are of European importance for the bird populations (roseate and Arctic tern, purple sandpiper and turnstone) at Druridge Bay and Coquet Island, which are included in the Northumbria Coast Special Protection Area, and for its dune systems and their plant communities, which are part of the North Northumberland Dunes Special Area of Conservation. The area supports a diverse range of marine

NCA profile	Detail
	species and ecosystems as a consequence of its geological diversity and the natural variation in the sediment loading of the water. The rivers Blyth, Wansbeck, Coquet, Pont and Seaton Burn drain through the coastal plain from the uplands to the west into the North Sea to the east, often passing through incised valleys with fragments of ancient woodland. They support rich wildlife, including white-clawed crayfish, otter, water vole and salmonids, and are important for recreation (walking, fishing and wildlife watching), water abstraction and sense of place.
15 Durham Magnesian Limestone Plateau	The Durham Magnesian Limestone Plateau is an open, agricultural landscape with sharply defined boundaries in the form of a steep limestone escarpment to the west and a dramatic coast of limestone cliffs, headlands and bays to the east. The River Wear cuts across the north of the area, flowing into the sea at Sunderland, and the River Skerne drains into the Tees Lowlands to the south. The Magnesian Limestone aquifer that sits below the area is an important source of drinking water for surrounding urban areas. Rural land cover consists of arable land and grazing pasture, with small, isolated areas of wildlife-rich habitat such as Magnesian Limestone grassland and ancient woodland in the narrow valleys (or denes) running down to the coast. The coast is an important breeding and feeding area for migratory birds, and harbour porpoise frequents inshore waters. The area has been strongly shaped by its industry, with coal mining and quarrying in particular leaving a very clear mark on local landscapes and identity. Settlements range from larger urban areas such as Sunderland to the north and ex-mining towns with their distinctive terraces to the south and east, to scattered traditional stone villages built around village greens on the plateau and 'New Towns' such as Peterlee and Newton Aycliffe. Local nature reserves and a good access network, particularly along disused colliery railways and the coast, provide local residents with good opportunities for outdoor recreation.
16 Durham Coalfield Pennine Fringe	The Durham Coalfield Pennine Fringe National Character Area (NCA) is a transitional landscape between the North Pennines NCA to the west and the Tyne and Wear Lowlands NCA to the east. It is formed by a series of broad ridges, separated by river valleys, with a strong west–east grain. Some 3 per cent (2,252 ha) of the NCA lies within the North Pennines Area of Outstanding Natural Beauty, and 204 ha falls within the North Pennine Moors Special Area of Conservation and Special Protection Area, designated for its habitats (including dry heath, blanket bog and old sessile oak woodland) and upland breeding birds (including golden plover, curlew, dunlin, hen harrier and merlin). The west is more upland in character, with large, open, regular fields bounded by drystone walls or fences, and is primarily used for sheep and cattle grazing. In the east the farmed landscape becomes more mixed, with arable crops grown on the richer land, and more irregular fields divided by hedges rather than walls. Networks of hedges and strips of woodland in river valleys and alongside streams, combined with shelterbelts and large conifer plantations, give parts of the area a well-wooded appearance. A number of major rivers run through the area, including the Wear and Derwent, and their tributaries, Browney, Deerness and Gaunless.

Demographics

There are over 300,000 people in Newcastle (Public Health England, 2018b). The city has a lower proportion of older residents than the England average (14.3% vs 17.7% aged 65+ respectively) and a higher proportion of young people than the national average – influenced by students living in the city (20.8% 15-24 year olds compared to 12.4% in England)

Newcastle's population is 88% white British and 12% other ethnic groups (2009 data). Children from black and minority ethnic (BME) groups make up 22% of the school population in 2011 –the proportion of BME children higher than for adults.

Employment rates in the North East are lower than average (71.1% vs 76.1% in the UK).

Wellbeing

Compared to the national average, people in Newcastle report lower levels of Happiness (7.24 vs 7.35) Life satisfaction (7.36 vs 7.49) and of feeling things they do are Worthwhile (7.53 vs 7.73). They also have higher levels of anxiety (3.1 vs 2.96). (ONS, 2017) Levels in North Tyneside are similar, while South Tyneside reports lower Happiness (7.13) and Life satisfaction (7.38), and also lower anxiety (2.95). (ONS, 2017)

Mental health profile

Generally, people in Newcastle and Gateshead report higher levels of mental ill health than the English average (See Figure 23). Comparative data on the prevalence of common mental health conditions shows that Newcastle and Gateshead CCG have similarly high rates (19.0%) and South Tyneside CCG (19.1%); with North Tyneside CCG slightly lower (17.3%), but still higher than average in England (16.9%).

The prevalence of depression in adults is similar in Newcastle and Gateshead (9.6%) to the average in England. Other indicators of poor mental health are worse than the English average (Depression and anxiety in the GP survey 17.3% vs 13.7%; new cases of psychosis per 100,000 population 23.9 vs 18.1).

Indicator	Period	Newcastle And Gateshead			NHS region -local office	England	England		
		Recent Trend	Count	Value	Value	Value	Worst	Range	Best
Estimated prevalence of common mental disorders: % of population aged 16 & over	2017	–	78,321	19.0*	-	16.9*	24.0		12.0
Estimated prevalence of common mental disorders: % of population aged 65 & over	2017	–	9,540	11.7*	-	10.2*	14.7		7.6
Depression: QOF incidence (18+) - new diagnosis New data	2017/18	↑	6,957	1.6%	1.7%*	1.6%	3.0%		0.6%
Depression and anxiety prevalence (GP Patient Survey): % of respondents aged 18+	2016/17	↑	1,217	17.3%	-	13.7%	21.3%		9.2%
Depression: Recorded prevalence (aged 18+) New data	2017/18	↑	41,295	9.6%	11.1%*	9.9%	15.9%		5.4%
Long-term mental health problems (GP Patient Survey): % of respondents (aged 16+)	2018/19	–	835	13.4%	-	9.9%	15.2%		5.6%
New cases of psychosis: estimated incidence rate per 100,000 population aged 16-64	2011	–	76	23.9*	19.0*	18.1*	69.4		15.7

Figure 24: Key mental health statistics Newcastle and Gateshead

Source: (Public Health England, 2019a). https://fingertips.phe.org.uk/profile-group/mental-health/profile/

Suicide rates per 100,000 are higher than average in Newcastle, at 10.6 per 100,000 compared to 9.6 in England. Rates are even higher in North Tyneside at 12.6, but lower in South Tyneside 8.3 (PHE public health profiles).

Hospital admissions for self-harm are higher than average, at 267.4 per 100,000 in Newcastle compared to 185.5 in England. Rates for North Tyneside are 336.7 and for South Tyneside 256.7 (PHE public health profiles).

9. Appendix 2: Excluded evaluations from the case site provision mapping

Author	Title	Intervention name	Location	Reason for exclusion
Anon, 2015	Evaluation report	Spring to Life Project	Sharpham, Devon	Insufficient methodological detail
Baker et al, 2011	Eco-art on prescription	EcoArt	Devon	Insufficient methodological detail
Biglands & Webber, 2019 Webber & Bigmands 2018 (pilot)	A woodland based psycho educational programme for teenage girls	Rooted	Shipley, W. Yorkshire	Small sample (n=8) Pilot n=5
Howes et al 2018	Moor health and Wellbeing: an evaluation of two National Park Projects	Dartmoor *Naturally Healthy* & Exmoor *Moor to Enjoy*	Dartmoor, Exmoor Devon	Population – "health issues"
Lepchani, 2018	An evaluation of *Write to Freedom's* activities, Feb 2017 to April 2018	*Write to Freedom*	Dartmoor, Devon	Insufficient methodological detail
McGeorge, 2013	An evaluation of the Community Garden Project run by organicARTS	organicARTS	Devon	Insufficient methodological detail
Roberts (no date)	Green Walking Project Case study	Green Walking	Spen Valley Greenway, W. Yorkshire	Insufficient methodological detail

10. Appendix 3: TIDieR assessment of the interventions in the evidence review (all studies)

Table 9: TIDieR assessment of interventions in the evidence review

Study	**Why** Rationale, theory, goal	**What Materials** Physical or information	**What Procedures** Activities, procedures, processes	**Who Provided** Expertise, background training	**How** Modes of delivery, individual, group	**Where** Types of locations	**When and How Much** Numbers of times delivered, over what period of time, number of sessions, durations, intensity, dose	**Tailoring** Planned to be personalised or adapted – what, why, when and how	**Modifications** If modified describe – what, why, when an how	**How Well Planned** Adherence assessed, how and by whom	**How Well Actual** Extent to which the interventio n was delivered as planned
Nature-based intervention *Grow* Adams & Morgan 2016 Quant	Designed to support people with experience of mental distress to experience wellbeing benefits of connecting with nature in a safe supportive group.	No details	Structured around a check in and check out session to shared thoughts and reflections. Includes guided nature walks, conservation tasks, green woodworking, food foraging, beach combing, mindfulness, creative activities	2 project staff and 2 trained volunteers	Closed group of 8-12	Rural Sussex in partnership with National Trust	1 whole day/wk for 8 weeks.	No details	No details	No details	No details
Alnarp Rehabilitation Garden Adevi & Martensson 2013 Qual	To facilitate the participant's return to work life and to improve strategies for coping with stress.	No details	Nature-assisted therapy and gardening, art therapy and relaxation.	Professionals from horticulture, physiotherapy, occupational therapy, medicine and psychotherapy	Individual (with physiotherapist and psychotherapist) and group to share experiences and train social skills	A two-hectare area with separate garden rooms.	No details	No details	No details	No details	No details
Wilderness therapy Banaka & Young 1985	To assess a wilderness program's effect on personal & social skills, hospital	Program guides used personal learning contracts to take gradual steps	Wilderness program – Adventure camp:	12 hospital staff. 12 professional outdoor guides provided activities.	Group.	Oregon USA	2 week program with 4 components: Individual learning contracts,	Individual learning contracts.	No details	No details	No details.

Study	**Why** Rationale, theory, goal	**What Materials** Physical or information	**What Procedures** Activities, procedures, processes	**Who Provided** Expertise, background training	**How** Modes of delivery, individual, group	**Where** Types of locations	**When and How Much** Numbers of times delivered, over what period of time, number of sessions, durations, intensity, dose	**Tailoring** Planned to be personalised or adapted – what, why, when and how	**Modifications** If modified describe – what, why, when an how	**How Well Planned** Adherence assessed, how and by whom	**How Well Actual** Extent to which the interventio n was delivered as planned
Quant	discharge, hospitalistaion, and survival in community.	towards learning skills.	mountaineering and white water rafting	Camp maintenance and cooking shared in groups of three – 2 pts, 1 staff.			participation in 3 one-day orientation sessions, 5 days of mountaineering and rockclimbing, and a 5 day white water rafting trip.				
Sydenham Garden Barley et al 2009 Quant & Qual	To facilitate meaningful creative activities carried out as part of a community of coworkers, staff and volunteers, to deliver significant therapeutic benefits.	No details	Participants referred by local professionals, such as GPs. Garden, art and craft activities.	Two horticulturalists ran the garden activities and a volunteer coordinator ran the art and craft activities. Both activities were assisted by volunteers.	Small group or one-to-one if coworkers were less confident.	An area managed as a nature reserve and a garden where vegetables, herbs and flowers are grown.	Each session lasted 2.5-3 hours, catered for a maximum of 10-12 coworkers. There were six garden and two art and craft sessions per week.	No details	No details	Vulnerability of client group led to considerable fluctuations in attendance from week to week, and sessions were not run to full capacity.	No details
Ann Arbor Arboretum – an urban park Berman et al 2012 Quant	Based on Attention Restoration Theory: interacting with environment rich with inherently fascinating stimuli that invoke involuntary	Map displaying walk	Walking	Taken alone	Individual	Green park	50- to 55-min walk - 2.8 miles).	None	None	Participants given GPS watch to ensure compliance	Not described by GPS watch used.

Study	**Why** Rationale, theory, goal	**What Materials** Physical or information	**What Procedures** Activities, procedures, processes	**Who Provided** Expertise, background training	**How** Modes of delivery, individual, group	**Where** Types of locations	**When and How Much** Numbers of times delivered, over what period of time, number of sessions, durations, intensity, dose	**Tailoring** Planned to be personalised or adapted – what, why, when and how	**Modifications** If modified describe – what, why, when an how	**How Well Planned** Adherence assessed, how and by whom	**How Well Actual** Extent to which the interventio n was delivered as planned
	attention modestly, giving directed-attention mechanisms chance to replenish.										
Wilderness Adventure therapy Bowen et al 2016 Quant	Adventure therapy uses experiential learning activities in outdoor environments for assessment and intervention at an individual and group level, in order to effect psychological and/or behavioural therapeutic change.	Intake (Week 1) includes screening, assessment, engagement, orientation, and negotiation of client goals. Treatment (Weeks 2–9) involves seven day-based adventure activities (e.g., bushwalking, abseiling, cross country skiing, and white water rafting), a two-day overnight training expedition, and a five-day expedition. Parents, teachers, and support workers also participate in up to eight weekly indoor	Eclectic therapeutic approach, drawing on cognitive-behavioural, systemic, existential, psychodynamic, and occupational therapy. Uses client psychological assessment, intake processes and treatment planning, group composition, psychological safety procedures, therapeutic group procedures, monitoring of client outcomes, therapist skill training,	Facilitated by a psychologist. 3 WAT facilitators per group.	Groups of 6-8 and individual components	Outdoors	P/T for 10 wks, some overnight plus FU	No details	No details	No details	No details

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		adventurous problem-solving activities incorporated within group therapy sessions. Termination (Week 10) includes a review of goals and unresolved needs/issues, identification of post-treatment goals and strategies, and enlisting of psycho-social supports. Follow-up includes liaison with other agencies, group re-union, and school or placement outreach follow-up.	management of ethical issues, and research evaluation. Emphasises development of social-emotional competencies and coping skills through group-based adventure experiences.								
Rise-Up – an adventure-based therapy program	To examine the feasibility of a six week adventure-based therapy intervention in	No details.	Two team-building exercises with a range of icebreakers and games, followed by showshoeing,	Facilitated by recreation therapists. They used a psychological rehabilitation framework to	Group, typically included 10-15 individuals.	Some activities took place in the city and some involved trips out of the city.	Rise-Up ran for six weeks, with activities taking place once per week and lasting from half a day to three days.	Activities were tailored to skill levels and interests as much as possible.	Some seasonal variation in types of activities used. No further details.	No details.	No details.

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Bryson et al 2013 Quant & Qual	an outpatient care setting.		downhill tubing, camping, and a closing celebration and meal.	engage participants in the group activities.							
Surfing Caddick et al 2015 Qual & Qual	No details	No details	Surfing, coastal walks and yoga/meditation sessions	No details	No details	Surf camps	Twice weekly	No details	No details	No details	No details
Wilderness therapy Clark et al 2004 Quant	Theorise that physically and emotionally demanding experiences, outdoors, in groups, will bring about positive characterologica l changes. To evaluate the impact of WT on immature defence styles, perceived psychological stressors, dysfunctional personality patterns, clinical syndromes, maladaptive behaviours.	Initial family meeting, and one 20 days into treatment prior to discharge	21 day wilderness adolescent therapy program. Referred but not clear who by. Therapists provide behavioural management, 12 step program, individual and group therapy – aimed at understanding why engage in destructive behaviour &how it affects families.	Therapists	4-8 people per group.	No details	21 days	No details	No details	No details	No details

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Hive Coan et al 2017 Quant & Qual	Based on Creative Eco-therapy, *Flourish* helps people look after their mental health by getting active outdoors and combining environmental activity with the creative process.	No details	Three linked projects, *Thrive, Flourish* and *Make@Hive.* Participants self-referred or referred through MH or primary care. People move between them and the other projects focus on making and creativity. Often run with pre-existing groups.	Project worker with volunteer support	No details	No details	"Regular" for 10 weeks.	No details	No details	No details	No details
Wilderness sites Combs et al 2016 Quant	To explore the trajectory of change over treatment in terms of behavioural & emotional dysfunction and the impact of demographics and presenting problems		Wilderness therapy/ Outdoor behavioural healthcare (OBH) Combining nature immersion, group living with peers, and individual & group therapy & educational and therapeutic curriculum. 5 week residential program	Therapists (MSc & PhD trained)	Group and individual	Wilderness sites in Utah, Oregon & Georgia USA	2 days/wk therapy incl. CBT, choice therapy, mindfulness.	Counselling elements for individual need	No details	No details	No details

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Residential wilderness programme Cook 2008 Qual	To guide male adolescents to enable them to succeed in life – guidance is provided through education, an experiential component, family services (home visits and family counselling sessions are encouraged), and therapeutic services.	No details	Group activities and experiential activities. Examples of group activities included problem solving, daily chores, cooking meals, and examples of experiential activities include ropes courses, extended hiking trips, canoe trips	Family service worker helped boys set individual goals. Key staff is mentioned but no additional details.	Role of group is important in shaping social and emotional development of participants. The group of boys acted as participants' support system and help individuals work through behaviours and problems that brought them to the program.	No details	Year-long residential wilderness program.	No details	No details	No details	No details
Community Garden Crossley 2018 Qual	To evaluate a project for working age volunteers that provided gardening training and therapeutic gardening sessions to improve volunteers' health and wellbeing	No details	Landscaping, planting, sowing seeds, pruning, weeding, maintenance tasks, harvesting and cooking	Two garden officers	Group and individual.	Community garden in Newcastle-upon-Tyne	3 session per week	No details	No details	No details	No details
Residential Wilderness therapy	Wilderness therapy thought to impact a range of affect, behavioural and	No details	Backpacking trip with daily group therapy. Individual therapy also	"Licensed professional"	Groups of 6-8.	Allegheny National Forest, Penn. And Daniel Boone	1.5-2 weeks intensive	Individual treatment goals pre established.	No details	No details	No details

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Davies Berman & Berman 1989 Quant	self perception models		available as needed. Daily diary kept by participants. 2 days at base camp given instruction in basic camping, backpacking and wilderness skills; and structured group activities aimed at increasing group cohesion. One wk on a backpacking trail. Responsibility for themselves in meeting physical challenges, work in cooperation with assigned partners.			National Forest, Kentucky					
Courtyard box garden (container gardening) Detweiler et al 2015 Quant	To assess the effect of horticultural therapy (HT) vs occupational therapy (OT) on post-traumatic stress disorder (PTSD), alcohol craving and QoL as part of a	No details	Planting, planning, watering, weeding, harvesting.	No details	No details	Courtyard Box garden (container gardening) in residential substance use facility.	Supervised 1hr/day 5 days/wk for 3 wks as part of a 28 day substance use treatment program	No details	No details	No details	No details

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	substance use treatment program										
Wave project (surf therapy) Devine-Wright & Godfrey 2018 Quant & Qual	To assess the impact of the Wave Project (surf therapy) on vulnerable young people (aged 8-21) with mental health issues, family breakdown and/or physical disability. Surfing is unstructured, exploratory and playful rather than achievement oriented. Having fun is fundamental to the well-being of children. Surfing is immersive, and can provide opportunity to experience risk – risk builds resilience.	Surfing equipment – boards, wetsuits. Buggies and adapted surfboards available to facilitate accessibility	Follow on Surf Club available (£5 fee – waived for families in financial hardship, plus £5 is transport provided) and opportunity to become a surf volunteer.	Volunteer surf assistance plus surf coordinator	1-to-1	10 coastal sites in the UK	6 week	As one to one can adapt to client skills and need. Specialist equipment used to enable people of all abilities to surf.	No details	No details	No details.
Vocational rehabilitation clinic in	To enhance 'occupational balance in	No details	Participants referred by the National Health	Occupational therapist, a physiotherapist,	Group. Inspired by a cognitive approach and	Therapeutic garden	10 sessions over 10 weeks, and 2 follow-ups at 3	No details	No details	No details	No details

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therapeutic garden Eriksson et al 2011 Qual	people' (enable return to work or to another occupation that could offer purpose and meaning) with stress-related ill health.		Insurance Office. All sessions consisted of training, discussions, and relaxation. Sessions ended with engagement in activities that aimed to promote relaxation and enjoyment e.g. arranging a bouquet of flowers.	a social worker, and a gardener.	focused on thoughts and behaviours in certain situations. Relaxation was based on mindfulness and focused on meditation and breathing		and 4 months after the rehabilitation period. Each session lasted for 3 hours.				
Wilderness therapy - *Friluftsterapi* Fernee et al 2019 Qual	The program was offered as a stand-alone, outpatient, and voluntary group treatment for adolescents aged 16 to 18 at a state-run public hospital.	No details.	Team building, preparing for overnight trip, high ropes course, preparing for expedition, practice hike with back packs, six-day overnight hike.	A team of three therapists comprising a clinical child psychologist and mostly master's level mental health practitioners. Each client was assigned a primary therapist from the team on the second day of the program.	Individual and group-based psycho-therapy was carried out during most day sessions and preferably on a daily basis on the overnight trips.	Outdoors, not generally perceived as 'wilderness' in a Norwegian context as clients were in relative proximity to civilisation throughout the duration of the intervention.	A 10 week intervention, that included a total of eight single-day sessions and two overnight trips of three and six days' duration.	The therapist and client developed a treatment plan with individualised goals. At the end of the program, decisions were made with regard to individual after-care plans, whether the client was discharged or arrangements were made for	No details.	No details.	No details.

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								further treatment.			
Community horticultural allotment group Fieldhouse 2003 Qual	No details.	No details.	No details.	No details.	No details.	Community horticultural allotment group	No details.	No details.	No details.	No details.	No details.
Wilderness therapy - Friluftsterapi Gabrielsen et al 2019 Quant & Qual	Norwegian wilderness therapy programme, *Friluftsterapi*, offered to adolescents within a mental health care setting. Programme aimed to increase the motivation and knowledge of how to engage in wildlife settings. The focus was more on the experience of oneself and others in wild places, and was less focused on	No details	No details.	Interdisciplinary teams of three therapists who also had outdoor skills.	Individual and group (n=8) activities. Group cohesion was an important goal.	Outdoors (except for first introduction day and closing day). In the coastal regions of southern Norway.	Eight single days and two wilderness overnight trips. Increasingly demanding and complex tasks were introduced.	No details.	No details.	No details.	No details.

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	facilitating outdoor adventures.										
HT on farms in natural landscapes Gonzalez et al, 2010 Quant	To assess change impression severity, attentional capacity and rumination for those with clinical depression in in a therapeutic horticulture programme.		Sowing, germinating, potting, planting, and cultivating veg, flowers and herbs. Also sitting, listening to birds and other passive activity.	Farmers facilitated activities	Groups	Farms	12 wk program of 24, 3-hr HT sessions (twice a week).	No details	No details	No details	No details
HT on farms in urban settings Gonzalez et al 2009 Quant	Therapeutic gardening on farms offered to those with depression in Norway. To assess change in severity of depression and perceived attention capacity.	Information sheets about plants and seeds, advice re clothing, shoes, weather etc.	Active and passive gardening activities – sowing, germinating, potting, planting, composting, cultivating veg, rooting cuttings. Also walking, sitting, nature watching, listening to nature.	Farmers facilitated activities	Groups of 3-5 people with possibilities for being alone.	Urban farms	3hrs, twice a week for 12 weeks over spring and summer	Participants could choose which farms they attend – other tailoring unclear	No details	No details	No details
HT on farms in urban settings	Therapeutic gardening on farms offered to those with		Active and passive gardening activities – sowing,	Farmers facilitated activities	Groups of 3-5 people with possibilities for being alone.	Urban farms	3hrs, twice a week for 12 weeks over spring and summer	Participants could choose which farms they attend –	No details	No details	No details

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Gonzalez et al 2011 Quant	depression in Norway.		germinating, potting, planting, composting, cultivating veg, rooting cuttings. Also walking, sitting, nature watching, listening to nature.					other tailoring unclear			
HT on farms in urban settings Gonzalez et al 2011b	Therapeutic gardening on farms offered to those with depression in Norway.		Active and passive gardening activities – sowing, germinating, potting, planting, composting, cultivating veg, rooting cuttings. Also walking, sitting, nature watching, listening to nature.	Farmers facilitated activities	Groups of 3-7 people with possibilities for being alone.	Urban farms	3hrs, twice a week for 12 weeks over spring and summer	No details	No details	18.4 sessions (/24) attended on average	No details
Garden at daytime shelter Grabbe et al 2013 Qual	To promote mental well-being among homeless women, with or without underlying mental illness, through a shelter-based		Physical activity outdoors, horticulture and nutrition education, stress reduction, and healthy food preparation Participants	MH nurses and student volunteers	Group	Shelter-based garden	2hr gardening session 2x/wk Plus women could freely engage in gardening at any time during daylight hours when the shelter was open.	Could chose to participate when required for as long as required, and to do gardening at anytime outside of led sessions.	No details	No details	No details

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	gardening experience. .		planted and tended the vegetable garden and prepared and ate the results.								
Alnarp rehabilitation garden Grahn et al, 2017 Quant	To examine return-to-work rates one year after participating in a rehabilitation program with different durations at the Alnarp Rehabilitation Garden. The natural environment can relieve symptoms of stress and improve recovery from mental disorders so may be useful for people absent from work due to stress-related mental disorders. ART, Psycho-Evolutionary Theory (PET) & Supportive	No details	Gardening and horticulture activities,	Support provided by a professional multimodal team: a registered occupational therapist; a registered psychotherapist; a registered physical therapist; a registered psychiatrist; a landscape architect; and a landscape engineer	Groups of 8 & individual	Alnarp rehabilitation garden, Sweden	Study compared 8, 12 & 24 weeks. 3.5hrs/day, 4 days/wk. Individual physical therapy and psychotherapy offered 2x/wk	Individual rehabilitation plan for each participant	No details	No details	No details

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	Environment Theory (SET) also cited.										
Gardening project Harris 2017 Qual	Study aims to build a clearer picture of processes affecting participation in TH programmes and the salience of 'nature' versus other components characteristic of TH interventions Draws on theories of biophilia & ART	No details	Clients referred by Community Mental Health practitioners, Occupational Therapists and Recovery Teams. Follows a recovery model to mental health in which staff facilitate a 'user-led' approach to activities rather than manage sessions Typically include vegetable & flower gardening, maintaining wildlife habitats, woodcraft, pottery, cooking and socialising.	Mental health professionals accompany on an initial visit & return for periodic reviews. Project manager and deputy run sessions	Group 12- 18 people	One acre of walled garden in a small market town in south-east England.	Weekly sessions that run 4 days per week. Open ended	User led	No details	No details	No details

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Therapeutic horticulture Howarth et al 2018 Quant & Qual	To use therapeutic horticulture as part of a mental health recovery programme to reduce social isolation and improve engagement for people with mental health problems.	Provided a simple guide to growing to enable participants to participate in sowing, growing and harvesting of products.	No details.	No details	No details	No details	No details	No details	No details	No details	No details
Horticultural activity program Kam & Siu Qual	To assess effectiveness of horticultural therapy for people with psychiatric illness on stress, work behaviour, QoL.	Each session had a written theme (sensory garden, activity garden, Farm garden, display garden, practical garden) and specific activity objectives and group sharing.	Work related skills training including indoor industrial activities (eg packing) and outdoor horticultural tasks – vegetable production, delivery & conducting farm tours.	Led by an occupational therapist	No details	New Life Farm – a rehabilitation sheltered workshop offering work related skills.	10 consecutive days. 1hr of horticulture, plus conventional workshop training.	No details	No details	No details	No details
Outdoor adventure Kelley et al 1997 Quant	Hypothesised that an outdoor adventure program would lead to improved functioning in people with serious mental illness – in terms	Leaders modelled activities. Instruction on safety procedures. Group rules (eg no solo climbing) frequently explained.	Each series started with a hiking trip then 4 rock-climbing & 4 cave exploring trips. Group discussions initiated during breaks & travel	At least 2 staff per outing – one of which was a clinical psychologist, others had varied backgrounds. All skilled in the outdoor	Groups of 8-12	No details	9 wk program of weekly, day long (8-10 hrs) outdoor adventure outings. 3 periods in spring, summer, autumn.	Order of activities was weather dependent. Participants could chose to practice current level of difficulty or progress to a	No details	No details	Attendance ranged from 2-10 participants – average 6.

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	of self efficacy, anxiety and depression, interpersonal traits eg trust and paranoia, locus of control, & other symptoms.	Self instruction manual – using orientation, cognitive rehearsal; self-guidance while doing task; coping self-statements to handle frustration, fear, failure; self reinforcements to maintain task perseverance, feedback , rewards.	encouraged discussing g feelings re group and activities, feedback for positive and negative behaviours - emphasising generalisation of observations & risk assessments to everyday life.	adventure activities. Received safety training, as well as training on an emphasis on group processing, progression through a graded series of difficulty, self-instruction training and generalisation.			Participants progressed through a series of graded activities	more difficult challenge.			
Outdoor behavioural healthcare Lewis 2012 Quant	For adolescents who resist or don't respond to traditional forms therapy, OBH offers group processes, experiential learning, peak experiences, and natural exposure for impact. Contextual shift away from the home environment, where problems are maintained, provides backdrop to	Program curricula designed to prepare clients for outdoor activities, assess clinical need, develop individual tx plans.	Residential, therapeutic approach. Weekly psycho-educational training modules & groups process meetings. Multiple behavioural management strategies employed to teach, reward and elicit adaptive behaviours. Contingency management to	Clinical team – MSC level therapist and BSC level residential staff.	Groups of 8-10 of the same gender with similar presenting issues and clinical needs. Individual therapy.	North Carolina, Idaho, NY – no further details	Average tx 57.48 days (SD13.22)	Individual tx plans.	No details	No details	No details

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	behaviour change. Better able to engage in tx. Allows skills development that can be taken home.		reinforce target behaviours. Clients progress through a series of cumulative building on progress at prior stage – eg skills acquisition, social-cognitive growth, community involvement, generalising learned skills to the natural environment, adaptive coping.								
Healing gardens McCaffrey 2007 Qual	Garden walks, alone or with guided imagery, compared to art therapy, for improving depression in older adults	Guided imagery script for Walking Group 2 was approved by Hoichi Kurisus, Japanese Garden designer, prior to the intervention. Walking Group 1 completed the walk without walking guidance, spending around 1 hour in the garden.	No details	Support from principal investigator	Group	Mokikami Museum and Japanese Gardens in Delray Beach, Florida, US	Three 6-week sessions were held	No details	No details	No details	No details

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"get dirty feel good" - Natural resource management in a Rural community Molsher & Townsend 2016 Quant	Improve wellbeing & create a sense of ownership and community cohesion.	Each session included training and information on environmental issues.	Most referred by MH or employment services. "Get dirty feel good" - volunteering for Natural Resource Management & training in wellbeing, healthy eating, photography & first aid.	Natural resource training provided by the Environment department, specialists provided other training (eg photography & first aid)	Group	Rural South Australia	3 programs of 1x5hr session/wk for 9-10 weeks.	No details	No details	No details	No details
Scuba diving Morgan et al 2019 Quant & Qual	Injured service personnel can suffer considerable MH challenges, incl PTSD. Scuba diving can help with physiological changes, altering blood gases and increasing serotonin.	To assess the impact of diving on servicemen with PTSD and amputations.	Written and practical skills training.	Graduated series of diving qualifications accredited by PADI Theory and practical skills. Encouraged to share experiences with buddies and groups, including coping mechanisms. All staff and instructors complete the Mental Health First Aid course. Continuing Buddy Peer	Group	The Red Sea	10-14 days	No details	No details	No details	No details

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				Support Service for servicemen.							
Forest activities Nordh et al 2009 Quant & Qual	Daily routine, meaningful activities and social training will promote restoration reduce exhaustion and increase capacity to function and improve QoL..	Lectures and experience.	Daily routine, meaningful activities and social training. Each of the 10 wks followed the same program: coffee, lectures/information; outdoor activity, lunch, fire/ BBQ. Making inventories of nature, culture and artefacts, walking, training in maps and compass . Weekly meeting with work rehab mentor to draw up individual plan for after the orogram	2 leaders from The Swedish forest Agency, 2 mentors from the work rehab group with a background in behavioural sciences.	Group of 9-13 Plus individual mentor meetings	Forest environment close to a Swedish town near a lake.	10 wks. 3 days/wk in the forest, 1 day somewhere else locally. Weekly meeting with work rehab mentor.	Personal plan for the future with mentor.	No details	No details	No details.
Environmental volunteering O'Brien et al 2011 Qual	Environment volunteering can improve health and wellbeing through: regular physical exercise, social interaction, team work	No details	No details	No details	No details	10 volunteer groups in N England and Scotland – for a range of environmental groups	<=8 – 33hrs/month	No details	No details	No details	No details

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	and the development of social networks, Relaxation and reducing mental fatigue, Stimulation and interest, Contribution to meaningful Activity.										
Woodland or Forest - Westonbirt Aboretum O'Brien 2018 Qual	Green mind theory: stress in modern lifestyles can be reduced by immersive experiences that include: Nature, Social or Craft engagement.	A community shelter away from public footpaths: wooden structure with a roof, a table for preparing food and drinks, seating, a fire pit, and a cob oven	Community Project which aimed to increase the range of people who take part in the Arboretum's heritage. Participants referred by health or social care, GP or self-refer. Range of activities incl woodland management, creative and sensory activities, and social activities which included working with others, preparing,	Forestry Commission England staff and volunteers	Group	Westonbirt Arboretum – a state forest managed by the Forestry Commission in SW England. 600 acres, registered as a grade 1 listed park and garden.	22 youth groups, 221 sessions. 18 adult groups, 91 sessions. 5hrs per session, every week or fortnight.	No details	No details	No details	

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			cooking & eating food.								
Alnarp Rehabilitation Garden Palsdottir et al 2014 Quant & Qual	To enhance a salutogenic and curative process to reinforce each individual's physical and mental capacity to their inner self with firm support from natural environments.	No details.	Four major therapy forms were used to support the nature-based rehabilitation: occupational therapy; physiotherapy in the form of Rosen therapy; psychotherapy; and horticultural therapy. Weekly schedule used	Transdisciplinary team.	Group therapy.	Alnarp Rehabilitation Garden – a two hectare site, divided into two major areas, the Nature Area which is an informal nature garden, and the Cultivation and Gardening Area, which includes formal gardens and rooms for horticulture and other garden work.	4 days/wk 12 weeks.	No details.	No details.	Average participation 38.5 days (range 34-49)	No details.
Horticulture experience Perrins-Margalis et al 2000 Qual	Engaging in horticulture as a purposeful activity may improve the quality of lifefor people with chronic mental illness.	No details	Planting, preparing soil, creating cactus gardens, creating indoor flower beds, fresh flower arranging	Two researchers presented two horticultural activities per week	Group	Indoor	6 week period	No details	No details	No details	No details.
Gardening group Rappe et al 2008 Qual	To assess the suitability and effectiveness of group gardening in contributing to the rehabilitation of	The Association for Mental Health financed the rent of the Plot, seeds, tools and fertilizers	Cultivated vegetables and flowers. Participants were encouraged to make decisions about	Not clear	Group	Annala Manor Park (Annala) in Helsinki, Finland - a plot for MH out pts	The group met weekly & could also visit the plot at anytime alone.	No details	No details	No details	No details.

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	mental health outpatients. Gardening is associated with the inner sense of tranquillity, includes the natural outdoor environment and meaningful physical work. Contact with nature reduces stress and enhances mood. Community gardening increases social capital, promotes neighbourhood ownership & a sense of civic pride. ART.		what to do								
Wilderness therapy Russell 2003 Quant	Integration of traditional treatment with dynamics inherent in group living in outdoor environments can address needs of unique	No details	Residential outdoor behavioural healthcare (no details)	Clinical Supervisor Medical supervisor Field therapist (every 3-5 days) Wilderness leader (throughout)	No details	Outdoor wilderness settings	7 outdoor Behavior Health Care Industry Council programs in Oregon, Utah, Arizona and Idaho 2 programs 3wks, 4 8wks, 1	Individual care plan developed for each participant – outdoor activities aimed at creating changes in	No details	No details	No details

Study	**Why** Rationale, theory, goal	**What Materials** Physical or information	**What Procedures** Activities, procedures, processes	**Who Provided** Expertise, background training	**How** Modes of delivery, individual, group	**Where** Types of locations	**When and How Much** Numbers of times delivered, over what period of time, number of sessions, durations, intensity, dose	**Tailoring** Planned to be personalised or adapted – what, why, when and how	**Modifications** If modified describe – what, why, when an how	**How Well Planned** Adherence assessed, how and by whom	**How Well Actual** Extent to which the interventio n was delivered as planned
	needs of adolescents through: promotion of self efficacy through task accomplishment ; restructuring of the therapeutic relationship; promotion of group cohesion and development through group living.						180days (average 45 days).	targeted behaviours.			
Youth care farms Schreuder et al 2014 Qual	Salutogenesis. Experiential learning improves mental and social health. Key features: Physical effort and a therapeutic component, the green environment, task accomplishment , restructuring of the therapeutic relationship, development of a therapeutic social group and	No details	Individual survival-training course (exercises, eg making a bivouac & physical challenges). followed by 6 months of living and working on the farm. 4 periods: 1 – adjusting to living and working on the farm. Objectives are learning to listen to the farmer and maintaining	Day youth worker on the survival course. Farmer & family as non-professional caregivers. Counsellor from the youth care organisation.	Individual and group	Care farms in the Netherlands	2 days survival training. 6 months residential. Counsellor 2x/wk. 6 months after care 0 - counsellor visits weekly.	No details	No details	No details	No details

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	the use of self-reflection. Trusting relationships develop between adolescents and mentors.		their own living unit. Contact with family and friends restricted. 2 –compare their actual situation with past experiences. Weekly telephone contact with parents. 3 –reflection of changes in behaviour over this time. More contact with parents. 4 –making plans for the future. Stay with parents 2 weekends								
Social and therapeutic horticulture - Thrive Sempik et al 2014 Quant	Christiansen's Person-Environment-Occupation-Performance model	No details	Goal setting. Use of plants in a structured way. General gardening planting, potting on, cuttings, pricking out, sweeping and maintenance,	Trained administrators experienced in horticulture and aspects of health and social care (incl OT)	Groups of around 25. Individual work also.	2 gardens in the UK	5.5hr sessions 1/wk.	Attendance varied according to individual and time of year.	No details	No details	No details

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			tool maintenance.								
Nacadia Therapy Garden Sidenius et al 2017 Qual	To treat people incapable of work owing to stress and/or stress-related symptoms.	No details.	The NBT programme consists of five components with an inter-supportive aim: (i) individual conversation therapy which uses mindfulness-based cognitive therapy; (ii) physical and mental awareness exercises, e.g. meditation and body scan; (iii) garden activities, e.g. chopping wood and collecting herbs; (iv) own time; and (v) homework to practise the different techniques and methods from individual conversation therapy, awareness	Daily therapy is performed and managed by two authorised psychologists, both trained in NBT. The therapist were supervised by a medically responsible psychiatrist. The garden activities were initiated and assisted by a professional gardener.	Individual. No details on which components are group.	Nacadia Therapy Garden.	10 weeks. It takes place on 3 days per week, for 3 days per week.	All of the NBT components are intended to apply to the whole group of participants but each component is flexible and optional and may be adapted to the individual participant's needs.	The NBT programme is the same all year round, and the framework is the same every day. Each week has a specific theme, in accordance with expected progress.	No details.	No details.

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			exercises, garden activities, and own time.								
Horticultural therapy Son et al 2004 Quant	HT designed to stabilise mental state in pts with schizophrenia with activities with plants, stimulation of sensibility by applying various materials and facilities, chances for self-reflection in the course of plant growing, promotion of interrelationships through collaboration	No details	Horticultural therapy	No details	Group	Korea	1 hour 2x/wk for 5 months	No details	No details	No details	No details
Therapeutic horticulture Stevens 2018 Qual	Therapeutic change is more likely to occur in natural environments (restorative) and in doing nature-based activities	No details	Most self-refer, a few referred by GP or job centre. Horticultural, administrative, selling tot he public	Manager of the nursey	No details	Nursery – part of a Sheltered Work Opportunities in Bournemouth, UK	Attended nursery 4 days a week	No details	No details	No details	No details
Nacadia Therapy Garden Stigsdotter et al 2018	That nature-based therapy will not differ in effect to CBT based Specialised	No details	Participants referred to the project by health practitioners (private practice doctors,	*Narcadia* two therapists and a gardener	Individual & group – but mostly individual and conversation between	Therapy garden in Denmark: 1.4-hectare wild forest garden in an arboretum. The design	10 wks. 3x3hr group sessions/wk with individual therapeutic conversation	Participants select activities they wish to undertake from those	No details	No details	No details

Study	**Why** Rationale, theory, goal	**What Materials** Physical or information	**What Procedures** Activities, procedures, processes	**Who Provided** Expertise, background training	**How** Modes of delivery, individual, group	**Where** Types of locations	**When and How Much** Numbers of times delivered, over what period of time, number of sessions, durations, intensity, dose	**Tailoring** Planned to be personalised or adapted – what, why, when and how	**Modifications** If modified describe – what, why, when an how	**How Well Planned** Adherence assessed, how and by whom	**How Well Actual** Extent to which the interventio n was delivered as planned
Quant	Treatment for Severe Bodily Distress Syndromes (STRESS).		psychologists and psychiatrists), and insurance companies. (a) Therapeutic conversations: individual conversations based on CBT and psychoeducation based on MBSR. (b) Awareness exercises: individual and group physical and mental awareness exercises in accordance with MBSR and related to nature experiences, such as mindful walking in the garden. (c) Nature-based activities: individual gardening activities, dependent on the season.		participants kept to a minimum	follows the model for evidence-based health design.	and individual nature-based activities introduced by the gardener. Control: STreSS individual 1 h therapeutic conversation sessions with one therapist.	suggested by gardener.			

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			Before each session, the gardener makes a list of possible activities from which the patients choose together with the therapist. Mindful awareness is integrated into the activities. (d) Reflection and relaxation time: individual time for reflection and relaxation in the garden. (e) Homework: individual homework to practice the different techniques and methods.								
Mountaineering Sturm et al 2012 Quant	To investigate the effects of therapeutic endurance training through mountain hiking in high risk suicide patients	65-75% intensity (Karvonen formula) controlled with the help of heart rate monitors.	No details	2 leaders – study director plus nurse, psychotherapist or doctor.	Group of 10	Mountains with elevation differences of 300-500m 30-45 minute drive from Salzburg	9 wk hiking, 9 wk control (Group 1 – order reversed for group 2) 3 hikes per week, Mon, Wed, Fri. Invited	No details	No details	No details	No details

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	with a view to reducing suicide. Exercise and sports might also be preventative factors in suicide attempts. Hiking could provide an appropriate as they can be monitored to avoid over-exertion, at the same time offering positive effects through moderate endurance training & as positive outdoor experiences and relationships among the hiking group						to take part in at least 2. 2-3hr hike.				
Wilderness camp Voruganti et al 2006 Quant	Rooted in experiential learning and outward bound philosophy. Lack of motivation, structured routine, initiative, and fitness are	No details	Adventure and recreational activities. Each day began with brainstorming, planning and preparation with staff and participnats.	Trained recreation therapist, registered nurse, social worker, occupational therapist.	Group	Canada No details	Summer: camping, canoeing, kayaking, rock climbing, rope courses, picnic. Winter: skating, snow shoeing, skiing, snowboarding, ice fishing,	No details	No details	No details	No details

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	impediments to rehab in people with schizophrenia, these can be addressed in the *Going Beyond* program: based on experiential learning theory and adventure and recreational activities.						indoor rock climbing, bowling.				
Nature assisted therapy Wahrborg et al 2014 Quant	Nature assisted therapy will be at least as successful as other therapies in treating stress and mild to moderate psychological complaints who are out of work. Draws on supportive environment theory – humans are adapted to a life close to nature & in social and cultural interacting with a limited no of people. PA is increased,	No details	Nature assisted therapy involving plants and the outdoor environment. Offers a multisensory stimulation to promote physical activity and soft fascination. Structured to include physical activity, psychotherapy & other rehab features.	Professionals from the "green sector" as well as traditional health professionals – physios, OTs, psychotherapists & doctors.	Group and individual activities.	Specially designed garden in Sweden.	12 wks	No details	No details	No details	No details

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	mature is a secure & enriched, multisensory environment, there is natural attachment to nature, symbolic and meaningful activities can be carried out.										
Medicine for the Earth Retreat centre in rural setting Warber et al, 2011 Quant	To compare effects of a spiritual retreat, (MFTE), on depression and well-being. Concept of connectedness is central Mind-body techniques & spirituality, may help pts with CHD. & provide nonpharma tools that may prevent further coronary events.	No details	Meditation, guided imagery, journal writing, drawing, nature activities, and nature imagery. Understanding of an all-encompassing spirit.	No clear. Windrise staff provided meals	Group	Windrise Retreat Centre Michigan, USA.	4 days residential. 19-20 hrs teaching/facilitation. Follow-up phone coaching biweekly for 3 mos	No details	No details	No details	No details
Sprout Community garden Whatley et al 2015	To explore how *Sprout* enabled occupational participation and social inclusion for	Bounded by a wire fence so garden is visible to residents Built structures: an office,	Possible occupations incl: Gardening (planting seedlings, watering,	5 Sprout staff, incl 1 f/t manager	Group	Community garden is a shared vegetable and herb garden on disused railway	3 days/wk	Choice of activities	No details	No details	No details

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Qual	people with mental ill-health. Uses a community development approach to build inclusive networks & enables participation in occupation	kitchen and patio, potting and propagation sheds. Areas include a Japanese garden, edible (vegetables and herbs), native and secret garden areas with seating, an outdoor pizza oven and a chicken coop.	harvesting, composting, writing plant labels) Taste Community Kitchen (participation in preparing weekly cooked meal); Food enterprises Creative projects Micro-enterprises run by participants with Sprout support Market preparation Open Gate stall (weekly) Community Participation in running monthly market stall			land in Melbourne, Australia.					
Branching Out Woodland Wilson et al 2011 Qual	As well as increasing physical activity, interaction with greenspace increases hedonic (the subjective experience of happiness) and	Forestry Commission Scotland provide site access. Program logistics given as information sessions.	Pts referred from secondary and tertiary MH teams. Range of conservation, bushcraft, construction, environmental art, exercise & museum visits.,	One members of staff from referring service attended. 1:1 staff for forensic pts	Groups of 6 (secure unit pts) -12	2 adjacent sites with views over Glasgow and the Campsie hills – a mature woodland (oak & beech) & a willow coppice site.	1x 3hrs/wk for 12 wks	No details	No details	No details	No details

Study	**Why** Rationale, theory, goal	**What Materials** Physical or information	**What Procedures** Activities, procedures, processes	**Who Provided** Expertise, background training	**How** Modes of delivery, individual, group	**Where** Types of locations	**When and How Much** Numbers of times delivered, over what period of time, number of sessions, durations, intensity, dose	**Tailoring** Planned to be personalised or adapted – what, why, when and how	**Modifications** If modified describe – what, why, when an how	**How Well Planned** Adherence assessed, how and by whom	**How Well Actual** Extent to which the interventio n was delivered as planned
	eudemonic (psychological functioning, positive relationships, and self-realization) factors of mental well-being.										
Wilderness therapy Woodford et al 2017 Quant & Qual	To support adult inpatients with mental illnesses to aid mental wellness, recovery, and transition back into the community.	No details	Included physical activity and nature-based programmes (e.g.	Registered nurse, 2 Certified Therapeutic Recreation specialists, and 2 recreation therapy student interns.	Individual and group. The 219ncluded219d 219219219d nature of client treatment plans meant that the length, number, and types of activities were dependent on the assessed needs of each individual.	Camp was 60 minutes from hospital, featured open spaces, outdoor dining shelters, fire pits, kitchen, bunk rooms etc.	3 day, 2 night wilderness therapy camp. Programme is delivered 3 times a year (summer, autumn, winter)	Individualised treatment plan, with activities specifically designed to target personal interest and the symptoms that significantly impacted on the patient's daily functioning.	Goals and plans were modified based on individual participant needs and progress.	Therapeutic Recreation staff had a debrief session with participants before leaving the camp	No details

11. Appendix 4: Study characteristics (quantitative studies)

Table 10: Study characteristics (quantitative studies)

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
Adams & Morgan 2016	UK	uBA	91	Rural Sussex, in partnership with NT	• *Grow* To support people with experience of mental distress to experience wellbeing benefits of connecting with nature in a safe supportive group. • Day/wk for 8 weeks • Structured around a check in and check out session Includes guided nature walks, conservation tasks, green woodworking, food foraging, beach combing, mindfulness, creative activities	Pre and post A variety of survey questions on wellbeing, health, perceived impact and mental and physical health. Instruments not provided.	91/108 completed evaluation. 77 FU
Banaka & Young 1985	USA	Non-RCT	78 pts with chronic mental illhealth from state mental hospitals. 48 intv (24m; 24f) 30 control (19m; 11f) Mean Age 30	Oregan	• To assess a wilderness program's effect on personal 7 social skills, hospital discharge, hospitalistaion, and survival in community. 2 week wilderness program – Adventure camp: 4 components:	Staff and self reports, pre, during, at the end &2/3 wks FU on: -Staff Personal and Social functioning instrument – measuring personal care, formal social system, informal social contacts, social acceptability, task orientation	105 nominated, 78 selected after screening. 20 assigned changed their minds and were replaced by controls. RM ANCOVA

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					Individual learning contracts, participation in 3 one-day orientation sessions, 5 days of mountaineering and rockclimbing, and a 5 day white water rafting trip.	-Patient Personal and Social functioning instrument	
Barley et al 2009	UK	uBA	28 (14m;14f) with mental health issues inlc anxiety, depression, bipolar, MS, personality disorder, psychotic disorder, social isolation	Garden in Sydenham, UK	• *Sydenham Garden* a primary-care-based social and therapeutic horticulture and participatory arts rehabilitation project for people with significant mental and/or physical illness.	-Social functioning scale -CORE-OM -PSYCHLOPS	Intervention start, 3 and 6mo FU. "erratic" completion Descriptive data Wilcoxon signed-rank tests
Berman et al 2012	USA	Randomised cross over trial	N=20 (8m, 12f) with Major Depressive Disorder (MDD) Mean age 26 Mean Beck Depression Inventory (BDI) score = 30.1 (SD 10.8) indicating severe depression	Ann Arbor Arboretum – an urban park	• To examine whether interacting with nature is beneficial for people with MDD • Randomly assigned to a 50-55 min walk in the park or on the streets. Returned one week later to walk the other location.	Positive and Negative Affect Schedule (PANAS) Backward Digit Span (BDS) task Also asked to score how much they had thought of the memory they generated (0 no; 1 sort of, 2 yes)	1 LTFU Initially asked to ruminate on an intense, negative, unresolved issue 2x2 ANOVA (pre-post; walk location) for both PANAS & BDS. Post hoc t tests for significant interactions
Bowen et al 2016	Australia	uBA	N=36 (15m; 21f) outpatients at an adolescent MH service. Mean age 14.8 (range 12-18)	Mixture of indoor and outdoor activities, including bush walking, white	• To evaluate the effectiveness of Wilderness Adventure Therapy (WAT)	6 self report questionnaires completed pre; post and 3 mo FU -Resilience Questionnaire (RQ) 14 items	36 provided data at all three time points. Not clear if more participated or were initially recruited.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			Referral due to Conduct /behaviour 29%; depression 21%; anxiety 14%; identity/ self- esteem 71%; psychosis 8%. But also co presenting problems incl. anxiety (41%) and depression (33%)	water rafting, abseiling, etc.	• 10 weeks 222ncluded222d intervention (see Table 1 schedule) – experiential learning activities in the outdoors. Delivered part time (including 7 day based excursions, a 2 day overnight training, and a 5 days expedition) to 6-8 participants. • Clinical psychology treatment model. Therapeutic aspects draw on CBT; systemic; existential; psychodynamic & occupational therapy. Outdoor activities "sequenced for success" • Parents, teachers and support workers also participate in up to 8 indoor problem solving activities.	-Beck Depression Inventory (BDI-II) 21 items -Youth Self Report 112 items -Coopersmith Self-Esteem Inventory (CSEI) 50 items - CORE Family Functioning Questionnaire 5 items - Life Attitudes Schedule – short form (LAS—SF) 24 items	24% of data values missing (more from latter half of the test battery) – these were imputed using Monte Carlo modelling. Changes investigated using descriptive statistics and 222ncluded222d222222 mean Effect Sizes.
Bragg et al 2013	UK	uBA	515 (66%m) Mean age 42 (range 15-85) 84% white British	52 Ecominds projects in England	• *Ecominds* • HT 26, conservation 12, nature arts and crafts 9, green exercise 3, care farming 2.	-Wellbeing; -WEMWBS; Rodenberg self esteem scale RSES -Profile of mood states POMS -Perceived positivity scale -Social inclusion;	Not all the same people completed pre and post questionnaires. Descriptive statistics Paired samples t-tests AVOVA MANOVA

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
						-Social wellbeing Module SWB Neighborhood belonging Neighborhood satisfaction Involvement in community activities -Connection to nature (not extracted) -Perceived health - healthy eating	Pearsons coefficient Wilcoxon Signed rand test
Bryson et al 2013	Canada	Mixed – uBA (interviews)	15 (11m; 4m) inpts (n=5) and outpts (n=10) of a large, urban schizophrenic case management program – all had primary diagnosis of psychosis. Mean age 35.3 (range 24-48) Years since diagnosis 0-27.	Adventure based therapy.	• *Rise-up* ABT 0.5-3 days once a week over 6-wks. • Groups of 10-15 people. • Facilitated by 2 trained recreation therapists experienced with psychosis. • 2 team building sessions with a range of ice breakers/ games; snowshoeing, downhill tubing, camping and closing celebration & meal.	- QoL SF-36 36 items - Rosenberg Self Esteem (RSE) Scale 10 items - Recover Assessment Scale (RAS) 41 items -	15/21 completed the program and were analysed (71%) Descriptive stats. Wilcoxon signed rank test used to compare difference in scores pre and post test. Cohen's d used to measure effect sizes.
Clark et al 2004	USA	uBA	109 (68m; 41f) troubled adolescents. Mean age 15.39 (range 13-18) Referred to the WT program	Wilderness therapy	• To test the hypothesis that WT has a positive effect on immature defense styles, perceived psychological stressors, dysfunctional personality patterns, clinical syndromes, maladaptive behaviours.	-Defense style Questionnaire -Adolescent clinical Inventory (MACI) -Youth Outcome Questionnaire Maladaptive behaviors	Participants who did not complete the program were excluded. 9 LTFU – 4 didn't complete, 5 had invalid MACI profiles. Pre-post measures (admission and discharge). Descriptive stats,

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					• 21 day wilderness therapy program • Therapists also provide behavioural management, 12 step program, individual and group therapy.		paired t-tests to compare change scores. ANOVA for gender differences on any dependent variables (only shown in 1 so not investigated).
Coan et al 2017	UK*	Mixed – uBA (FGDs)	N= 47 (12m; 27f) 87% white British, 2& Black Caribbean 2% Black African, 6% Asian Pakistani, 2% mixed. 64% >age 40 34% educated to degree or above	Shipley, Yorks.	• Aimed to measure health and wellbeing improvements • Charity *Hive* runs 2 fixed length group programmes for people with mild to moderate health problems – *Thrive*, - creative course, *Flourish* – Creative Ecotherapy & *Make@Hive* a regular creative drop in. Funded through charitable sources. Run by a coordinator with volunteer support. • Service users encourage to progress to volunteer roles. • Self referred or through mental health services/ primary care.	Warwick Edinburgh Mental Wellbeing Scale (WEMWEBS) 14 items	39 responses pre and post Descriptive stats

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
Combs et al 2016	USA	uBA	N=659 (486M; 191 F) on 4 programmes. Mean age 16.3 18% adopted 85% White Mood disorders (68%); substance use (64%); behavioural disorders (69%); Anxiety (54%); attachment disorder (4%); developmental disorders (3%); learning disorders (4%).	Wilderness sites in Utah, Oregon, Georgia USA	• To explore the trajectory of change over treatment in terms of behavioural & emotional dysfunction and the impact of demographics and presenting problems. • Wilderness therapy/ Outdoor behavioural healthcare (OBH) Combining nature immersion, group living with peers, and individual & group therapy & educational and therapeutic curriculum. 5 week residential program • Therapists (MSc & PhD trained) used a combination of techniques on 2 days of each week incl. CBT, choice therapy, mindfulness.	Youth Outcome Questionnaire (self report) Y-OQ-SR 4 points during the program and FU 6 and 18 months	NB 792 enrolled – 45 people who left the program before completion were excluded. 88 refused to participate. 200 randomly selected for long term follow up but only 55% of these completed at 6mos and 31% at 18 mos. Multi Level Modelling to assess differences at admission and rate of change. ANOVA to compare measures over time OLS regression model to explore predictors of outcome t-tests to compare responders and non-responders
Davies-Berman & Berman 1989	USA	uBA	23 adolescents (15m; 8f), outpt mental health pts with family problems, relationship difficulties, depression, anger and impulse control problems.	Wilderness therapy	• To assess the impact of WT • 1.5-2 week backpacking trip with daily therapy. • Groups of 6-8. • Specified treatment goals.	Pre post test -Internal-External locus of control -Perceptions of self-efficacy - Piers Harris Self esteem Inventory	Pre post Paired *t* tests

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
						-Behavioral symptoms Inventory	
Detweiler et al 2015	USA	Pilot RCT	38 Veterans on a substance use program Mean age 46.4. All had a least 2 psychiatric diagnoses.	Courtyard Box garden (container gardening) in residential facility.	• To assess the effect of horticultural therapy (HT) vs occupational therapy (OT) on post-traumatic stress disorder (PTSD), alcohol craving and QoL • Supervised 1hr/day 5 days/wk for 3 wks as part of a 28 day substance use treatment program • Planting, planning, watering, weeding, harvesting.	Pre and post treatment -Quality of Life Enjoyment and Satisfaction Questionnaire (short form – Q-LES-Q-SF) - Alcohol Craving Questionnaire (ACQ-NOW) - Post traumatic Stress Disorder Chcecklist Civilian Version (PCLC) -CES Depression Scale (CES-D) - Salivary cortisol wks 1,2,3	Repeated measures ANOVA for cortisol & pre post differences within each group. ANCOVA (baseline scores as covariate) For all other measures. 24 completed program. Although 49 signed consent, only 38 were assigned to a group – not clear where the 11 went. 37% drop out (of the 38) "included in analysis if they participated in the randomly assigned group and followed protocol for saliva samples" = 11. But also say all but 2 were insufficient. Inconsistencies of numbers throughout.
Devine-Wright & Godfrey 2018	UK*	Mixed: uBA (FGD)	412 YP (1:2 m:f) 218 carer/guardian also completed a post intervention survey.	10 Coastal sites in Cornwall, Devon, Dorset, Isle of Wight, Scotland, S wales & Scarborough	• What is the impact of the *Wave Project* (surf therapy) on vulnerable young people? • 6 week intervention aimed at young people	-bespoke wellbeing questionnaire adapted from the Stirling Wellbeing Scale (SCWBS) using 6 items from the positive functioning scale.	Pre, Post measures Of 461 referred, 412 completed survey, 347 completed SCWBS Cases with missing data excluded.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					aged 8-21 with mental health issues, family breakdown and/or physical disability • Referral from • 1-to-1 volunteer surf assistance plus surf coordinator. • Follow on Surf Club available (£5 fee – waived for families in financial hardship, plus £5 is transport provided) and opportunity to become a surf volunteer.	- post int survey – not extracted. -Resilience scale – 3 items (not referenced)	Comparisons between pre and post scores calculated using paired sample t-test.
Gabrielsen et al 2019	Norway	Mixed: uBA & Ints using realist	32 adolescents (21m; 21f) Mean age 16.5 (range 16-18) From specialised mental health care. Frequent diagnosis: social anxiety, depression, behaviour disturbance, adjustment disorders & mental fatigue. 12 interviews from 1 of 4 groups in quant study	Coastal regions of Southern Norway	• What overall inferences can be made about the effectiveness of a wilderness therapy programme for adolescents in a mental health care setting (*Frilufterapi)?* • Intervention includes mixed gender and diagnosis groups of 8. 4 included in quant research, 1 in qual. • 8 single days and 2 overnight trips of 3 and 6 days over an 8-10 wk period. Only intro and	-Sense of coherence scale (SOC) 13 items -General perceived Self-efficacy Scale (GSE) 10 items -Satisfaction with Life scale (SWLS) 5 items -Self rated Health (SRH) 1 items -Hospital Anxiety & Depression scale (HADS) 14 items -Five Facet Mindfulness scale (FFMS) 39 items - Life effectiveness Questionnaire (LEQS) 24 items	Pre Post & 12 mo FU Mixed model analysis for repeated measures on all tests. Paired t tests.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					closing days not outdoors. In spring or autumn. • *Frilufterapi "*a 228ncluded228d228 approach that to mental health treatment that combines individual and group based therapeutic work with basic outdoor life, through ecological, physiological and psychological processes". • Assimilates ideas of simple outdoor lifestyle focused more on experience of oneself and others in wild places, less focus on outdoor adventures. • Aimed to increase motivation & knowledge of how to engage in wildlife settings. • Increasing outdoor knowledge and group cohesion an important goal. Practical issues like dressing effectively, nutrition, navigation, safety, camp routines etc.	-Youth Outcome Questionnaire (YOQ-SR) 64 items - Personal Life circumstances (PLQ) 20 items -Digit span tests and coding.	

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					• Ongoing individual and group therapy. Incidents highlighted and used therapeutically in closed group therapy.		
Gonzalez et al 2009	Norway	uBA	18 clinically depressed adults (DSM-IV major depression), dysthymia, or depressive phase of bipolar disorder. <15 on the BDI	Urban farms in Norway	• To assess change in severity of depression and perceived attention capacity. • Recruited through GPs and advertisements • 12 wk group-based, therapeutic horticulture program. 3hr sessions, 2x/wk • Active and passive gardening activities – sowing, germinating, potting, planting, composting, cultivating veg, rooting cuttings. Also walking, sitting, nature watching, listening to nature.	Recruitment T1 Questionnaires at baseline T2, during the intervention (at 4, 8 & 12 wks – T3,4,5), and 12 wks post intervention T6 -Beck Depression Inventory (BDI) -Attentional Function Index (AFI) -Perceived Restorative Scale (PRS)	Paired sample *t*-test to see if baseline BDI changed between T1 & T2; Changes over the intervention measured with Repeated measures ANOVA with 4 times points (T2-T5) Greenhouse –Geiser corrected degress of freedom where appropriate. Planned contrasts (Helmert) used to determine whether change was greater during specific parts of the intervention. Bivariate Correlations (Pearson rs) to assess the degrees of freedom of change of AFI 7 with greater levels of being away and fascination. Change in scores for BDI and AFI calculated taking differences between T2 and T5.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
							Paired sample *t* tests used to assess persistence of any change at T6. LTFU of 22 initially recruited 3 dropped out in wk 1; 1 didn't complete questionnaire, 2 at post measure
Gonzalez et al 2010	Oslo, Norway	uBA	28 people (7m; 21f) with clinical depression (BSM-IV defined, plus BDI >=15). Mean age 44.1 (range 25-64) 100% white	Four farms in natural landscapes in Oslo	• To assess change impression severity, attentional capacity and rumination for those with clinical depression in in a therapeutic horticulture programme. • 12 wk program of 24 3-hr HT sessions (twice a week). Sowing, germinating, potting, planting, and cultivating veg, flowers and herbs. Also sitting, listening to birds and other passive activity. •	Pre during and immediately post 12 wk programme, plus 3mo FU. -Beck Depression Inventory (BDI) 21 items -Attentional Function Scale 16 analogue scales. -Brooding scale 5 items -Being away and Fascination (10 items) from subscales of Restorative scale	LTFU = 2 Repeated measure ANOVA to assess changes in BDI, AFI, Brooding, BA and FA. Small sample method to check for type 1 errors (Baldwin et al 2005) Missing values replace by mean of the scores on remaining items for an individual.
Gonzalez et al 2011#	Norway	uBA	18 (3m; 15f) with major depression or in depressive phase of bipolar disorder. All BDI score >=15.	Four farms in natural landscapes in Oslo	• To investigate whether existential issues, such as loss of meaning in life, which can cause depression, can be	Recruitment T1 Questionnaires at baseline T2, during the intervention (at 4, 8 & 12 wks – T3,4,5), and 12 wks post intervention T6	Repeated measures ANOVA T1-T2; T2-T5 and T2-T6 Effect size for each test.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			Mean age 49.7 (range 27-65)		addressed through gardening. • 12 week horticultural program of 24 3-hr HT sessions (twice a week). Sowing, germinating, potting, planting, and cultivating veg, flowers and herbs. Also sitting, listening to birds and other passive activity.	-BDI -Life regard index (existential issues)	
Gonzalez et al 2011b	Norway	uBA	46 (10m; 36f) with major depression, dysthymia, or in depressive phase of bipolar disorder. All BDI score >=15. Mean age 46.3 (range 25-65)	Four urban farms	• Assess covariation of changes in depression severity, anxiety, positive affect & perceived stress before during and after a TH intv. • 12 week horticultural program of 24 3-hr HT sessions (twice a week). Sowing, germinating, potting, planting, and cultivating veg, flowers and herbs. Also sitting, listening to birds and other passive activity.	Recruitment T1 Questionnaires at baseline T2, during the intervention (at 4, 8 & 12 wks – T3,4,5), and 12 wks post intervention T6 -BDI -Spielberger State-Trait Anxiety inventory (sate sub scale) -Positive –negative Affect scale Perceived stress scale Therapeutic Factorsa Invenroty	5 dropped out early and not included on the analysis. Study pools findings over 2 years with 5 groups of 3-7 in each year. RM AVOVA
Grahn et al 2017	Sweden	uBA	106 (10m; 96f) Social insurance office referrals due to being on sick leave due to stress/depression, and	Alnarp rehabilitation garden within the Swedish University of Agricultural Sciences	• To examine back to work rates one year after participating g in a rehab program in the garden for people with	Pre, post and 1 yr FU Self reported return to work at 1yr FU	Effect sizes calculated based on differences in means (Hedges' g); and Odds ratios.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			confirmed diagnosis by psychiatrist. Mean age 45.7 (range 22-63)		stress related mental disorders. • 4 days/wk; 3.5 hrs/day. • 8, 12 or 24 wk programs (determined by the referrer) applying Supportive Environment Theory. • Individual rehab program designed for each participant • Gardening & horticultural activities. Meaningful activity & group rehab. • Support provided by multimodal team including psychotherapist; physical therapist; landscape architect; landscape engineer.	Occupational competence self- assessment tool. 21 items. Mastery scale 7 items Sense of coherence. Scale 29	
Howarth et al 2018	UK	Mixed: Recovery star dataset	20 people with MH problems	North of England	• To evaluate the impact of a mental health recovery programme using therapeutic horticulture. • Sowing, growing, and harvesting of garden produce.	Interval data from – Recovery star in which people plot their progress on managing MH; social networks, relationships	Descriptive statistics over 10 wks.
Kam & Siu 2010	Hong Kong	RCT	24 (17m; 7f) 10 intv 12 control	New Life Farm, dedicated sheltered workshop	• Effectiveness of horticultural therapy for people with psychiatric	-Depression and Anxiety Stress scale	2 drop outs from experimental group after assignment.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			Schizophrenia, bipolar, major depression.	agriculture as a therapy.	illness on stress, work behaviour, QoL. • 10 consecutive days • Work related skills including indoor industrial activities (eg packing) and outdoor horticultural tasks – vegetable production, delivery & conducting farm tours. Led by an occupational therapist	-Work Behaviour Assessment -Personal Wellbeing Index (QoL)	Nonparametric tests
Kelley et al 1997	USA	BA	76 (mean age 31.61; range 21-55). 57 (42m; 8f) people with serious and persistent MH receiving outpt tx in psychosocial rehab programs 19 (14m, 5f) control drawn from those volunteering but unable to attend due to scheduling and those who attended 1-2 sessions.	Maryland, USA	• To see if an outdoor adventure program would lead to improved functioning in people with serious mental illness. • 9 wk program of weekly day long outdoor adventure outings – hiking 4xcaving; 4x rock climbing.	-Generalized Self efficacy scale -State-Trait anxiety Inventory BSI (anxiety & depression subscales) -Trust & Cooperation Scale -Multidimensional Locus of Control Scales for Psychiatric pts -BSI subscales	115 expressed an interest and provided wait list data, 67 completed 3 or more outings. 57 provided complete data. 50 analyzed. Pre first hike and post last day's activity.
Lewis 2014	USA	uBA	N=190 (125m; 62f) Mean age 15.69 (range13-19) 86% Caucasian	North Carolina, Idaho, NY.	• To asses impact on psychiatric symptoms • Outdoor behavioral health care. • Group and individual counselling.	Baseline, day 7 3mo and 12mo FU. -Treatment Outcome package (subjective distress, symptomatic states, overall functioning. ADHD, conduct,	230 enrolled, 40 withdrew from program. 87% completed post tx assessment; 72% 3mo & 63% 12mo FU. NS diffs related to age, gender, conduct,

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					• Steps program supporting behaviour change.	depression, substance abuse, academic functioning, violence, suicidality, sleep, social conflict) -	substance abuse in completers and LTFU. Raw scores converted to standardized z-scores, with a mean of zero, SD of 1. Paired t-tests compare pre and post. Individual growth curve modelling for 12mo fu.
Molsher & Townsend 2016	Australia	uBA	N=32 (16 m; 16 f) mean age 42 (range 14-71) 10 MH conditions; 5 emotional/behavioural; 3 PH problems; 2 learning disabilities; 1 offender. Most referred by MH or employment services.	Rural community on Kangaroo Island	• Improve wellbeing & create a sense of ownership and community cohesion. • "get dirty feel good" – volunteering for Natural Resource Management & training in wellbeing, healthy eating, photography & first aid. 3 programs of 1x5hr session/wk for 9-10 weeks. • 520/1015 hrs spent on NRM on the ground.	Mixed methods: Survey with open ended questions. (asked re wellbeing; most beneficial aspects; commitment to environmental stewardship) Quant measures taken before, after & at 3 mo FU -18 item Wellbeing score (GWBS) - Emotional state scale (adapted from Osgood scale)	Unclear. Descriptive stats for GWS., mood. Methods for calculating p values not described.
Morgan et al 2019	UK	uBA	N=15 (15m) ex service personnel with single or double amputations and PTSD	UK and the Red Sea	• Graduated series of diving qualifications accredited by PADI • Theory and practical skills over 10-14 days at the red Sea	GHQ-8	Pre post course 73% response rate (n=10).

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					• All staff and instructors complete the Mental Health First Aid course. • Continuing Buddy Peer Support Service for servicemen.		
Nordh et al 2009	Sweden	uBA	N=24 Demographic details on 21 (57% f) Mean age 45 (range 27-61) Main diagnosis was exhaustion syndrome and depression, others had MH and stress related disorders.	Sweden	• Collaboration between the Swedish Forest Agency and a wok rehab company. • 10 wks 3days/wk in forest, 1 elsewhere. • Coffee, lectures/information; outdoor activity, lunch, fire/ BBQ. • Making inventories of nature, culture and artefacts, walking, training in maps and compass. • Weekly meeting with work rehab mentor to draw up individual plan for after the program	Pre and post intervention Symptoms of illness (SMBQ) Functioning (OSA-F, ADL) QoL (PGWB)	24/34 volunteered to take part (8 refused, 4 did not complete FU) Descriptive statistics. Wilcoxon Signed-Rank test
Palsdottir et al 2014	Sweden	uBA (ints)	N=21 (2m; 19f) Stress related mental illness, on sick leave.	Specially designed health garden on Uni campus.	• 12 wk nature-based rehabilitation program in a • 4 major therapy forms were used to support the nature-based rehabilitation: occupational therapy;	Pre and post, 2 mo FU and 12 mos for return to work. -Occupational value (Oval-pd) -Stress & Crisis inventory (SCI-93)	21/27 agreed to participate in research. Confounders 235ncluded. Wilcoxon signed rank test

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					physiotherapy in the form of Rosen therapy; psychotherapy; and horticultural therapy.	-Sense of Coherence scale (SoC-13) -Occupational self assessment function (OSA-F) -Perceived health state (EQ-VAS) -Return to work rate	
Russell 2003	USA	uBA	858 adolescents (592m; 329f) with variety of disorders incl. oppositional defiant disorder, substance disorders, depression. Ages 16-18	7 outdoor Behavior Health Care Industry Council programs in Oregon, Utah, Arizona and Idaho.	• To assess the impact of Outdoor Behavioral healthcare for troubled adolescents. • Wilderness therapy • 2 programs 3wks, 4 8wks, 1 180days (average 45 days). • Clinical Supervisor, therapists/counselors visited the field every 3-5 days.	Baseline, 3 and 6 mos post. Plus 12 mo follow up with a random selection. And -Youth outcome Questionnaire	885/1035 (85%) of invited clients participated. 523 provided data. Pairwise *t*-test for differences at discharge and 12 mos.
Sempik et al 2014	UK	Secondary analysis of accumulated assessment data	143 (108m; 35f) Mean age 35(SD16.1) m; 38.5 (SD16.5) 27<18years. Mental health (43%) or learning disabilities (39%), autism (7%)	Thrive HT in the UK	• 2 garden projects of Social and therapeutic horticulture • Use of plants in a structured way. • Trained administrators experienced in horticulture and aspects of health and social care (incl OT) • General gardening planting, potting on, cuttings, pricking out,	Daily assessments -Social interaction -Communication -Motivation -Task engagement	Baseline was taken as first measurement taken after <=3mo attendance. Descriptive stats, comparison of means using ANOVA and *t*-tests.

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					sweeping and maintenance, tool maintenance. • 5.5hr sessions 1/wk. • Referrals from health and social care & self.		
Son et al 2004	Korea	BA	50 in-pt with schizophrenia 25 intv 35 controls – matched on symptoms	Horticultural therapy	• Horticultural therapy • 1 hour 2x/wk for 5 months • Control usual tx	Before, mid and after HT -Relationship Change Scale -Self Esteem Scale - Social behaviour Scale -Symptom Checklist -Evaluation of Horticultural Activity	2-way ANOVA, Wilcoxon matched pair signed rank tests.
Stigsdotter *et al* 2018	Denmark	RCT	84 43 Tx (7m; 31f) 41 control (6m; 27f) Primary diagnosis - psychiatric diagnosis of adjustment disorder and reaction to severe stress.	*Nacadia* Wild Forest Garden	• Horticultural therapy vs CBT (STreSS) • 3 hr 3x/wk for 10 wks • Control 1hr/wk for 10 weeks	-Psychological General Well-Being Index (PGWBI), - Shirom–Melamed Burnout Questionnaire (SMBQ)	Post, 3, 6 & 12 mo FU ITT analysis 0.36% missing data analysed using LOCF. Only 27 tx & 17 control completed all measures. Two-way mixed-design ANOVA for PGWBI. Wilcoxon signed-rank tests for SMBQ.
Sturm et al 2012	Austria	Randomised Crossover trial	20 psychiatric inpatients. (14m; 6f) All had at least one prior suicide attempt and diagnosed with hopelessness.	Mountains with elevation differences of 300-500m 30-45 minute drive from Salzburg	• To investigate the effects of therapeutic endurance training through mountain hiking in high risk suicide patients with a view to reducing suicide.	Pre, between the hiking phases and post. -Beck Hopelessness scale (BHS) -Beck Depression Inventory (BDI)	167 eligible, 20 randomised. 17/20 completed (10 group 1; 7 group 2) Groups 1&2 combined for effects. Compared to show

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					• 9 wk hiking, 9 wk control (Group 1 – order reversed for group 2) • 3 hikes per week, Mon, Wed, Fri. Invited to take part in at least 2. 2-3hr hike. 65-75% intensity (Karvonen formula) controlled with the help of heart rate monitors. • 2 leaders – study director and nurse, psychotherapist or doctor.	-Beck scale of suicide ideation	differences between groups. t-test and Fishers exact test used to assess baseline differences. Effects sizes computed using Cohen's d for paired t-tests.
Voruganti et al 2006	Canada	Case-control	54 With Schizophrenia 23 intv (19m; 4f) Mean age 21.04 (SD 12.2) 31 wait list controls (23m; 8f) Mean age 40.83 (SD 9.44)	Adventure and recreation based group intervention	• To assess the impact of a novel Adventure and recreation based group intervention • Summer: camping, canoeing, kayaking, rock climbing, rope courses, picnic. Winter: skating, snow shoeing, skiing, snowboarding, ice fishing, indoor rock climbing, bowling.	Pre 8 mo post and 12 month FU -PANSS -Global functioning (GAF) -Self esteem (ASIS) -Cognitive deficits (SSTICS)	97% tx adherence. No drop outs. RM-ANOVA
Wahrbord et al 2014	Sweden	Retrospective cohort	796 118 intv 678 matched controls from the health Care Registry	Nature assisted therapy using a specially designed garden.	• Multimodal rehab program involving professionals from nature and medicine • Multisensory environ • Structured to include physical activity,	I yr Pre and 1yr post -Healthcare contacts	103/118 participated Chi2 and Welch's t-tests applied for descriptive data. ANOVA for resgression, RR (95% CI)

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			Mild to severe depression, PTSD, psychotic symptoms. 11/12% f Mean age 45.9/ 46.3		psychotherapy & other rehab features		
Warber et al 2011	USA	Pilot RCT	58 Acute Coronary Syndrome patients with depression. MFTE n=23 LFC n=14 Control n=10	Windrise Retreat Centre, Metamora, Michegan (both MFTE and LFC groups) – rural setting.	• Medicine for the Earth (MFTE) retreat, 4-day weekend retreat vs 4-day retreat Lifestyle Change Program (LFC) vs usual care control • MFTE focusses on connectedness & consists of meditation; guided imagery; journaling; drawing; nature activities; nature imagery. • LFC is a whole person approach to lifestyle change aimed at improving cardiac health – nutrition, exercise, stress management.	Physical measures related to cardiac health (not extracted) Beck Depression Inventory (BDI) 21 items Brief Symptom Inventory 53 item Perceived stress scale 14 item State Hope Scale 6 item Gratitude scale 6 item QoL SF36 Irvine Spiritual wellbeing scale & transmutation change questionnaire (TCQ)	92 eligible 58 randomised 47 completed baseline, 45 3mo; 41 6mo FU. Chi-sq for categorical data, analysis of variance for continuous to assess differences at baseline. Independent t tests to compare individual TCQ items between groups. Repeated measures analysis using SAS missed procedure for all others
Woodford et al 2017	Canada	uBA (ints)	24 from acute mental health unit attending 3 wilderness wellness events.	Wilderness therapy 60 minutes from hospital open spaces, outdoor dining shelters, fire pits, kitchen bunk rooms.	• 10 clients participate in a 3 day, 2 night wilderness camp. Client: Staff ratio 4:1. • Individuals are assessed, individual treatment plan developed related to anxiety management, improving social	Positive and Negative Affective scale (PANAS) 20 item.	Pre post Paired t test

Study	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					engagement, mood or social functioning. • Individual and group programme developed to build social skills, social connectivity, life skill development, & participant defined goals. Also physical activity (sports) and nature-based programs (eg nature walks and camp based activities • CTRSs oversee all interventions and work with behaviour modification techniques, sense of community, skills development and natural environment.		

* Studies related to activities in case study sites and identified through provision mapping. *Hive* is no longer funded.

Only study 1 extracted- study 2 is a repeat of 2010 publication by the same author.

12. Appendix 5: Quality appraisal (quantitative studies)

Table 11: EPHPP quality appraisal

Study	Selection bias	Study design	Confounders	Blinding	Data collection	Withdrawal/ drop outs	Intervention integrity	Analysis	Overall
Adams & Morgan 2016	Weak	Weak	NA	Weak	Weak	Weak	Weak	Weak	**Weak**
Banaka & Young 1985	Weak	Moderate	Weak	Weak	Strong	Weak	Weak	Strong	**Weak**
Barley et al 2009	Weak	Weak	NA	Weak	Moderate	Weak	Weak	Moderate	**Weak**
Berman et al 2012	Weak	Moderate	Strong	Weak	Moderate	Strong	Strong	Strong	**Moderate**
Bowen et al 2016	Weak	Weak	NA	Weak	Moderate	Weak	Strong	Moderate	**Weak**
Bragg et al 2013	Weak	Weak	NA	Weak	Moderate	Weak	Weak	Moderate	**Weak**
Bryson et al 2013	Weak	Weak	NA	Weak	Strong	Moderate	Weak	Strong	**Weak**
Clark et al 2004	Weak	Weak	NA	Weak	Moderate	Moderate	Weak	Moderate	**Weak**
Coan et al 2017	Weak	Weak	NA	Weak	Moderate	Strong	Weak	Weak	**Weak**
Combs et al 2016	Moderate	Weak	NA	Weak	Strong	Weak	Weak	Strong	**Weak**
Davies-Berman &	Weak	Weak	NA	Weak	Strong	Weak	Moderate	Strong	**Weak**

Study	Selection bias	Study design	Confounders	Blinding	Data collection	Withdrawal/ drop outs	Intervention integrity	Analysis	Overall
Berman 1989									
Detweller et al 2015	Moderate	Strong	Weak	Weak	Moderate	Weak	Weak	Weak	**Weak**
Devine-Wright 2018	Moderate	Weak	NA	Weak	Moderate	Moderate	Weak	Weak	**Weak**
Gabrielsen et al 2019	Strong	Weak	NA	Weak	Strong	Weak	Moderate	Weak	**Weak**
Gonzalez et al 2009	Weak	Weak	NA	Weak	Strong	Strong	Moderate	Weak	**Weak**
Gonzalez et al 2010	Weak	Weak	NA	Weak	Weak	Strong	Weak	Strong	**Weak**
Gonzalez et al 2011	Weak	Weak	NA	Weak	Strong	Weak	Weak	Weak	**Weak**
Gonzalez et al 2011b	Weak	Weak	NA	Weak	Strong	Weak	Weak	Weak	**Weak**
Grahn et al 2017	Moderate	Weak	NA	Weak	Weak	Weak	Weak	Moderate	**Weak**
Howarth et al 208	Weak	Weak	NA	Weak	Weak	Weak	Weak	Weak	**Weak**
Kam & Siu 2010	Strong	Strong	Strong	Moderate	Strong	Moderate	Moderate	Moderate	**Strong**
Howes et al 2018	Weak	Weak	NA	Weak	Moderate	Weak	Weak	Weak	**Weak**

Study	Selection bias	Study design	Confounders	Blinding	Data collection	Withdrawal/ drop outs	Intervention integrity	Analysis	Overall
Kelly et al 1997	Weak	Weak	Weak	Weak	Moderate	Weak	Moderate	Moderate	**Weak**
Lewis 2014	Moderate	Weak	NA	Weak	Strong	Moderate	Moderate	Strong	**Weak**
Nordh et al 2009	Weak	Weak	NA	Weak	Moderate	Weak	Weak	Moderate	**Weak**
Molsher & Townsend 2016	Weak	Weak	NA	Weak	Weak	Weak	Weak	Weak	**Weak**
Morgan et al 2019	Weak	Weak	NA	Weak	Weak	Weak	Weak	Weak	**Weak**
Palsdottir et al 2014	Weak	Weak	NA	Weak	Strong	Weak	Moderate	Moderate	**Weak**
Russell 2003	Moderate	Weak	NA	Weak	Strong	Weak	Moderate	Moderate	**Weak**
Sempik et al 2014	Weak	Weak	NA	Weak	Moderate	Weak	Weak	Moderate	**Weak**
Son et al 2004	Weak	Moderate	NA	Weak	Strong	Weak	Weak	Moderate	**Weak**
Stigsdotter et al 2018	Moderate	Strong	Strong	Weak	Strong	Moderate	Moderate	Weak	**Weak**
Sturm et al 2012	Weak	Moderate	Strong	Weak	Strong	Moderate	Moderate	Strong	**Weak**
Voruganti et al 2004	Weak	Moderate	Strong	Moderate	Strong	Strong	Weak	Moderate	**Weak**
Wahrborg et al 2014	Moderate	Moderate	Strong	Strong	Strong	Strong	Weak	Strong	**Moderate**

Study	Selection bias	Study design	Confounders	Blinding	Data collection	Withdrawal/ drop outs	Intervention integrity	Analysis	Overall
Warber et al 2011	Strong	Strong	Strong	Weak	Strong	Strong	Moderate	Strong	**Strong**
Woodford et al 2017	Weak	Weak	NA	Weak	Strong	Strong	Strong	Moderate	**Weak**

13. Appendix 6: Results from included quantitative studies

Table 12: Results from quantitative studies

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
Adams & Morgan 2016	Overall score T(86) = 20.22, p= 0.001 Across a range of wellbeing indicators t's>12.13, p's <0.01		87.5% reported great or significant impact on MH (5point scale) 63.6% reported great or significant impact on PH (5point scale)				
Banaka & Young 1985			Pt PSF *Personal care* N/S *Formal social system* p<0.01 *Informal social contacts* p<0.05 *Social acceptability* p<0.01 *Task orientation* p<0.01	Staff PSF *Personal care* N/S *Formal social system* N/S *Informal social contacts* N/S *Social acceptability* p<0.01 *Task orientation* p<0.01			
Barley et al 2009	*Manchester short assessment of QoL (n=15)* N/S			*Social functioning scale (n=7)* n/s *CORE-OM* N/S			

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
				PSYCHLOPS N/S			
Berman et al 2012	-		-	-*PANAS* *Positive affect* prewalk Nature 2.11 (0.82) Urban 1.92 (0.62) Post walk Nature 2.62 (1.03) Urban 2.26 (0.89) *Negative affect* prewalk Nature 2.04 (0.84) Urban 2.03 (0.88) Post walk Nature 1.53 (0.86) Urban 1.64 (0.92) -*BDS* prewalk Nature 7.42 (3.00)	-	-	-

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
				Urban 8.26 (2.51) Post walk Nature 8.63 (2.87) Urban 7.84 (2.24)			
Bowen et al 2016		*Depression* pre 42.33 (15.26) post 48.63 (12.04) 3mo 48.61 (11.30) (EST1-T2 0.46, CI -0.07, 0.85) *Suicidal proneness* pre 15.85 (3.95) post 15.57 (5.28) 3mo 17.52 (5.82) (ES 0.-.06, CI -0.45, 0.33)		*YSR* pre 36.51 (7.92) post 39.21 (7.09) 3mo 39.44 (7.14) (ES T1-T2 0.36; CI 0.03, 0.75) *Resilience* pre 33.53 (12.09) post 38.94 (9.80) 3mo 36.00 (9.51) (ES 0.49, CI 0.10, 0.89) *Self esteem* pre 48.58 (20.71) post 53.53 (17.76) 3mo 54.47 (15.50) (ES 0.36, CI -0.13, 0.64)	Small positive overall effect size (0.26) in the short term, but not in the longer term (ES -0.06)		

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
Bragg et al 2013	*Perceived positivity* pre 5.95 (+-2.29) post 6.97 (+-2.13) p<0.001. Neighborhood belonging (2.63) post (2.34) N/S Importance of being with others pre 3.06 (+-1.21) post 3.52 (+-1.09) p<0.001		*Perceived health* Pre 5.62 (+-2.31) [post6.87 (+-2.10) p<0.001 *Importance of healthy eating* NS				
Bryson et al 2013	*SF36* Overall: Pre 59.62 (SD 16.60) Post 65.32 (17.98) p=0.26 2/6 domains sig. different Energy/fatigue (ES Cohen's d 0.90 p=0.05) & Emotional wellbeing (ES Cohen's d 1.60, p=0.003)).			*RSES* pre 18.33 (SD 4.79) Post 19.00 (5.35) p=0.67 *RAS* total pre 156.00 (SD18.41) post 158.67 ES Cohen's d = 0.35, p=0.05.			

Clark et al 2004	-	-	-	*Immature defense scores* (t(108) = 3.71 P<0.01) *Dysfunctional personality scores* (*t*(108) = 2.65 p <0.01) *Clinical Syndrome scores* (*t* (108) = 3.66 p<0.01) *Maladaptive behaviour scores* (*t*(44)=6.2 p<0.01) *Dysfunctional personality patterns* Small effect (Cohens d0.40) *Immature defense scores* Moderate effect size (Cohens d = 0.75) *Clinical syndromes scores* Moderate effect (Cohens d = 0.70) *Maladaptive behaviour scores* Large effect		-	-

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
				(Cohens d = 1.87) *Neurotic defense scores* Increased (*t*(99)=-2.97 p<0.01), moderate effect (Cohens d=-0.60)			
Coan et al 2017	*WEMWEBS* Pre mean 43.2 Post mean 49. Pre low wellbeing 46% Post low wellbeing 21%	-	-	-	-	-	-
Combs et al 2016	-	-	-	*Y-OQ-SR* Significant reduction in dysfunction from intake (mean 64.83) to discharge (28.33) and at 18 mo FU (33.75) – the post measures within the normal range. Other data not extracted but	-	-	-

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
				note that those with mood disorders take longer than the 5 week program to have sub clinical levels of dysfunction (Fig 1)			
Davies-Berman & Merman 1989				*Self efficacy* t(22)=4.34, p<0.01 *Self Esteem* T(15) = 3.18 p<0.01 *BSI F(3, 19) = 14.75, p<0.01* *Locus of control* NS			
Detweiler et al 2015	*Q-LES-Q-SF* (n=22) OT 61.22 HT 71.05 (p=0.603)	*CES-Depression* (n=21) OT 21.31 HT 15.61 (p=0.996)	-	*ACQ-NOW* (N=23) OT 1.61 HT 1.92 (p=0.991) *PCLC* (n=17) OT 46.99 HT 48.52 (p=0.084)	-	Salivary Cortisol (n=11) NS 12% reduction (p=0.43)	-
Devine-Wright & Godfrey 2018	*SCWBS* Overall Pre 3.89 (SD 0.63)	-	-	*Resilience* Pre 0.752	-	-	-

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
	Post 4.18 (SD 0.063) t; (349) = -10.21, p<0.000 (sic). *Positive functioning scale* Alpha pre 0.759 Post 0.814			Post 0.76 (p<0.000 (sic))			
Gabrielsen et al 2019	*YOQ* Pre – post NS Pre – 12mo FU Cohen's d 0.39 (p<0.005) *SWLS* Pre – post NS Pre – 12mo FU NS	*HADS anx* Pre – post NS Pre – 12mo FU Cohen's d 0.59 (p<0.01) *HADS dep* Pre – post NS Pre – 12mo FU Cohen's d 0.40 (p<0.1)	*SRH* Pre – post NS Pre – 12mo FU ns	*SoC* Pre – post NS Pre – 12mo FU Cohen's d 0.36 (p<0.1) *GSE* Pre – post NS Pre – 12mo FU Cohen's d 0.60 (p<0.05) *LEQ* Pre – post NS Pre – 12mo FU Cohen's d 0.63 (p<0.01)			
Gonzalez et al 2009	-	*BDI* Baseline 28.4 (6.3) 12 wk intv 17.6 (7.4)	-	*AFI* Baseline 68.8 (18.4) 12 wk intv 79.0 (14.8)	-	-	-

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
		12 wk FU 20.8 (9.0)		12 wk FU 74.5 (25.4)			
Gonzalez et al 2010	-	*BDI* Baseline 25.2 (7.8) 12 wk 19.6 (8.0) 3 mo FU 20.4 (10.3) (change T2-later F 10.72, p=0.003)	-	*AFI* Baseline 64.4 (21.6) 12 wk 73.6 (18.6) 3mo FU 67.0 (17.7) (change T2-later F 4.85, p=0.036) *Brooding* Baseline 13.4 (3.6) 12 wk 11.8 (3.3) 3mo FU 12.3 (3.8) (change T2-later F 4.49, p=0.044)	-	-	-
Gonzalez et al 2011		BDI base to end program F36.247 p<0.010 At 3 mos FU F 3.435, p=0.004		LRI-R to end program F 0.787 p=0.387 At 3mos FU F 0.266, p=0.614			
Gonzalez et al 2011b		BDI base to end program F 20.94 p<0.001 At 3 mos FU F 13.76, p=0.001		PANAS base to end program F 5.48 p=0.024 At 3 mos FU F 1.52, p=0.225			

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
		STAI-SS base to end program F9.49 p=0.004 At 3 mos FU F 2.82, p=0.101		PSS base to end program F 9.63 p=0.003 At 3 mos FU F 3.67, p=0.063			
Grahn et al 2017							42/106 44% returned to FT or PT work at 1yr FU. *OSA* (n=10) 0-24 wks 9.5 mean diff (p<0.01) M*astery* (n=12) 0-24wks 3.2 mean diff (p=0.01) *SoC* (n=10) 0-24 wks 9.3 mean diff (p<0.05)
Howarth et al 2018	-	Some improvement in MH scores for 35% while 45% had similar	-	-	-	-	-

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
		rates to baseline					
Kam & Siu 2010		Change score comparison Intv vs Control *DASS* -24.2 (17.78); -0.50 (6.78) p0.01 WBA Not significant PW1 not significant					
Kelley et al 1997				MANCOVA For self esteem & self efficacy variable (*Self efficacy scale, 2 subscales of PSES, Generalised SES & Rosenberg self esteem inventory)* Int vs control F(1,64 df) = 6.64 p<0.01 For Anxiety and depression *(State-Trait anxiety Inventory; BDI, BSI (anxiety & depression subscales)*			

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
				Invt control F(1,64 df) = 5.06 p<0.05 For Trust & Paranoia (*Trust and cooperation scale, interpersonal & hostility scales of BSI)* N/S For Locus of Control (3 subscales of *Multidimensional Locus of Control Scales*) N/S Other BSI subscales N/S			
Lewis 2014				Post-intv *Conduct problems* t(165)=6.15 p<0.001 *substance abuse* t (165) =7.51 p<0.001			
Molsher & Townsend, 2016	*GWBS Wellbeing positive*	Graph only – significance unclear.	86% reported *WB* improved	-	-	-	-

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
	Pre mean 56.8 Post mean 58.4 (p<0.001, df=27) *Distress* Pre mean ? Post mean 66.5 3 mo FU 66.6 (data not extracted from graph)		61% highlighted social benefits 36% learning about environment.				
Morgan et al 2019	-	*Anxiety N/S* *Depression* N/S	-	*Social Functioning N/S*	-	-	-
Nordh et al 2009	*ADL* NS *PGWB* pre 81.7 post 71.9 (<0.01) *HAD* NS	*SMBQ* NS *SCI-13* pre 52.7 post 49.4 (p<0.001)		*SMS*			*OSA-F*
Palsdottir et al 2014			*EQ-VAS* pre 36.6 (SD 16.22) post 62.0 (SD18.5) p=0.0009	*SCI-93* pre 68.1 (SD26.1) post 53.6 (SD29.6) p<0.001 *SoC-13* pre 50.3 (SD11.6) post 55.1 (SD 11.4) p=0.0274 *OSA-F* pre 34.5 (SD5.8) post 41.8 (SD7.1) p=0.0002			*Oval-pd* pre 35 (SD 5) post 44 (SD8) p=0.0009 *Return to work* 10/16 returned to work

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
Russell 2003	Admission to discharge mean difference *SR Y-OQ* (t(522)=14.38, p<0.000)	-	-	-	-	-	-
Sempik et al 2014				For MH pts only *Social interaction* Sig changes only seen after 365 days *Communication* N/S *Motivation* N/S *Task engagement* N/S			
Son et al 2004				*Social behaviour scale* Change Int vs Control verbal N/S; Nonverbal p<0.05; Substance of conversation p<0.001 *Self esteem* Change Int vs Control p<0.01			

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
				Inter-relationships Change Int vs Control p<0.01			
Stigsdotter et al 2018	*PGWBI* increased over time, F(4,144) = 5.23, P < 0.01, overall partial η 2 = 0.13, and N/S difference between treatments, F(1,36) = 0.39, P > 0.05, overall partial η2 = 0.01			*STreSS* increases over time (χ2(4) = 33.15, P < 0.001) and for NNBT (χ2(4) = 45.35, P < 0.001)			
Sturm et al 2012	-	Hiking vs control *BHS* (p<0.0001, d=-1.4) BDI (p<0.0001, d=1.0) *B Suicide ideation* (p=0.25, d=-0.29)	-	Hiking vs control *Sense of belonging* p=0.04, d=0.53	-	-	-
Voruganti et al 2006				*PANSS* PANSS			

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
				-Global functioning (GAF) -Self esteem (ASIS) -Cognitive deficits (SSTICS) F(1,52)=1.29, p<0.26 *GAF* F(1,52)=8.94, p<0.05 *ASIS* F(1,52)=8.52, p<0.01 *SIP* F(1,52)=4.98, p<0.01 *SSTICS* F(1,52)=4.41, p<0.04			
Wahrborg et al 2014	-	-	-	-	-	-	Healthcare contact Cases SMR 0.84, 95%CI 0.81-0.87; controls 0.92, 95% CI 0.09-0.93
Warber et al 2011	*SF-36 (Bodily pain)* MFTE pre 57 (20-90) Post NA 3mo 71 (20-90) 6 mo 70 (30-90)	*BDI* MFTE pre 12 (2-36) Post 6 (0-23) 3mo 6 (0-21) 6 mo 6 (0-18)		*BSI* MFTE pre 24 (3-47) Post 13 (0-42) 3mo 14 (0-38) 6 mo 15 (1-36)			

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
	LCP pre 61 (10-90) Post NA 3mo 64 (30-90) 6 mo 70 (10-90) Control pre 59 (30-90) Post NA 3mo 70 (40-90) 6 mo 74 (50-90) P=0.3474 *SF-36 (Role - emotional)* MFTE pre 57 (20-90) Post NA 3mo 71 (20-90) 6 mo 70 (30-90) LCP pre 61 (10-90) Post NA 3mo 64 (30-90) 6 mo 70 (10-90) Control pre 59 (30-90) Post NA 3mo 70 (40-90)	LCP pre 11 (2-36) Post 7 (0-25) 3mo 7 (0-26) 6 mo 7 (0-30) Control pre 8 (0-19) Post NA 3mo 5 (1-12) 6 mo 6 (1-13) P=0.2085 *Perceived Stress scale* MFTE pre 36 (22-48) Post 30 (19-45) 3mo 31 (17-46) 6 mo 30 (19-48) LCP pre 37 (29-52) Post 33 (22-42) 3mo 36 (20-51) 6 mo 32 (23-54) Control pre 30 (22-390 Post NA 3mo 30 (22-39) 6 mo 31 (19-40)		LCP pre 19 (3-47) Post 18 (2-38) 3mo 16 (1-36) 6 mo 10 (0-38) Control pre 16 (0-35) Post NA 3mo 15 (0-29) 6 mo 10 (2-21) p=0.144 (0.0225 for group x time interaction)			

Study	Wellbeing / QoL	Mood	Self reported benefits	Psychological & behavioural	Standardised effect Sizes	Physical measures	Occupational measures
	6 mo 74 (50-90) P=0.3474	P=0.0930					
Woodford et al 2017				*PANAS* 6/10 positive affects showed statistically sig improvements. 1/10 negative. No overall score given			

14. Appendix 7: Study characteristics (qualitative studies)

Table 13: Study characteristics (qualitative studies)

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
Adevi & Martensson 2013	Sweden	Qualitative	5 participants, diagnosed with exhaustion disorder and had been on sick leave for 2-3 years. Between 25 and 60 years old; 4 women and 1 man; recently (0.5-1.5 years) completed rehabilitation.	Alnarp Rehabilitation Garden. Two hectare area with separate garden rooms. Garden contains natural areas and traditional cultivation areas with growing beds for more demanding activities. Also includes groves and meadows.	• To explore the impact of garden therapy on stress rehabilitation with special focus on the role of nature as part of the garden. • Rehabilitation process aims to stimulate all senses, increase self-esteem, self-awareness, and help participants to create positive habits and routines for daily life. • Art therapy and relaxation are examples of activities offered besides nature assisted therapy and traditional gardening.	Semi-structured interviews, lasted 45-60 min and took place in the home of the participants (4) or at Alnarp (1). Interviews were recorded and transcribed.	Qualitative data analysis in the vein of grounded theory (Glaser & Strauss, 1967). Open coding, analysis line by line, word by word. New themes emerged and coded until 'saturation' i.e. no new themes arising. Two explanatory categories used to organise results.
Barley et al 2012	UK	Qualitative interview study	16 participants (referred to as 'coworkers'); 7 women and 9 men, aged between 38 and 91 years; had a range of severe mental and	Sydenham Garden is a primary-care-based social and therapeutic horticulture and participatory arts rehabilitation project for people with significant	• To conduct an in-depth exploration of the views and experience of participants of a primary-care based horticultural and participatory arts rehabilitation project (Sydenham Garden). • Sydenham Garden includes an area that is managed as a nature reserve	Semi-structured interviews which were digitally recorded and transcribed.	Interviews were analysed using constant comparison and thematic analysis. Two researchers independently applied open codes to three transcripts and agreed

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			physical health problems (most had depression). 'Coworkers' are referred by local professionals, such as GPs. Coworkers are encouraged to move on to other opportunities after 12-18 months.	mental and/or physical illness.	and a garden where paid staff, volunteers, and coworkers grow vegetables, herbs and flowers. Art groups are held weekly in the garden. Produce is used by coworkers or sold by them to the local community at fairs and from a weekly stall.		descriptive codes. These, together with new codes were then applied to subsequent transcripts. Descriptive codes were collated into themes and a preliminary explanatory framework was devised. This was used as a basis for further coding. Two authors agreed the coding.
Bryson et al 2013	Canada	Qualitative (part of a mixed methods study)	15 participants with psychosis	Adventure-based therapy	• To examine the feasibility of a six-week adventure-based therapy intervention called Rise-Up in an outpatient care setting. A post-intervention qualitative examination of participants' experiences was undertaken. • The intervention was facilitated by recreation therapists and involved a range of group activities such as team-building exercises, hiking, rock climbing, rope courses, and horseback riding.	Semi-structured interviews (approximately 10-20 minutes long)	Content analysis strategy was used (Smith, 1995). Common themes/categories were identified through a line-by-line open coding process and conceptual categories were developed.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
Caddick et al 2015	UK	Qualitative	15 participants (aged 27-60 years) who had been directly involved in front-line duties and combat roles during their service. Ten out of the 15 had been diagnosed with PTSD but all participants referred to themselves as living with PTSD. One additional participant was a former member of the civilian emergency services who was diagnosed with PTSD. The total number of participants was 16.	Coastal UK based veterans' surfing charity.	• To investigate the effect of surfing on the wellbeing of combat veterans experiencing posttraumatic stress disorder (PTSD).	Semi-structured life history interviews. Half of the participants took part in a follow-up interview. The interviews numbered 24 in total, each lasting between 1 and 4 hours. Participant observation in the daily activities of the veterans during 18 of the charity's twice-weekly surf camps, and during three residential weeks which involved joining in activities (surfing, coastal walks and yoga/meditation). This resulted in approximately 90 hours of observational data.	Dialogical narrative analysis (Frank, 2010, 2012) was used. It considers what type of story is being told and how the story is structured.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
Coan et al 2017	UK	Qualitative (part of a mixed methods study)	12 participants (7 volunteers, a number of whom had experienced mental ill health, and five service users with a range of mental health problems). 3 stakeholders, 2 of whom referred people with mental health problems to attend Hive programmes, and one signposted.	Hive, a charity, has provided projects to support people experiencing mild to moderate mental health problems. One project, Flourish, based on Creative Eco-therapy, aimed to help people get active outdoors and combined environmental activity with the creative process.	• To assess the impact of participating in a HIVE programme on individuals' health and wellbeing. • To identify whether participating in a HIVE programme has led to individuals participating on other activities including volunteering. • To identify possible recommendations/improvements to the HIVE programmes. • To examine the role that Hive currently fills locally.	Two focus groups; one used a story-board to focus the discussion. Semi-structured telephone interviews lasting between 18 and 38 minutes. Focus groups and interviews were recorded but not transcribed.	Thematic analysis
Cook 2008	US	Qualitative	13 participants (boys), between 12 to 16 years. Voluntarily enrolled on a year-long residential wilderness program for boys.	Residential wilderness program located in southeastern US. Central to successful completion of the program is the role of the group in shaping the social	• To explore the aspects of a residential wilderness experience that informed self-evaluations in male adolescents (12-16 years) over a four-month period.	Semi-structured interviews conducted on two separate occasions - at Time 1 (start of the program) and Time 2 (four months later). Interviews lasted approximately one hour.	Preliminary codes were identified and quotations that supported these were identified. Other relevant codes emerged and were added. Once all interviews were coded, each transcript was

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			Many participating in the program had DSM-IV diagnoses and one of the criteria for admission to the program included a primary DSM diagnosis other than substance abuse.	and emotional development.		Interviews were recorded and transcribed verbatim.	reviewed a second time, and the revised codes applied. A similar process was used to analyse the second round of interviews.
Crossley 2018	UK	Qualitative (informed and influenced by principles of co—production and participatory research)	Staff and volunteers. Evaluation took place in third year and there were 37 volunteers in year 3 (8 women and 29 men, 5 were employed, 2 were retired and 30 were unemployed). Twenty of the volunteers had a disability, defined as a physical or mental	Scotswood Natural Community Garden was established in 1995 and covers around two and three acres. The garden has a number of different projects catering for different age ranges and abilities.	• To evaluate the impact of the *Growing Together* project at Scotswood Natural Community Garden. • *Growing Together* was a three year project for working age volunteers and provided gardening training, work experience and support for people looking to return to work, and therapeutic gardening sessions designed to maintain and improve volunteers' health and wellbeing. • There were sessions three days a week in the garden providing training and work experience in horticulture and gardening, with	Participatory photography involved providing volunteers with digital camera to photograph favourite aspects of the garden and aspects of the garden they would like to change. In a facilitated session, the volunteers discussed a selection of their photographs, why they took them, and what the images meant to them.	Inductive coding was used to identify themes in the data.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			impairment that had a substantial and long-term effect on the ability to do normal day-to-day activities.		tailored individual support to help improve each volunteer's wellbeing and mental health.	Participatory video involved recording volunteer activities and three videos were played back to the volunteers and in a facilitated session volunteers discussed activities and what they meant to them. Semi-structured interviews with two staff members who also kept diaries over the evaluation period (noted the informal and ad-hoc conversations and interactions with volunteers). Participant observation with researcher participating in some garden activities, visiting the garden and taking part in the volunteer lunch served every Wednesday. Researcher also accessed reports and	

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
						records relating to the project.	
Devine-Wright & Godfrey 2018	UK	Qualitative (part of a mixed methods study – longitudinal analysis)	13 adults (parent/carer) and 9 children (participants) in The Wave Project in Cornwall, Devon, Scotland and South Wales.	Coastal. The Wave project works in 13 locations across 8 regions: Cornwall, Devon, Dorset, Sussex, North Yorkshire, East Lothian, South wales and the Isle of Wight.	• To illustrate the effect of The Wave Project on participants over time. • The Wave Project is a six-week tailored, one-to-one surfing intervention, seeking to improve the lives of vulnerable young people. The Wave project is also a charity. • 10-15 new referrals come in weekly from professional services. On referral a third of Wave Project participants have diagnosed mental health issues.	Focus groups and interviews were conducted (February 2018), recorded and fully transcribed.	Thematically analysed.
Eriksson et al 2011	Sweden	Qualitative exploratory longitudinal study	5 participants. All were women, between 36-52 years, and had diagnoses reported according the ICD-10 (WHO, 1992). Participants were referred by the National Health Insurance Office.	Vocational rehabilitation clinic	• To explore and describe how women with stress-related ill health who are on sick leave experience the rehabilitation process in a therapeutic garden and how these experiences connect to their everyday lives. • Rehabilitation program was located in a therapeutic garden led by an occupational therapist, a physiotherapist, a social worker, and a gardener. It was delivered in group format and included 10 sessions	Three semi-structured interviews at three weekly intervals during rehabilitation and one interview three months after. Data comprised 18 digitally recorded interviews that lasted between 30 and 60 minutes and were transcribed verbatim.	Used methods from grounded theory (Charmaz, 2006; Glaser & Strauss, 1967 i.e. constant comparison of data and continuous memo writing.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					over 10 weeks, and two follow-ups at three and four months after the rehabilitation. Each session had a similar structure and lasted for three hours. • Garden was situated in a green-house of 500 square meters, and the environment was specially designed to promote health according to clinical experiences and theoretical ideas from the field of environmental psychologists (Stigsdotter & Grahn, 2003). For example, the therapeutic garden was divided into several areas with various characteristics to encourage different modes and activities.		
Fernee et al 2019	Norway	In-depth qualitative investigation	14 participants (eight girls and six boys), required to be 16 years by the onset of the treatment and not older than 18 years by the end of the intervention. 11 completed the	Norwegian adaptation of wilderness therapy called *Friluftsterapi* (FT). The natural areas sought out in this version of the FT program are not generally perceived	• To identify some of the therapeutic opportunities – also called mechanisms – that arose throughout the FT treatment process; to explore the circumstances under which these therapeutic mechanisms emerged; and to briefly discuss the possible fundamental of underlying conditions of the FT treatment.	Fieldwork included six single-day sessions, the three day trip and six day expedition with each of the two FT groups. Descriptive fieldnotes and reflections were mostly recorded the same evening or the next day following the single-day	Critical realist approach was used and the guidelines by Danermark et al (2002) were applied in the analytic process and included four stages: (a) initial description; (b) analytical resolution; (c) abduction; and (d) retroduction.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			majority of the treatment. Four participants were first-time referrals, remaining 10 had been in treatment before. Approximately half of the participants were diagnosed with one or a combination of diagnoses along the anxiety and/or depression continuum.	as 'wilderness' in a Norwegian context, as participants remained in close proximity to civilisation throughout the intervention.	• The FT program did not offer continuous undisturbed time in wilderness areas over a consecutive number of days. But the majority of the program was situated in nature.	sessions. On the overnight trip, notes were recorded each night in the fields and finalised shortly following the trips. Fourteen individual semi-structured interviews were carried out from the first two to four weeks after the FT treatment ended. They lasted approximately 27 to 81 minutes. Interviews were recorded and transcribed verbatim.	
Fieldhouse 2003	UK	Qualitative	9 participants (three women and six men), between 24 and 61 years. All were diagnosed as having a serious mental health problem.	Community horticultural allotment group	• To explore the subjective experience of meaning that underpins attendance at a community mental health team horticultural allotment group.	In-depth, semi-structured interviews and focus groups. Interviews were recorded.	Data analysis was in four stages: categorisation, quantitative analysis, firming up categories and developing relations between categories. Constant comparison was used to isolate

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
							units of meaning which were then categorised.
Gabrielsen et al 2019	Norway	Qualitative (part of a mixed methods study)	12 participants from 2 of 4 groups in quant study (seven girls and five boys), between 16-18 years. All participants were admitted to the specialised mental health care system due to the severity of their mental health challenges.	Coastal regions of Southern Norway. Norwegian wilderness therapy programme, *Friluftsterapi,* a new treatment modality within a Norwegian public mental healthcare setting.	• To explore the subjective experiences and perceived outcomes of participation in the *Frilutsterapi* programme. • Programme consisted of 8 single days and 2 overnight trips of 3 and 6 days over an 8-10 wk period. Only intro and closing days not outdoors. In spring or autumn.	Participant observation took place throughout the first two of the four *Friluftsterapi* interventions. The main purposes were to gain insight into the treatment process in context, and to add nuances and depth to the subsequent data collection and analysis. Interviews took place around the same time as the post- and follow-up quantitative data collection.	A critical realist model (Danermark et al, 2002) was adopted as a guideline for analysis. The first two stages of the model was used: (i) initial description and (ii) analytical resolution.
Grabbe et al 2013	US	Qualitative descriptive design	8 participants. All were women living in shelters or on the street and ranged in age from 20 to 59 years.	Garden at a daytime shelter for women.	• To explore the perceptions of homeless women regarding their experience in a shelter-based garden project to promote mental wellness. • Garden project offered a regularly scheduled activity where the women could come together to work on a	Semi-structured interviews, lasting between 20 to 60 minutes. Interviews were audio-recorded and transcribed.	Conventional content analysis (Hsieh & Shannon, 2005). Findings were derived inductively. Authors read the interviews multiple times. Coding schemes were used

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			4 of the women reported having 1 or more mental illnesses.		shared and relaxing experience. Project staff helped integrate simple food preparation, health, nutrition, and horticulture education into the sessions.		to organise the clusters of concepts; conceptual definitions were developed based on the interview data.
Harris 2017	UK	Qualitative	15 participants (8 women and 7 men), with direct experience of mental distress. Participants were referred to as volunteers and mean volunteer time of participants was 4.3 years. One participant had self-referred and the remaining had been referred via a mental Health Service (n = 12) and recovery service (n =2).	Gardening project	• To build a clearer picture of processes affecting participation in TH (therapeutic horticulture) programmes and the salience of 'nature' versus other components characteristic of TH interventions. • Gardening project was set in one acre of walled garden in a small market town in south-east England, and had been running as a charity for 20 years. It supported people with mental health difficulties as well as being open to the public as a community garden selling refreshments, plant produce and crafts.	Focus groups (n = 7; n = 8) took place at the garden. Discussions were audio recorded and transcribed verbatim.	Thematic analysis, all transcripts were coded using an inductive framework (Braun & Clarke, 2006). Four key themes arose from the data analysis: 'community', 'agency', 'mental health' and 'natural value'.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
Howarth et al 2018	UK	Qualitative (part of a mixed methods study)	20 participants with MH problems, between 35-68 years.	Social enterprise based in north of England using therapeutic horticulture	• To evaluate the impact of a mental health recovery programme using therapeutic horticulture. • To explore participant perceptions and experiences of therapeutic horticulture. • Sowing, growing, and harvesting of garden produce.	Semi-structured focus group interviews, comprising 16 people in 4 sessions. 11 exit interviews.	Thematic analysis using grounded theory approaches.
McCaffrey 2007	US	Qualitative	60 participants with a diagnosis of depression from a healthcare provider or self-diagnosis of depression.	The Morikami Museum and Japanese Gardens features a 200-acre park with walking paths through 20 acres of Japanese-style gardens, the Gulf Stream Bonsai Collection, koi ponds and waterfalls, and many places to sit and reflect.	• To determine the effects of two different types of garden walks and an art therapy comparison intervention on depression in older adults. • Three groups were studied: Group 1 walked the garden alone; Group 2 walked the garden with a guided imagery leader; and Group 3 participated in art therapy sessions. • Three six-week sessions of each group were held. The two walking groups met on different days of the week and the art group met at a separate location.	Focus group interviews and personal stories of sadness and joy - and post-intervention. Focus groups were held on the last day of the six-week intervention period for each group in the study and lasted for around two hours.	No details.
Morgan 2019	UK	Qualitative (part of a	13 participants, all men, who had	Red Sea	• To conduct a service evaluation of Deptherapy to establish whether the	Semi-structure interviews (face-to-face (n = 8) and	Analysed for key themes.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
		mixed methods study)	completed the PADI (Professional Association of Diving Instructors) Deptherapy course since 2014. In order to be accepted onto the Deptherapy course, applicant must have sustained a life-changing physical or mental health injury resulting from military service. 2 family members (father and wife of 2 participants) and 3 health care professionals (2 paramedics and 1 physiotherapist) who had observed the Deptherapy	Scuba diving	programme was resulting in a positive therapeutic outcome for participants and to make recommendations on improving participants' experience. • To validate the written questionnaire results and to provide the opportunity to garner further qualitative data not specifically covered within the questionnaire. • Deptherapy was formed as a charity in 2014 and aims to promote the rehabilitation of military personnel, and veterans, who have experienced life-changing physical and/or psychological injuries, through the medium of scuba diving. This is achieved by offering people accepted onto the programme the opportunity to progress through a graduated series of scuba diving qualifications accredited by PADI.	telephone (n = 5)) which lasted between 40 and 80 mins. Responses were documented during the interview.	A detailed review of relevant literature regarding PTSD symptomology in veterans and sporting activities as a possible therapy was used to highlight significant, recurring themes. The frequency that these themes were cited during interviews was then documented and tabulated for each veteran.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			programme first-hand.				
Nordh et al 2009	Sweden	Qualitative (part of a mixed methods study)	9 participants, 1 of the 3 groups that participated in the study. Most of the participants suffered from depression and anxiety disorders.	Forest environment close to Mora, a town in central Sweden. Two sites were chosen, both situated in or near the forest along the shoreline of Orasjön, a large lake. All places were peaceful, without noise or other disturbing elements such as other people or traffic. There were small cottages to use if the weather was bad.	• To study whether people on long-term sick leave, who suffer from mental fatigue and stress-related illness, can improve their health and capacity when undertaking meaningful activities in a restorative context, such as in a forest. • Ten week intervention that combined activities, teaching and recreation in a forest environment. The purpose of the activities was to give participants a daily routine, with meaningful activities and social training in an environment that would promote restoration. • Two days a week were spent in the environment around the cottages and one day somewhere else in the municipality. • The regular activities were forest based, such as making culture and artefact inventories, training in using maps and a compass, making inventories of nature reserves, learning about wildlife, flora and	Participant observation in which the researcher participated for three of the 10 week intervention with one of the groups. Interviews with each participant were held during a 20- to 30-minute walk. They were held on four occasions: at the beginning of the project, in the middle of the project, at the end of the project and 5.5 months after the project had finished.	No details.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					fauna, or simply taking a walk in the forest.		
O'Brien et al 2011	UK	Qualitative	Study 1 – 10 volunteer groups. General environmental volunteering programme. 88 volunteers, between 16-76 years. 15 were unemployed, at least 2 were assigned to social workers, 3 were in care, 1 man had a carer but attended without him, 1 young man was in a special school, 2 men were not working due to ill health, and at least 2 spoke openly about living with depression. Study 2 – volunteers,	Study 1 – Organisations involved: Hampshire and Isle of Wight Wildlife Trust, Royal Society for the Protection of Birds, Forestry Commission Scotland, Gateshead Metropolitan Borough Council, Durham Bird Club, Border Forest Trust, British Trust for Conservation Volunteers, Friends of the Lake District, National Trust for Scotland, and Northumberland National Trust. Study 2 – Organisations involved: Kensington &	• To explore the role of active hands-on contact with the environment through a general environmental volunteering programme and through a targeted therapeutic volunteer programme. • Study 1 – Organisations involved in the research covered a range of organisational size and scope, included urban and rural sites, and covered volunteers from a range of ages and different socio-economic backgrounds. The groups were working in a variety of places from scenic rural to very urban locations, with a range of activities including coppicing, footpath improvement, removal of invasive species and habitat maintenance. • Study 2 – involved a one-year ethnographic case study at the Meanwhile Garden, London, which provided an overview of the ecotherapeutic project in action. The therapeutic garden extends over 3000m^2 forming part of a larger	Study 1 – Interviews with volunteers as they undertook tasks or as they had a break for tea or lunch. The researchers spent a day with 10 volunteer groups working alongside them, observing and interviewing all of them as they carried out different environmental management tasks Study 2 Ethnographic case study preceded by 10 interviews with participants were recruited from environmental volunteering projects across the UK. Two focus groups of practitioners (n = 6, n = 4) and two interviews who organise and deliver	In both studies thematic analysis (Joffe & Yardley, 2004) was used to inductively identify patterns (themes) within the data. Notes and transcripts were carefully read, coded and re-coded to cover all aspects of participants' comments and descriptions by the authors for each study separately.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			between 22-60 years, unemployed and on incapacity-related benefits due to mental health conditions. Participants were referred to the project by their health or social care practitioner or general practitioner, or they could refer themselves if they were interested in this type of therapeutic approach.	Chelsea Mind, Community mental health teams, tutors and educators (e.g. City & Guilds), Health and social care professionals, voluntary agencies, horticulturalists, service users, ecologists, work experience and employment, and therapist (HELP Advisory Service).	urban public green space in central London.	therapeutic activities were also held. Participant observations were recorded in field notes and project research diaries at the end of each day of fieldwork.	
O'Brien 2018	UK	Qualitative mixed methods	24 participants recruited from five adult groups with mental health problems, and drug and alcohol addictions.	Westonbirt Aboretum is a state forest managed by the Forestry Commission England (FCE). It is the national aboretum in England carrying	• To explore whether repeated trips to Westonbirt Aboretum could provide a deeper engagement with nature and an opportunity to engage and shape nature, and how this could have had an impact on participants' sense of wellbeing.	(i) In situ 'being and doing' with participants – researcher spent the day at Westonbirt for the final visit of the five adult groups. (ii) interviews were undertaken in situ at the above final visits (10-20 minutes. They	The interviews and participant observation used the 'five ways to wellbeing' framework (Aked & Thompson, 2011). The interview transcripts were read and coded for themes. Top level

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
				out international conservation activities. The site is 600 acres in size, situated in the south west of England.	• The Westonbirt Project, funded by the Heritage Lottery Fund, included the creation of a Community project which aimed to increase the range of people who take part in the Arboretum's heritage. A programme of visits was developed including multi-visits, involving a number of repeat visits to the site. • The range of activities included woodland management and maintenance such as coppicing, deer fencing, wood cutting, tree planting, and bramble clearance. There were also creative and sensory activities focusing on creating art, leaf printing, sound mapping, using taste, touch, sight, sound to explore the site, and social activities which included working with others, preparing, cooking and eating food together. Groups would spend approximately five hours on site from 10-15pm every week or fortnight.	were digitally recorded and transcribed. (iii) participant observation – FCE staff and volunteers undertook participant observation at each session and focused on a sample of 2-3 people. (iv) de-briefing sessions – after each session FCE staff and volunteers would discuss how the session had gone and the researcher attended the final de-brief session.	themes were deductive i.e. the 'five ways to wellbeing' each became a top-level theme. The participant observation was written up into these top 'five ways' themes as well. For both sets of data, further coding was undertaken to develop sub-themes and these were then linked to three types of engagement - nature, social and craft (Pretty et al, 2017).
Palsdottir et al 2014a	Sweden	Longitudinal single case study (study	43 former clients (35 women and 8 men) who had	Alnarp Rehabilitation Garden. The two	• To explore and illustrate how participants with stress-related mental disorders participating in	Semi-structured interviews were carried out within one month after the	Interpretative phenomenological analysis (IPA) was used to analyse the

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
		was carried out over four years, in 2007 and from 2009-2011).	participated in a 12-week nature-based rehabilitation. The inclusion criteria were (i) on long-term sick leave and (ii) one of the following International Classification of Diseases (ICD-10) as the primary diagnosis: psychiatric diagnosis of adjustment disorder and reaction to severe stress (ICD-F43), or depression (ICD-F32.0).	hectare garden was designed according to theories on nature's restorative effects. The garden contains places for work as well as for rest and contemplation, and is divided into two major areas: the *Nature Area*, an informal nature garden; and the *Cultivation and Gardening Area* including formal gardens and rooms for horticulture and other garden work.	nature-based rehabilitation (NBR) experience and describe their rehabilitation process in relation to the role of natural environments at the Alnarp Rehabilitation Garden. • The NBR was designed as 12 week' rehabilitation and was performed as group therapy consisting of a maximum of eight people in each group, and as one group ended another begun. • A transdisciplinary team supported the NBR: occupational therapy, physiotherapy in the form of Rosen therapy, psychotherapy, and horticultural therapy. It is described as a unique phenomenon in its use of a professional healthcare rehabilitation team and a specially designed outdoor environment (the garden).	ended their rehabilitation, and were approximately one hour long. All interviews were recorded and transcribed verbatim. Palsddottir participated in the NBR, first during spring 2010 and then again during spring 2012, observing the intervention as a current whole phenomenon. This enabled the researcher to see and experience in situ how the intervention took place.	data. IPA is an idiographic and detailed analysis of elements reflecting persons' experiences of an event or a phenomenon and how they give meaning to it.
Palsdottir et al 2014b	Sweden	Qualitative (part of a mixed methods study)	15 participants. The inclusion criteria was one of the following International Classification of Disease (ICD-10)	Specially designed health garden (two hectares) according to theories on restorative and supportive environments. The	• To describe and assess changes in the participants' experienced value of everyday occupations after nature-based vocational rehabilitation.	Semi-structured interviews carried out 10-12 weeks after the intervention, either by face-to-face or via telephone. Each interview lasted	Analysis was inspired by Graneheim & Lundman's overview of important concepts in qualitative content analysis. The process involved identifying

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			diagnoses as the primary diagnosis: psychiatric diagnosis of adjustment disorder and reaction to severe stress (ICD F43); depression (ICD F32.0. ICD F32.1).	garden was divided into different rooms with various characteristics and structures, in order to meet the emerging needs and moods of participants during their rehabilitation. During the intervention, the participants could use the garden freely according to their own needs and desires, supporting their rehabilitation process.	• The nature-based rehabilitation programme ran for 12 weeks and was scheduled for four days a week, each day lasting for 3.5 hours. The programme was outlined as group therapy, consisting of four to five individuals in each group. • The nature-based programme comprised four integrated therapy forms: occupational therapy, physiotherapy, psychotherapy, and horticultural therapy.	about 30 minutes and was documented using handwritten notes.	meaning units which were increasingly abstracted into more condensed units and then codes. Based on these codes, categories were formulated and then themes.
Perrins-Margalis et al 2000	US	Qualitative	10 participants diagnosed with chronic mental illnesses.	Psychosocial/vocational rehabilitation clubhouse. The clubhouse had an already established horticulture programme.	• To describe and analyse a group-based horticulture experience from the perspective of persons with chronic mental illness. The study examined the impact of this horticulture experience on participant Quality of Life.	Three researchers acted as members of the group and participated in each horticulture activity for the six week study period. Researchers observed the participants and recorded field notes.	Data from journals, field notes and interviews were analysed.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
					• The horticulture activities offered included planting seedlings, creating indoor perennial flower beds, creating individual cactus gardens, creating wreaths and fresh herb wreaths and fresh flower arranging.	Participants were asked to write about their horticulture experience in journals each week. At the end of the study, semi-structured interviews were conducted, recorded and transcribed verbatim.	
Rappe et al 2008	Finland	Participatory study	12 participants (mental outpatients and support persons) who were part of a gardening group. All but 1 of the participants were women. Age ranged between 41-64 years.	Annala Manor Park in Helsinki. The Association for Mental Health has a plot for its members to carry gardening at Annala.	• To assess the suitability and effectiveness of group gardening in contributing to the rehabilitation of mental health outpatients. • The group met weekly at a set time but it was also possible to visit the plot at anytime by oneself.	Observation, open-ended questions and diaries, in which participants could make notes about their experiences. Two outpatients returned their diaries and two support people. Researchers had 17 meetings with gardening group.	Open-ended questions and diaries were analysed by quantitative content analysis and by categorising the statements of respondents according to the phenomenological approach (Lukkarinen, 2001; Tuomi & Sarajarvi, 2002).
Schreuder et al 2014	Netherlands	Qualitative	11 participants (2 women and 9 men), between 17-22 years. They had completed a programme (six	Youth care farms. They are locations where youngsters and farmers' families live and work together. The	• To explore how (learning) experiences offered through outdoor experiential programmes, particularly the youth care farm approach, may (or may not) enhance young people's ability to recognise	Semi-structured interviews which typically lasted one hour. Interviews were transcribed verbatim.	Interpretative phenomenological analysis (Boeije, 2010). Transcripts were double coded and compared, and data

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			months stay at a care farm) operating at care farms in association with a youth care organisation.	'living and working programme' is developed for youngsters with severe social and mental health problems.	and then utilise available resources for personal growth, protection and health promotion.	Nine interview transcripts were included in the dataset.	were clustered into related themes according to the principles of thematic analysis. Themes were created inductively and deductively.
Sidenius et al 2017	Denmark	Qualitative (part of a larger study which included a RCT comparing nature-based therapy to cognitive behavioural therapy for people with stress-related illnesses)	14 participants recruited from seven groups who had participated in the NBT at Nacadia from 5 August 2013 to 27 March 2015. They were between 20-60 years and had one of the following ICD-10 codes (WHO, 1992) as their primary diagnosis of adjustment disorder and reaction to severe stress (ICD-F43.0-9, minus 1 = PTSD). This level	Nacadia Therapy Garden at the University of Copenhagen. Nature-based therapy (NBT)	• To illuminate the phenomenon of participants' lived experience of nature-based therapy in the University of Copenhagen's Nacadia Therapy Garden. • The NBT programme in Nacadia lasts for 10 weeks and takes place on three dates per week, for three hours per day. In this study there were a maximum of seven participants per group and a minimum of four. • The NBT is the same all year round, and the framework is the same every day. However, every week has a specific theme. • The daily therapy was performed and managed by two authorised	Interviews (approximately 20 minutes) carried out in the second, fifth and ninth weeks of the NBT programme. Interview guide consisted of open-ended questions. Interviews were recorded and transcribed.	Analysis involved author discussion of data and findings in a dynamic and open 'spiral' process in line with Dahlberg et al (2008) and their concept of the analytical flow.

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			of stress was considered to correspond to 3-14 months of inability to work.		psychologists, both trained in NBT. The therapist were supervised by a medically responsible psychiatrist. The garden activities were initiated and assisted by a professional gardener		
Stevens 2018	UK	Qualitative	12 participants who typically came to the nursery 4 days a week. 4 people came after being referred by doctor and by job centre personnel and four came after they heard about the nursery.	Cherry Tree Nursey, a sheltered work project for people with severe and enduring mental illness.	• To show how hypnosis can provide a useful framework for understanding therapeutic horticulture. • Activities in which the participants were involved covered a wide range, including horticultural, administrative, social support, domestic, skill-acquisition, education and awareness raising, and selling to the public.	In-depth, semi-structured interviews of variable length, depending on the capabilities and patience of the interviewees. Nine of the interviews were recorded and notes were made on three.	No details.
Whatley et al 2015	Australia	Ethnographic exploration	13 participants (4 staff, 5 participants, 2 of their external support workers and 2 volunteers) in ethnography. 6 additional participants involved outside	Community garden. Mind Sprout Supported Community garden (Sprout) is a service established by Mind Australia in 2002.	• To explore how a supported community garden, *Mind Sprout*, situated in inner-city Melbourne, created a socially inclusive environment and enabled occupational participation among people recovering from mental ill-health.	Fieldwork – 23 hours of participant observation were undertaken from November 2010 to January 2011. Researcher worked alongside participants, observing and talking with them; also	Data analysis occurred concurrently with data collection, commencing with a close reading of all data, including field notes, collected documents and interview transcripts. Analysis proceeded

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
			the participation observation period (senior staff member, 3 staff and 2 Sprout members experiencing mental ill health.		• Sprout supported community garden is a shared vegetable and herb garden located on disused railway land in metropolitan Melbourne. The garden provides a program which is offered three days per week to people with experience of severe and persistent mental ill-health. • Produce from the garden is used for communal activities such as a community meal or is sold at a weekly 'Open Gate' or at the Sprout community garden market held eight times a year.	reviewed Sprout program documentation and took photographs of spaces and objects in the environment, to supplement observations. Semi-structured interviews ranged from 40 to 90 minutes and were digitally recorded and transcribed. All participants were provided with the written transcript of their interview and invited to comment.	through open and focussed coding, memo writing and mind mapping as further data were collected (Charmaz, 2006).
Wilson (2009)	UK	Qualitative (part of a mixed methods study)	29 participants with a mental health diagnosis and referred from Mental Health Service within the NHS Greater Glasgow and Clyde area.	Woodland 12 week programme in which clients take part in a variety of activities including health walks, environmental arts, conservation, bushcraft skills and relaxation. The sessions were run	• To evaluate the effects of participation in the Branching Out programme on those who use secondary and tertiary care mental health services. • To discover if the quantitative data measuring the primary outcome measures were supported by comparable qualitative evidence. • To discover if there were any perceived changes from clients and	Semi-structured interviews (n = 29); maximum of three interviews were conducted per group , during one of the sessions between the 7^{th} and 212^{th} weeks. Focus groups with clinicians and staff.	Thematic analysis and interpretive phenomenological analysis (Smith et al, 1995).

Study ID	Country	Study description	Participants	Setting	Study aim and context of nature exposure	Data collection	Analysis
				by an experienced Forestry Commission Ranger and an Assistant Ranger, with input from seasonal workers such as an environmental artist and tai chi instructor.	staff to any other variables other than primary outcomes.		
Woodford et al 2017	Canada	Qualitative (part of a mixed methods study)	24 participants (11 women and 13 men) between 19 to 58 years. Receiving treatment for symptoms associated with various mental health illnesses, such as anxiety and mood disorders, psychosis and schizophrenia.	Wilderness Wellness camp located about 60 minute from hospital, features open spaces, outdoor dining shelters, fire pits, kitchen, bunk rooms and a hiking trail.	• To explore how the assessment, planning, implementation, evaluation and documentation process in therapeutic recreation can be used when implementing a wilderness therapy programme. • Camp programs were structured to increase the independence of clients by focusing on social skills and independent living skills. Program also included physical activity and nature-based programs, creative arts, mindfulness activities, team-building activities, and meal preparation and clean-up.	Direct staff observation, goal setting with participants, and camp evaluation questionnaire.	No details

15. Appendix 8: Topic guides for interviews

Topic Guide for Primary Health Care Professionals (GPs)

Therapeutic Nature

This project aims to understand the factors that influence successfully providing, **prescribing** and **commissioning** nature-based interventions for mental ill health.

1. Introduction

Introduction to researcher

- Research topic and funder
- Explanation of the aims and objectives of the study
- Explanation of confidentiality and consent
- Explanation of recording, length (1 hour to 1.5hours) and nature of discussion, outputs/reporting and data storage issues
- Go through consent issues explaining that they may withdraw at any time from the interview and do not have to answer any questions they would prefer not to
- Check whether they have any questions
- Check whether they are happy to continue

2. Background

Aims: to get participant talking and to find out contextual information about his/her current role.

NB: If participant does not use the social prescribing scheme or has used it in the past but no longer uses it, ask participant to think back to when he/she did.

- What they do
- Knowledge of, and extent of involvement in, social prescribing
    - buy-in/commitment to social prescribing
- Knowledge of availability of nature-based interventions in their local area
    - How do they find out about what is on offer

3. Experience of social prescribing for nature-based interventions

Aims: to understand the social prescribing scheme in place and how it is organised; and the role of nature-based interventions within the existing scheme; extent to which the social prescribing scheme has evolved over time and reflections on why.

- Describe social prescribing in the practice
    - When was it first set up
    - Existence of specific formal or informal "rules" about who might be suitable/unsuitable for social prescribing
    - What kind of referral system is in in place

- Direct referral

  Probe
- How does this work
- Use of Link Worker or other staff

  Probe
- Who employs and funds the Link Worker
- Where is the Link Worker located
- What does the Link Worker do
  - level of engagement with person with mental ill health
  - extent of liaison with the health care professionals and environmental/voluntary sector
- What are the steps in making a referral
  - How well does the system work/flow
  - Where do the blockages occur
- Has the social prescribing scheme changed/evolved over time

- Reasons to use nature-based interventions as a social prescription
  - What is the importance and role of nature-based interventions to social prescribing in the practice
    - Perception of value of nature-based interventions
  - When are nature-based interventions an appropriate prescription
  - Are there particular nature-based interventions that work for people with an identifiable mental illness
  - What are their perceptions of quality of the available nature-based interventions

4. Challenges to using social prescribing of nature-based interventions

Aims: to understand what works well and what works less well in the social prescribing of nature-based interventions

- What has worked well/less well – (for GPs and other healthcare professionals 'working well' may mean that it enables them to better manage demands on their time; better use of NHS resources)
  - Would they make /recommend changes to the current social prescribing system for nature-base interventions
  - Has it altered the demand for their services
  - What makes a good nature-based intervention
  - Assurance of quality of nature-based intervention – 'trustworthiness'
  - What kind of mechanisms for feedback or follow-up with people prescribed
    - How do they know if the person take up the prescription
    - Have they examples of effectiveness of any nature-based interventions in terms of improvements in mental health and wellbeing

- What are the key ingredients for a successful social prescribing scheme
    - **Collaboration** between primary and secondary health care and environmental/voluntary sector
    - **Communication** between sectors and with Link Worker
    - Are systems in place to support **partnership working** – referral and information sharing system
        - How effective is the referral system?
        - Does it increase workload (paperwork/referral form and need to develop new partnerships in early stages)
    - Is there access to direct funding – funding following people being referred
    - How important is the role of the Link Worker
    - What particular training or skill set do link workers need

5. Future of social prescribing for nature-based interventions

Aims: to find out how they see the future, reflections on social prescribing in the practice and to close the interview.

- Intentions to use social prescribing for nature-based interventions in the future
- Further support that would be necessary or should be available to make social prescribing for nature-based interventions work/sustainable
- Potential for upscaling
- Any other points they would like to raise

6. In conclusion

Aim: to reiterate confidentiality and to ask permission to archive participant's transcript for research purposes.

- Thank participant for their time. Reiterate the interview will remain confidential. Tell them that they are welcome to contact members of the study team to ask questions at a later date if they wish.
- Ask participant for permission to archive the transcript of the interview. Explain that although identifying features will be removed from the transcript they may be identifiable due to the unique nature of their role/geographic setting.

END RECORDING

Topic Guide for Secondary Mental Health Care Professionals (Community Mental Health Teams - Nurses, Community Psychiatrists)

Therapeutic Nature

This project aims to understand the factors that influence successfully **providing**, **prescribing** and commissioning nature-based interventions for mental ill health.

1. Introduction

Introduction to researcher

- Research topic and funder
- Explanation of the aims and objectives of the study
- Explanation of confidentiality and consent
- Explanation of recording, length (1 hour to 1.5hours) and nature of discussion, outputs/reporting and data storage issues
- Go through consent issues explaining that they may withdraw at any time from the interview and do not have to answer any questions they would prefer not to
- Check whether they have any questions
- Check whether they are happy to continue

2. Background

Aims: to get participant talking and to find out contextual information about his/her current role.

NB: If participant does not use the social prescribing scheme or has used it in the past but no longer uses it, ask participant to think back to when they did.

- What they do
- Knowledge of, and extent of involvement in, social prescribing
    - buy-in/commitment to social prescribing
- Knowledge of availability of nature-based interventions in their local area
    - How do they find out about what is on offer

3. Experience of social prescribing for nature-based interventions

Aims: to understand the social prescribing scheme in place and how it is organised; and the role of nature-based interventions within the existing scheme; extent to which the social prescribing scheme has evolved over time and reflections on why.

Describe social prescribing

- When was it first set up
- Existence of specific formal or informal "rules" about who might be suitable/unsuitable for social prescribing
- What kind of referral system is in in place
- Referral from GPs and others in primary care

Probe

- How does this work
- Use of Link Worker or other staff

  Probe
- Who employs and funds the Link Worker
- Where is the Link Worker located
- What does the Link Worker do
  - level of engagement with person with mental ill health,
  - extent of liaison with the community mental health professionals and environmental/voluntary sector
- What are the steps in making a referral
  - How well does the system work/flow
  - Where do the blockages occur
- Has the social prescribing scheme changed/evolved over time

- Reasons to use nature-based interventions as a social prescription
  - What is the importance and role of nature-based interventions to social prescribing
    - Perception of value of nature-based interventions
  - When are nature-based interventions an appropriate prescription
  - Are there particular nature-based interventions that work for people with an identifiable mental illness
  - What are their perceptions of quality of the available nature-based interventions

4. Challenges to using social prescribing of nature-based interventions

Aims: to understand what works well and what works less well in the social prescribing of nature-based interventions

- What has worked well/less well – (for CMH teams – better mental health outcomes; better use of resources)
  - What makes a good nature-based intervention
  - Assurance of quality of nature-based intervention – 'trustworthiness'
  - What kind of mechanisms for feedback or follow-up with people prescribed
    - How do they know if the person take up the prescription
    - Have they examples of effectiveness of any nature-based interventions in terms of improvements in mental health and wellbeing
  - Would they make /recommend changes to the current social prescribing system for nature-base interventions

- What are the key ingredients for a successful social prescribing scheme
  - **Collaboration** between primary and secondary health care **and** environmental/voluntary sector
  - **Communication** between sectors and with Link Worker

- Are systems in place to support **partnership working** – referral and information sharing system
  - How effective is the referral system?
  - Does it increase workload (paperwork/referral form and need to develop new partnerships in early stages)
- Is there access to direct funding – funding following people being referred
- How important is the role of the Link Worker
- What particular training or skill set do link workers need

5. Future of social prescribing for nature-based interventions

Aims: to find out how they see the future, reflections on social prescribing in the practice and to close the interview.

- Intentions to use social prescribing for nature-based interventions in the future
- Further support that would be necessary or should be available to make social prescribing for nature-based interventions work/sustainable
- Potential for upscaling
- Any other points they would like to raise

6. In conclusion

Aim: to reiterate confidentiality and to ask permission to archive participant's transcript for research purposes.

- Thank participant for their time. Reiterate the interview will remain confidential. Tell them that they are welcome to contact members of the study team to ask questions at a later date if they wish.
- Ask participant for permission to archive the transcript of the interview. Explain that although identifying features will be removed from the transcript they may be identifiable due to the unique nature of their role/geographic setting.

END RECORDING

Topic Guide for Community-based Providers/Deliverers of Nature-based Interventions

Therapeutic Nature

This project aims to understand the factors that influence successfully **providing** or **delivering**, prescribing and commissioning nature-based interventions for mental ill health.

1. Introduction

Introduction to researcher

- Research topic and funder
- Explanation of the aims and objectives of the study
- Explanation of confidentiality and consent
- Explanation of recording, length (1 hour to 1.5hours) and nature of discussion, outputs/reporting and data storage issues
- Go through consent issues explaining that they may withdraw at any time from the interview and do not have to answer any questions they would prefer not to
- Check whether they have any questions
- Check whether they are happy to continue

2. Background

Aims: to get participant talking and to find out contextual information about his/her current role.

- What they do
- Involvement in delivering nature-based interventions
- Type and number of nature-based interventions available for people with mental ill health as a social prescription
- Perception of value of nature-based interventions
    - Do nature-based interventions offer 'unique' benefits to people

3. Experience of social prescribing for nature-based interventions

Aims: to understand the participant's experience of social prescribing for nature-based interventions; and how their provision and delivery has evolved over time.

- Describe first involvement with social prescribing scheme
    - Reasons for involvement (e.g. enthusiasm of an individual – a champion)
    - What did they learn from that experience
    - How has their delivery of nature-based interventions for a social prescribing scheme developed from those initial experiences
- What is their current involvement with social prescribing
    - What is offered
    - Existence of specific formal or informal "rules" about who might be suitable/unsuitable for social prescribing

    - Are the nature-based interventions 'bespoke', designed for people with an identifiable mental illnesses
    - Are there particular nature-based interventions that 'work' for people with an identifiable mental illness
    - How do they assess the 'quality' of the nature-based interventions they offer
- What governance is in place to receive social referrals

4. Challenges or barriers to delivering nature-based interventions within a social prescribing scheme

Aims: to understand what works well and what works less well in the social prescribing of nature-based interventions.

- What are the key ingredients for a successful social prescribing scheme for nature-based providers
    - How would they describe the **collaboration** between primary/secondary health care professionals **and** them
    - What do they do to **communicate** with health care professionals (GPs and CMHTs) on benefits of nature-based interventions
    - How would they describe their **collaboration** with other local nature-based providers
    - How would they describe their **communication** with the Link Worker
        - Do they provide regular updates to Link Worker and others
        - How important is the role of the Link Worker
        - What particular training or skill set do link workers need
    - How the existing systems support **partnership working** – referral and information sharing system
        - How effective is the referral system?
- How are they funded to deliver nature-based interventions – support from small grants
    - Do they receive **payment** for delivering the interventions
- What are the challenges of designing and delivering a nature-based intervention targeting an identifiable mental illness
    - Cost of delivering interventions for people with an identifiable mental illness
    - Resources – knowledge and skills in organisation
    - Health professionals limited understanding of benefits of nature-based interventions
    - Health professionals not valuing nature-based interventions
    - Putting policies and procedures e.g. health and safety – in place.
    - Gaining accreditation
- Perceived effectiveness of referral process from healthcare professionals (GPs and CMHT)
    - Sharing of information on people's medical history and support/treatment they are receiving – issues of confidentiality/data protection issues
    - Failure of people to take up the social prescription for the nature-based intervention

5. Future of social prescribing for nature-based interventions

Aims: to find out how they see the future, reflections on social prescribing for nature-based interventions and to close the interview.

- Intentions to provide and deliver nature-based interventions in the future
- Further support that would be necessary or should be available to make social prescribing of nature-based interventions work/sustainable
- Potential for upscaling – capacity to expand and perceived demand
- Any other points they would like to raise

6. In conclusion

Aim: to reiterate confidentiality and to ask permission to archive participant's transcript for research purposes.

- Thank participant for their time. Reiterate the interview will remain confidential. Tell them that they are welcome to contact members of the study team to ask questions at a later date if they wish.
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END RECORDING

Topic Guide for Social Prescribing Link Workers

Therapeutic Nature

This project aims to understand the factors that influence successfully providing or delivering, prescribing and commissioning nature-based interventions for mental ill health.

1. Introduction

Introduction to researcher

- Research topic and funder
- Explanation of the aims and objectives of the study
- Explanation of confidentiality and consent
- Explanation of recording, length (1 hour to 1.5hours) and nature of discussion, outputs/reporting and data storage issues
- Go through consent issues explaining that they may withdraw at any time from the interview and do not have to answer any questions they would prefer not to
- Check whether they have any questions
- Check whether they are happy to continue

2. Background

Aims: to get participant talking and to find out contextual information about his/her current role

- What they do as a Link Worker (may have different titles in different places)
- Who employs them and funds them
- Where are they based
    - Within GP surgery, local community or both
- How long have they been doing the job
- How secure is the post (link to funding)

3. Experience of working within a social prescribing scheme

Aims: to understand the participant's experience of working within a social prescribing scheme; liaising with the environmental and voluntary sectors delivering the nature-based interventions, liaising with GPs and CMHTs; and level of engagement with people or clients.

- What kind of service do they offer
    - Signposting service, providing advice, spending consultation time addressing needs in a more holistic way (supporting and motivating individuals to achieve changes)
- How they carry out assessments with people – levels of engagement
- Existence of specific formal or informal "rules" about who might be suitable/unsuitable for social prescribing
- How does the referral system work
    - Receiving referrals from health professionals
    - Referring to environmental/voluntary organisations

- Knowledge of environmental voluntary organisations offering nature-based interventions in the local area
    - How do they access information on nature-based interventions (portals, directories)
    - How many nature-based interventions are available as options for referral
    - How popular are the nature-based interventions with people
    - How do they perceive the quality of the nature-based interventions available
    - Perception of value of nature-based interventions
- How they raise awareness with health care professionals on the value of nature-based interventions
- How they actively present/promote nature-based interventions to people
- How they set up and maintain relationships with GPs and CMH teams

4. Challenges to using social prescribing of nature-based interventions

Aims: to understand what works well and what works less well in the social prescribing scheme

- What are the key ingredients for a successful social prescribing scheme
    - How important is their role as Link Worker
    - What particular training or skill set do link workers need
    - Resources - Itime investment to build a relationship and trust with the person)
    - How would they describe the communication between sectors and with Link Worker
    - **Collaboration** between primary and secondary health care **and** environmental/voluntary sector
    - Are systems in place to support **partnership working** – referral and information sharing system
        - How effective is the referral system
        - How transparent are the referral criteria
        - Are there times when a social prescription is not 'appropriate' for a person
        - Have they referred a person back to GPs and CMH teams
- What has worked well/less well
    - What makes a good nature-based intervention
    - Assurance of quality of nature-based intervention – 'trustworthiness'
    - What kind of mechanisms for feedback or follow-up with people prescribed
        - How do they know if the person take up the prescription
        - Have they examples of effectiveness of any nature-based interventions in terms of improvements in mental health and wellbeing
- Would they make /recommend changes to the current social prescribing system for nature-base interventions

5. Future of social prescribing for nature-based interventions

Aims: to find out how they see the future, reflections on social prescribing for nature-based interventions and to close the interview.

- Further support that would be necessary or should be available to make social prescribing of nature-based interventions work/sustainable
- Potential for upscaling
- Any other points they would like to raise

6. In conclusion

Aim: to reiterate confidentiality and to ask permission to archive participant's transcript for research purposes.

- Thank participant for their time. Reiterate the interview will remain confidential. Tell them that they are welcome to contact members of the study team to ask questions at a later date if they wish.
- Ask participant for permission to archive the transcript of the interview. Explain that although identifying features will be removed from the transcript, they may be identifiable due to the unique nature of their role/geographic setting.

END RECORDING