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THE HUMBER AND NORTH YORKSHIRE GREEN SOCIAL PRESCRIBING PROGRAMME COHORT EVALUATION

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Social Prescribing

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Department for Environment Food & Rural Affairs | NHS | Office for Health Improvement & Disparities | National Academy for Social Prescribing | NATURAL ENGLAND | THE NATIONAL LOTTERY | SPORT ENGLAND | Department for Levelling Up, Housing & Communities | Department of Health & Social Care

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List of Abbreviations

ADL	Activities of Daily Living
CI	Confidence Interval
CBT	Cognitive Behaviour Therapy
GCSE	General Certificate of Secondary Education
GSP	Green Social Prescribing
HADS	Hospital and Anxiety Depression Scale
HIV	Human Immunodeficiency Virus
HNY	Humber and North Yorkshire
GP	General Practitioner
IMD	Index of Multiple Deprivation
LTCs	Long-Term Conditions
MID	Minimum Important Difference
NBI	Nature Based Interventions
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
PCNs	Primary Care Networks
PTSD	Post-Traumatic Stress Disorder
OCD	Obsessive Compulsive Disorder
ONS	Office for National Statistics
O/T	Occupational Therapy
SMD	Standardised Mean Difference
SD	Standard Deviation
SP	Social Prescribing
UoY	University of York
VCSE	Voluntary Community and Social Enterprise

Executive Summary

There is a strong body of evidence that points to the mental health and wellbeing benefits of nature alongside a growing evidence base on the health and wellbeing benefits of green social prescribing (GSP). Central to the UK government's commitment to transform mental health services, increase social prescribing (SP), and deliver personalised care, seven successful 'test and learn' GSP sites were identified across England, including the Humber and North Yorkshire (HNY) GSP programme. The aim of the 'test and learn' sites was to embed GSP into communities to improve mental health outcomes, reduce health inequalities, reduce demand on the health and social care system, and develop best practice in making green social activities more resilient and accessible. This report summarises the findings of the cohort evaluation, a key component of the HNY GSP programme, and reports on the mental health and wellbeing outcomes of participants who took part in nature-based activities linked to the GSP initiative. It discusses the findings in relation to the wider literature, key challenges identified by referring services involved in the cohort evaluation, alongside clinical implications, and future research opportunities in the area of GSP.

Aims and Methods

As part of the UK's cross-government commitment to embed GSP into communities in order to prevent and tackle mental ill health, the Humber and North Yorkshire Health and Care Partnership (comprising of East Yorkshire, Hull, North Yorkshire, Vale of York, North Lincolnshire, and North East Lincolnshire) was commissioned as one of seven 'test and learn' GSP sites across England. A central objective of the HNY GSP programme was to 'test the ways in which connecting people with nature could improve mental wellbeing'. The evaluation was described as a cohort and aimed to collect before and after outcome data to demonstrate the mental health benefits of engaging in nature-based interventions (NBIs) linked to the GSP initiative. The programme was led by HEY Smile Foundation on behalf of the Humber and North Yorkshire Health and Care Partnership and sought to recruit participants for the cohort evaluation across the six areas of the HNY region. Eligible participants were recruited by SP link workers/support workers and mental health and occupational therapy (O/T) teams in participating referring services. Data were collected using before and after questionnaires to determine the impact of GSP on mental health and wellbeing outcomes using the ONS-4 and Hospital and Anxiety Depression (HADS) scales. Survey data were analysed quantitatively using descriptive and multivariable analyses.

Results

In total, 232 'Before' surveys and 185 'After' surveys were submitted by teams across the Humber and North Yorkshire Health and Care Partnership from February 2022 to completion of data collection in March 2023. Of these, 224 were valid 'Before' surveys, 173 valid 'After' surveys, and 22% (n=51) were lost to follow-up.

Taking part in GSP activities significantly improved wellbeing (i.e., life satisfaction, worthwhile and happiness), with a majority of participants moving from medium to high thresholds for wellbeing. The size of the improvement in wellbeing translates to a medium effect size when reported as a standardised mean difference (SMD). While an effect of GSP was observed for anxiety on the subscale of the ONS-4, anxiety scores remained within a medium range with a small effect size reported for GSP. Taking part in GSP activities was associated with a significant reduction in anxiety (-2.63, 95% confidence interval -3.35 to -1.90, $p < 0.001$) and depression (-2.54, 95%

confidence interval -3.29 to -1.79, p< 0.001). These improvements in anxiety and depression symptoms translate to a medium effect size when reported as a SMD.

Multivariable analyses explored whether the improvements in wellbeing and anxiety and depression were predicted by duration of GSP activity, while controlling for levels of deprivation and health status. GSP interventions of 9-12 weeks plus, showed greater benefit for wellbeing compared with GSP interventions ranging from 1-4 weeks for life satisfaction, worthwhile and happiness measures. GSP interventions of 5-8 weeks duration also showed greater benefit for happiness compared with GSP interventions of 1-4 weeks. GSP duration exposure of 5-8 weeks was associated with significantly greater benefit for anxiety and depression, compared to GSP interventions ranging in duration from 1-4 weeks. However, no benefit was found for GSP interventions that were a longer duration than 5-8 weeks for anxiety and depression. These results indicate that GSP activities offered for between 5 to 12 weeks offer the most benefit for wellbeing and mental health.

Implications, Limitations and Future Research

Findings are consistent with previous systematic reviews and meta-analyses on NBIs which show good evidence for positive mental health and wellbeing outcomes. Specifically, group-based gardening NBIs, are among the most effective interventions for mental health and these activities were among the most commonly undertaken in this GSP programme. Additionally, the size of the intervention effects for GSP are comparable with those reported for psychological interventions for anxiety and depression.

Limitations of the present evaluation are recognised. Specifically, the evaluation used a non-randomised and uncontrolled design, leading to potential selection bias and confounding. Additionally, the participants represent a self-selected group from a wider eligible population, making it difficult to generalise the findings beyond the HNY context. GSP activities were also heterogeneous and combining categories for analytical purposes might overlook important differences between the different activities.

Future research should seek to identify and evaluate the 'active ingredients' of GSP interventions, allowing for more targeted offers for people with mental health problems. Additionally, there is scope to explore if GSP can facilitate transferrable skills through employment and volunteering opportunities. Furthermore, there is potential to explore the suitability of GSP as an intervention in supporting symptom management for people living with a long-term condition using controlled study designs.

In conclusion, GSP may be suitable as a mental health and wellbeing intervention delivered over the short-term.

1. Introduction

1.1 Social Prescribing

SP enables GPs, health and care professionals, and other local agencies to refer people to a range of local, non-clinical services through a SP link worker to support users' health and wellbeing (Buck and Ewbank, 2020). SP link workers are typically non-clinical professionals based in primary care practices or in community organisations who accept referrals for SP and support individuals access a range of community-based resources (Drinkwater et al., 2019). Social prescriptions include a wide range of services, such as exercise programmes, housing support, financial and legal services, art classes, nature activities, volunteering opportunities and adult education and literacy services (Chatterjee et al., 2018).

In the UK, investment in SP is underpinned by cross-departmental government health and social care policy, such as the NHS Five Year Forward View (England, N. H. S., 2014), the General Practice Forward View (England, N. H. S., 2016), the NHS Long-Term Plan (England, N. H. S., 2019), and the 25 Year environment Plan (Defra, 2018). The NHS Five Year Forward View outlined the importance of developing partnerships with the voluntary, community and social enterprise (VCSE) sector to support the broader provision and delivery of healthcare and reduce the burden on the health and social care system (England, N. H. S., 2014). The 25 Year Environment Plan emphasises the need to build on existing work with environmental organisations in the VCSE sector to support populations with mild to moderate mental health conditions (Defra, 2018).

SP is a central component of Universal Personalised Care, which strives to give people choice and control over their mental and physical health and aims to benefit up to 2.5 million people by 2024 (England, N. H. S., 2019). SP is one of the six core pillars of personalised care, which sets out a goal that every person in England will be able to access SP through their GP, with a target of at least 900,000 people referred by 2023/24 (England, N. H. S., 2019). To this end, the NHS Long-Term Plan aims to increase the number of SP link workers in primary care through the Additional Roles Reimbursement Scheme (to be reviewed for future funding in 2024; Westlake et al., 2023). An additional requirement for primary care networks (PCNs) to provide SP was introduced in 2022/23, whereby PCNs must work with populations experiencing health inequalities to offer SP interventions.

1.2 Nature and Mental Health

The Covid-19 pandemic saw an increase in people's awareness of the benefits of nature through highlighting the importance of nature in supporting peoples' mental and physical health (ONS, 2021). Specifically, an increase in the frequency of use of public and private natural environments and a concurrent change in usage patterns were reported during this period (ONS, 2021). Both frequency of greenspace use and access to nearby nature (i.e., nature views from within the home) were associated with better mental health outcomes such as greater levels of self-esteem, life satisfaction, and subjective happiness and lower levels of depression, anxiety, and loneliness during lockdowns (Soga et al., 2020).

Previous research has shown that engaging with nature can have a positive impact on mental and physical health outcomes through reducing stress (Mygind et al., 2021; Yao et al., 2021), improving mood (Capaldi et al., 2014;

McMahan & Estes, 2015), facilitating physical activity (Shanahan et al., 2016), promoting social connectedness (Alaimo et al., 2016; Wray et al., 2020), and restoration of cognitive processes (Staats et al., 2003; Stevenson et al., 2018).

Specifically, in relation to nature exposure, greater levels of emotional well-being, lower physiological arousal, increased positive affect, decreased negative affect and greater restoration are associated with natural environments compared with built or urban environments (e.g., MacKerron & Mourato, 2013; Menardo et al., 2021; Ulrich et al., 1991; Yao et al., 2021). Residential greenness has also been found to be associated with lower rates of depression and better mental health (Beyer et al., 2014; McEachan et al., 2015; Sarkar et al., 2018; Triguero-Mas et al., 2015). A systematic review on nature exposure during COVID-19 showed that access to nearby nature and higher frequency of visits to public greenspaces during the pandemic were associated with lower odds of depression and anxiety and improved mental wellbeing and mental health respectively (Patwary et al., 2022). Furthermore, exposure to nature while exercising (i.e., green exercise) has been shown to be associated with greater changes in self-esteem for adults with mental ill-health compared with other adult population groups (Barton & Pretty, 2010).

Chronic stress and stressful life events are considered significant risk factors in the development and exacerbation of a range of diseases (Cohen et al., 2007; Cohen et al., 2019), including anxiety and depression, coronary heart disease, autoimmune disease, and other chronic conditions (Hammen, 2005; Hammen, 2016; Cohen et al., 2019). Research on those living in urban environments has found that greater residential greenness is associated with decreased physiological stress (i.e., cortisol) and subjective stress (Gidlow et al., 2016; Roe et al., 2013; Thompson et al., 2012). Natural environments can also act as an important resource in the management and recovery of acute stress through decreasing perceived (subjective) stress, increasing positive affect and lowering negative affect (Berto, 2014; Kondo et al., 2018). During the Covid-19 pandemic, nature was considered an important coping mechanism whereby nearby nature (e.g., private gardens), public natural spaces (e.g., urban parks) and digital nature (e.g., social media nature challenges, webcam travel) were used to manage and recuperate from stressors associated with the pandemic (Egerer et al., 2022, Grima et al., 2020; Lee et al., 2022).

There is evidence that unequal access to blue and green space leads to health inequalities and widening disparities (Jennings & Johnson Gaither, 2015; Jennings et al., 2017). Specifically, the closure of public natural spaces (e.g., parks, allotments, community gardens) as a responsive measure by local authorities during the Covid-19 pandemic was criticised for compounding existing health inequalities (Douglas et al., 2020; Geary et al., 2021). Accessible and high quality public natural spaces can therefore have an important role in mitigating health inequalities and in achieving sustainability (Geary et al, 2021), where natural environments can be equigenic i.e., green and blue spaces may help reduce the impact that socioeconomic inequalities and multiple disadvantage have on health outcomes (de Vries et al., 2003; Mitchell et al., 2015).

1.3 Green Social Prescribing

GSP involves taking part in activities in nature, known as NBIs which have been designed for people with specific health needs. NBIs involve a wide range of activities such as social and therapeutic horticulture (using gardening, food growing and plants to support wellbeing); care farming (involving the therapeutic use of agricultural

landscape and farming practices); and environmental conservation (involving activities designed for conservation and management of natural places for health and wellbeing). Three key elements define nature-based programmes (i.e., natural environment, social contact, and engagement in meaningful activities) and it is suggested that these elements interact to promote positive mental health outcomes for users (Bragg & Atkins, 2016).

NBIs targeted at vulnerable populations with a defined health need have a good evidence base for addressing mental health and social care issues (Bragg & Atkins, 2016; Coventry et al., 2021), with potential for a much broader impact across different population groups (Darcy et al., 2019). NBIs in people with long-term conditions (LTCs) have also demonstrated positive psychological and physiological impacts, with suggestion that NBIs can operate as a supplementary intervention to support health and wellbeing in those living with a LTC (Taylor et al., 2022).

This is significant given that one in eight people globally were living with a mental health condition in 2019, with depression and anxiety the most common mental health conditions reported (WHO, 2022). Estimates during the period 2019-2020 pointed to a 26% increase for anxiety and 28% increase for major depressive disorders due to the impacts of the Covid-19 pandemic. Moreover, depression is considered a leading cause of ill-health and disability worldwide (Moussavi et al., 2007) with 1 in 5 people attending primary care for depression (Mitchell et al., 2009), adding significantly to the economic and healthcare burden (König et al., 2020; Moussavi et al., 2007).

Previous research on GSP programmes in New Zealand found greater perceived health benefits and increased likelihood of meeting physical activity guidelines for users, compared to those not participating in GSP (Hamlin et al., 2016; Sinclair & Hamlin, 2007). GSP is a central component of the government's Covid-19 mental health recovery plan, to support people living with mental illness. In 2021 Defra, NHS England and NHS Improvement, Ministry of Housing, Communities and Local Government, Department of Health and Social Care, Natural England and Public Health England made an investment of £5.77 million to embed GSP in communities.

1.4 Test and Learn Sites

As part of the UK governments commitment to transform mental health services, increase SP, and deliver personalised care, Integrated Care Systems and Sustainability and Transformation Partnerships leads were invited to submit an expression of interest to become a 'test and learn' GSP site.

The aim of the 'test and learn' initiative was to embed GSP into communities in order to:

- Improve mental health outcomes
- Reduce health inequalities
- Reduce demand on the health and social care system
- Develop best practice in making green social activities more resilient and accessible

Seven 'test and learn' sites were funded in England:

- Humber and North Yorkshire Health and Care Partnership
- South Yorkshire and Bassetlaw Integrated Care System
- Nottingham and Nottinghamshire Integrated Care System

- Joined Up Care Derbyshire Integrated Care System
- Greater Manchester Health & Social Care Partnership
- Surrey Heartlands Health and Care Partnership
- Healthier Together Bristol, North Somerset and South Gloucestershire Integrated Care System

The seven ‘test and learn’ sites also form part of wider research on GSP being undertaken nationally as part of a nationally funded evaluation which aims to establish the effectiveness of GSP clinically, chart the spread of GSP activities nationally, and explore the views on GSP amongst healthcare workers and members of the public (Cook, 2022).

2. Aims and Methods

The HNY GSP programme was led by HEY Smile Foundation on behalf of the Humber and North Yorkshire Health and Care Partnership, who were commissioned as one of seven sites across England to develop a 'test and learn' site for GSP. A central objective of the HNY GSP programme was to 'test the ways in which connecting people with nature could improve mental wellbeing'. To this end, an evaluation was conducted (overseen by the University of York (UoY)) to meet this objective and described as a cohort. It aimed to collect before and after outcome data to demonstrate the mental health benefits of engaging in NBIs that were linked to the GSP initiative across the six places making up the Humber and North Yorkshire Health and Care Partnership: East Yorkshire, Hull, North Yorkshire, Vale of York, North Lincolnshire and North East Lincolnshire. The evaluation sought to follow a minimum of 480 participants from across the HNY region with the aim of recruiting participants in each of the six 'places' outlined above.

The Inclusion criteria were:

- ≥18 years of age to encompass 'working age' adults who can provide consent.
- Those experiencing mild to moderate mental health issues, including mild to moderate anxiety (generalised anxiety disorder, panic disorder, health anxiety and medically unexplained); social phobia/anxiety; specific phobias; single incident post-traumatic stress disorder (PTSD); obsessive compulsive disorder (OCD); and mild to moderate depression and low mood, including post-natal depression, work related stress, bereavement, and sleep difficulties.
- A low level of risk to themselves and others.
- Motivated and interested in engaging in a GSP activity.

Individuals may have also needed to be able to take part in some physical activity independently without 1:1 support for some GSP activities. Where possible and appropriate GSP activities were tailored to meet individual physical health needs.

The Exclusion criteria were:

- Active risk of harm to self, current suicidal intent, recent suicide attempt or still in crisis.
- Active risk of harm to others or recent history of violence.
- Drug and alcohol misuse as a primary problem, or the level of misuse likely to prevent engagement in regular access of GSP.
- Ongoing, active, or relapsing symptoms of social emotional health needs, psychosis, manic or hypomanic episodes or a diagnosed personality disorder. In these cases, NICE guidance would not indicate GSP as an initial intervention.
- Significant psychosocial or physical health factors which prevent engagement in GSP activity or require input from a multi-disciplinary team and where home visits are required.

2.1 Referring Services and Nature-Based Providers

A wide range of SP/referring services in HNY participated in the HNY GSP programme, including SP services embedded within PCNs, SP services delivered by the VCSE sector and those led by local authorities, alongside mental health services and O/T teams. Participating SP/referring services are summarised and described in Table 1 below.

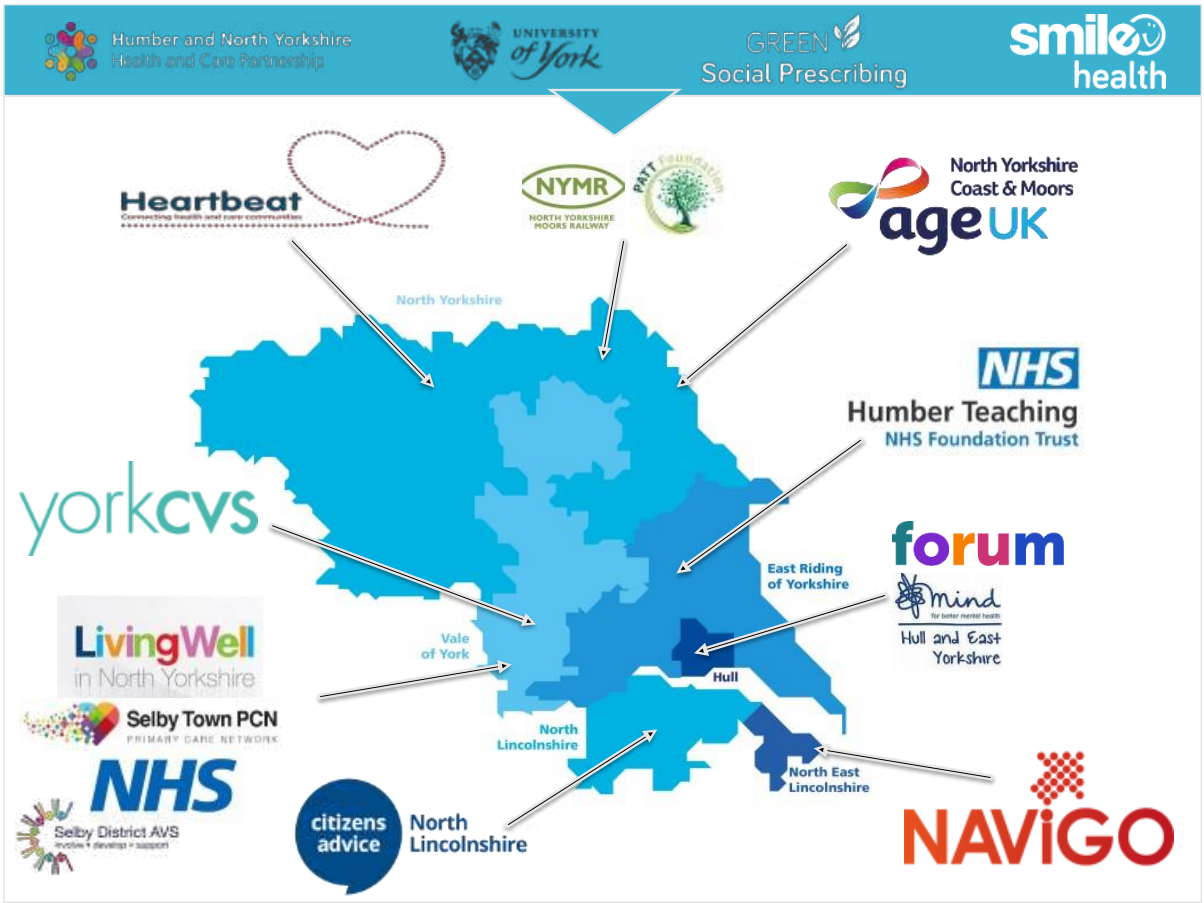

Figure 1: Participating SP/referring services in the cohort evaluation across the HNY region

Table 1: Description of participating SP/referring services in the HNY GSP cohort evaluation

Name of SP/Referring Service	Description
NAViGO Health and Social Care CIC	Mental Health service delivered by a CIC and commissioned by the NHS
Citizens Advice North Lincolnshire	VCSE commissioned to deliver for two PCN's
Forum / Hull and East Yorkshire Mind	VCSE Social Prescribing service / VCSE Mental Health service
Humber Teaching NHS Foundation Trust	NHS Trust service
Humber Teaching NHS Foundation Trust (O/T)	NHS Trust service
Age UK North Yorkshire Coast & Moors	VCSE Social Prescribing service commissioned by the NHS
Heartbeat CIC	VCSE organisation. Provider of primary care services in four PCN's
Selby and District AVS	VCSE organisation with a mental health support service
Selby Town and District / Tadcaster and Rural Selby PCN	PCN led Social Prescribing services
Living Well in North Yorkshire	Local Authority Social Prescribing Service
York CVS	VCSE SP service commissioned by the NHS
North Yorkshire Moors Railway and PATT Foundation	Charity delivering conservation-based activities

Nature-based providers were identified by the HNY GSP programme team and shared with the SP/referring services who also utilised existing relationships with provider organisations. In addition to existing nature-based projects being delivered across the HNY region, additional nature-based projects were directly funded by the HNY GSP programme to support the referral of participants into GSP activity.

Figure 2: Funded nature-based projects delivered across the six areas of HNY

2.2 Cohort Recruitment

The SP, mental health, or O/T teams in each service were directly responsible for recruitment and data collection. Participants in the cohort who met the inclusion criteria were identified by the SP link worker/support worker (or equivalent job title) embedded within each service in each of the six places. Through a 'What Matters to You' conversation, participants were offered a 'green' or 'blue' activity from a menu of vetted providers currently running activities in their area. As part of this conversation, the SP link worker/support worker also discussed the evaluation and invited eligible participants to take part.

GSP Referral Pathway

SP enables GPs, health and care professionals, and other local agencies to refer people to a range of local, non-clinical services through a SP link worker to support users' health and wellbeing.

SP link workers are typically non-clinical professionals based in primary care practices or in community organisations who accept referrals for social prescribing and help individuals access a range of community-based resources.

Social prescriptions include a wide range of services, such as exercise programmes, housing support, financial and legal services, art classes, nature activities, volunteering opportunities and adult education and literacy services.

The SP link worker focuses on what matters to the person and for some people this will be GSP i.e., the practice of supporting people to engage in nature-based interventions and activities to improve their health and wellbeing.

GSP Activity

Figure 3: The GSP referral pathway

A bespoke 'Before' and 'After' survey was developed by the research team at the UoY (Appendix 1) and hosted on the Qualtrics online platform to support data collection at two time points: before the participant engaged with the 'green' or 'blue' activity, and after completing the activity (or at 3 months, whichever was sooner).

The 'Before' Survey included the participant consent form, the service evaluation information sheet, and items to collect data on these variables:

- Social Prescribing Service (i.e., name and location)
- Demographics of participants (i.e., age; gender; ethnicity; post-code)
- Current health status (i.e., limitations to day-to-day activity from mental and/or physical health)
- Type of impairment of health problem
- Education and employment status
- Information about referral (i.e., reason for referral; source of referral)

The 'After' Survey included items to collect data on these variables:

- Social Prescribing Service (i.e., name and location)
- Name of the organisation who delivered the GSP activity
- Type of nature-based activity referred to (e.g., gardening; food growing; maintenance; conservation; green exercise; crafting; bushcraft)
- Duration and frequency of the GSP activity

Data on mental health outcomes were also collected at each time point (i.e., on the 'Before' and 'After' survey) using the ONS-4 scale and the HADS. These measures were chosen following consultation with local services with an emphasis on striking a balance between the need to collect data using widely recognised and validated tools and avoiding using measures that were regarded as too clinical such as the PHQ-9.

ONS-4 Scale

The ONS-4 is a validated 4-item measure of wellbeing used as part of the wider Measuring National Well-being Programme at the Office for National Statistics (ONS) (ONS, 2018). The ONS-4 measures three types of well-being: evaluative, eudemonic, and affective experience. It consists of 4-single item questions measuring satisfaction with life, meaning and purpose in life, and levels of happiness and anxiety using a 11-point Likert scale. Thresholds range from low to very high for life satisfaction, worthwhile, and happiness and from very low to high for anxiety (Table 2).

Table 2: Personal wellbeing thresholds for ONS-4

Life satisfaction, worthwhile and happiness		Anxiety	
Response on an 11-point scale	**Label**	**Response on an 11-point scale**	**Label**
0 to 4	Low	0 to 1	Very low
5 to 6	Medium	2 to 3	Low
7 to 8	High	4 to 5	Medium
9 to 10	Very high	6 to 10	High

HADS

The HADS is a 14-item validated measure of anxiety and depression symptoms consisting of two 7-item subscales for anxiety and depression (Zigmond & Snaith, 1983). The HADS was originally developed for use in clinical settings, however, it is now widely used in non-clinical populations (Crawford et al., 2001). Thresholds for HADS range from sub-threshold and in normal range (scores < 8), mild anxiety/depression (scores 8-10), moderate anxiety/depression (scores 11-15), to severe anxiety/depression (scores 16-21).

To support participant recruitment, a plain English Information Sheet, a SP link workers script (both co-designed with SP teams), and a HNY GSP service evaluation webpage were developed by the UoY research team for use by the SP teams in each service (Appendix 2 and 3).

2.3 Data Collection

Data collection started in February 2022 and concluded in March 2023. As part of the initial 'What Matters to You' conversation facilitated by each SP link worker/support worker, eligible participants were invited to take part in the cohort evaluation. Before the participant started their GSP activity, they completed a consent form to agree to take part in the cohort evaluation and completed the 'Before' survey. 'Before' and 'After' surveys could be completed using a paper and pen version (and afterwards inputted by the SP link worker/support worker into Qualtrics) or completed directly using the electronic Qualtrics survey link. For the majority of services, the SP link worker/support worker supported participants with the completion of questionnaires, however in some instances questionnaires were also completed remotely by participants using the electronic survey links. A randomised, unique 5-digit number was automatically generated by Qualtrics for each participant completing their 'Before' survey. This unique personal identifier was recorded by the SP link worker/support worker supporting the participant, and subsequently inputted as the ID number by the SP link worker/support worker or participant upon completion of the 'After' survey at the end of participants' engagement with the GSP activity, or at 3 months (whichever was sooner).

2.4 Data Analysis

The final dataset was exported from Qualtrics and imported into IBM SPSS Statistics software (Version 28; IBM Corp 2021) for descriptive analyses. Initial descriptive analyses of process data related to referral and delivery of GSP across the HNY region and included demographic characteristics; referral source; frequency, duration, and type of GSP intervention sessions; dropouts; and prevalence of health problems. Type of GSP activity was re-categorised according to the categories identified in the Nature on Prescription handbook (Fullam et al., 2021) (Appendix 4). Results for initial analyses were summarised descriptively using mean (standard deviation [SD]), for continuous data and counts (percentages) for categorical data.

Before and after health outcome data using the ONS-4 and HADS were reported descriptively as mean (SD), along with 95% confidence intervals (CIs). Significance was tested for using the Wilcoxon two-sample paired signed rank test. To allow for comparisons with other non-GSP interventions, we also calculated the SMDs for ONS-4 and HADS using *cohen's d* (95% CI). Known as an effect size, *cohen's d* is calculated by dividing the mean difference between the before and after scores and dividing by the pooled SD. We draw on established cut-offs used in behavioural science for effect sizes whereby SMDs of 0.56–1.2 are categorised as large; effect sizes of 0.33–0.55 as moderate, and effect sizes ≤0.32 as small (Lipsey & Wilson, 1993).

The analysis plan for multivariable analyses was agreed with the independent HNY GSP steering group committee. It was decided that testing whether duration of GSP activity was a predictor of mental health benefits had policy and strategic relevance for future implementation of GSP. Multivariable analyses were conducted in Stata software (Version 17; StataCorp, 2021). Linear regression models adjusting for baseline levels of deprivation (i.e., IMD decile) and health status were fitted to determine if GSP duration (i.e., 1-4 weeks; 5-8 weeks; 9-12 weeks) predicted responses on wellbeing (i.e., ONS-4 subscales 1-3) and the HADS Anxiety and Depression subscales at 3-months follow-up (or intervention end, whichever was sooner). For the purpose of the model, IMD data were categorised as Heavily Deprived (i.e., IMD Deciles 1-4), Moderately Deprived (i.e., IMD Deciles 5-7), and Affluent (i.e., IMD Deciles 8-10) (Table 3). Health status was based on self-reported ADL (Table 4).

Table 3: IMD Categories for Regression Model

IMD Decile	N=201	% Overall
Heavily Deprived		
1 (Most Deprived)	70	35%
2	21	10%
3	23	11%
4	18	9%
Moderately Deprived		
5	12	6%
6	6	3%
7	20	10%
Affluent		
8	10	5%
9	16	8%
10 (Least Deprived)	5	3%

Table 4: ADL Categories for Regression Model

Health Status	N=223	% Overall
Limited significantly	47	21%
Limited, but not significantly	132	59%
Not limited	44	20%

Different covariance patterns for the repeated measurements were explored and the most appropriate pattern was used for the final model. The beta coefficients associated with outcome measures taken before the intervention quantified the magnitude of effect.

Analyses and interpretation were guided by empirically reported metrics about population–level minimum important difference (MID) with estimates that range from –1.6 to –2.1 (HADS-A) and –1.8 to –2.1 (HADS-D), or about a 20% reduction from baseline (Curtis et al., 2014). Similarly, analyses were informed by published wellbeing thresholds for the total ONS-4 score, which relate to life satisfaction, worthwhile activities, happiness, and anxiety.

3. Results

3.1 Survey Data

In total, 232 'Before' surveys and 185 'After' surveys were submitted by teams in participating services from February 2022 to completion of data collection in March 2023 (Figure 3). Of these, 224 were valid 'Before' surveys, 173 valid 'After' surveys, and 22% (n=51) were lost to follow-up. Two participants were excluded as they did not meet the eligibility criteria. Reasons for lost to follow-up were reported for 32 participants, with no reason reported for 12 participants; seven participants ID's (Before surveys) were not identified for follow-up (Appendix 5). Across the six regions of HNY, North East Lincolnshire, North Yorkshire and Hull submitted the majority of 'Before' and 'After' surveys (Table 5).

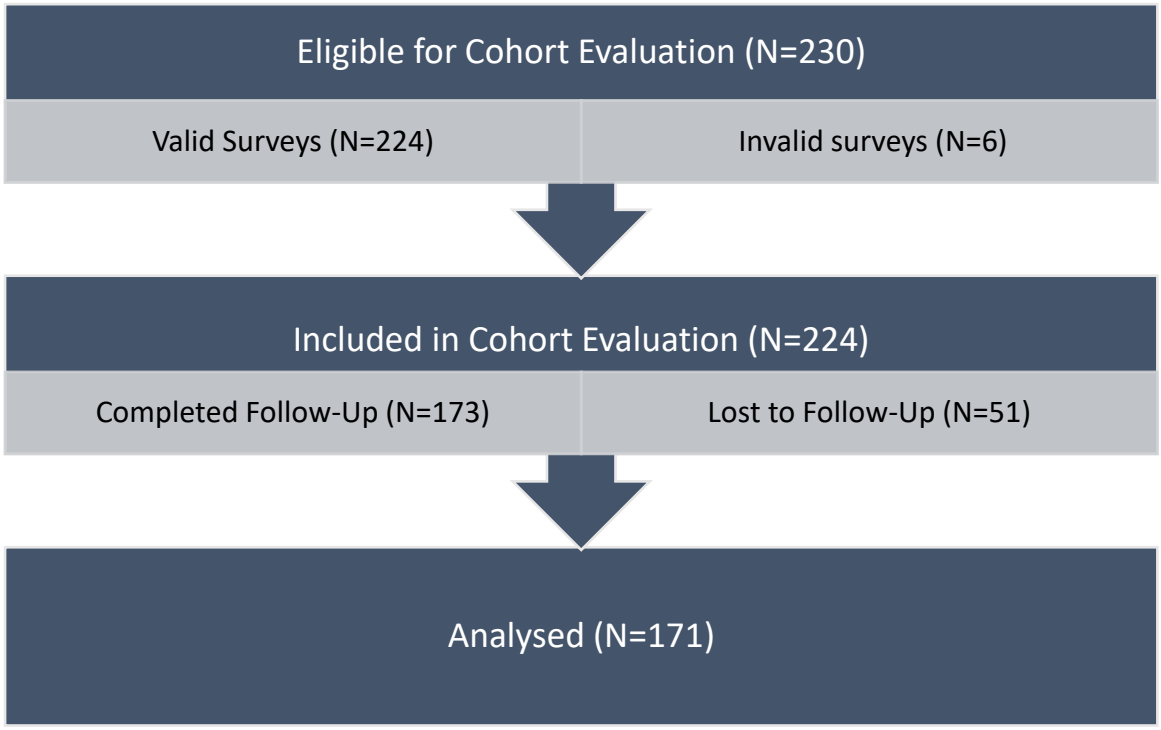

Figure 4: Cohort Evaluation Flow Chart

Table 5: Summary of Before, After and Lost to Follow-Up across participating SP/referring services

SP/Referring Service Area	SP/Referring Service Location	SP/Referring Service	Before Surveys (N)	After Surveys (N)	Lost to Follow-Up (N)
Vale of York	York	York CVS	11	7	4
North East Lincolnshire	Grimsby	NAViGO	104	97	7
North Yorkshire	Scarborough	Age UK North Yorkshire Coast & Moors	42	30	12
	Richmondshire	Heartbeat CIC	1		1
	Selby	North Yorkshire County Council/PCN direct	3		3
	Selby	Selby & District AVS	7	7	
	Ryedale	North Yorkshire Moors Railway / PATT Foundation	6	3	3
North Lincolnshire	East and West PCNs	Citizens Advice North Lincolnshire	7	5	2
Hull	Hull	Forum / Hull and East Yorkshire Mind	39	21	18
	Hull	Humber Teaching NHS Foundation Trust (O/T)	3	3	
East Yorkshire	Place-wide	Humber Teaching NHS Foundation Trust	1		1
		Total	**224**	**173**	**51**

3.2 Descriptive Data

3.2.1 Participants Demographics

Frequency and proportion of demographic characteristics are reported in Table 6. The majority of participants ranged between 18-74 years of age (96%), with 87% of all participants within the working age category (i.e., 18-64 years). Overall, just under a quarter of participants were between 45-65 years age (23%), while other age categories included: 55-64 years (19%), 35-44 years (18%), 25-34 years (16%), 18-24 years (11%), 65-74 years (9%), 75-84 years, 85 plus years (1%), and preferred not to say (1%).

In total, 59% of participants identified as female, 39% male and 2% as non-binary. The majority of participants were British (92%), with other ethnic groups making up Other White (2%), Irish (1%), Any Other Mixed Background (1%), and White and Black Caribbean, White and Black African, White and Asian, Pakistani, and Other (all <1%).

In terms of employment status, over a quarter of all participants were employed, either full-time (14%) or part-time (14%), or unable to work due to ill-health or disability (28%). In addition, 15% of participants reported being retired, 6% were engaged in voluntary work, 3% were looking after the family home, 1% in education or training, and 2% other.

Over half of all participants reported having either a GCSE/O-level or equivalent (28%), or a Diploma/Foundation level degree or other Level 5 qualification (23%). Other qualifications included A/AS level or equivalent (12%), undergraduate degree with honours (11%), and other (4%). Four percent of the sample reported having a higher degree (for example PhD or Masters), while just over one tenth of the sample had no qualification (11%), and 8% preferred not to say.

Nearly two thirds (65%) of the sample reported living in the most heavily deprived geographical areas (i.e., IMD Deciles 1 to 4), with 19% living in moderately deprived areas (i.e., IMD Deciles 5 to 7) and 16% living in affluent areas (i.e., IMD Deciles 8 to 10).

There was a degree of multimorbidity indicated amongst the sample, with 314 health conditions recorded by participants. The majority of participants identified as having at least a mental health condition (74%), while just over one fifth reported any other long-term illness or health condition (21%), and just under one fifth self-reported as having dyslexia or an autistic spectrum disorder (17%). Just under one tenth of the sample identified a physical impairment which requires use of a wheelchair or other mobility aid (9%), a long-term health condition such as HIV, cancer, heart/respiratory condition (9%), or a learning difficulty/disability or cognitive impairment such as Down's syndrome (8%). In total, 4% reported having a sensory impairment.

In terms of health status, the majority (80%) of participants were limited in their ability to engage with ADL. Of these, just over one fifth of the sample were limited significantly, while one fifth were not limited at all by their health condition.

Table 6: Demographics of Cohort Participants

Demographics	N (Total N)	% Overall
Gender		
Male	86 (223)	39%
Female	131 (223)	59%
Non-Binary	4 (223)	2%
Age Group		
18-54 years	151 (223)	68%
55-85 years +	70 (223)	31%
Ethnicity		
British	206 (223)	92%
Other	14 (223)	7%
Main Employment Status		
Employed (Full or Part-time)	63 (222)	28%
Unable to work due to ill-health or disability	63 (222)	28%
Unemployed	36 (222)	16%
Main Education Status		
GCSE/O-level or equivalent	62 (222)	28%
Diploma/foundation level degree or other level 5 qualification	50 (222)	23%
IMD Decile		
Most Deprived (IMD Deciles 1-4)	132 (201)	65%
Moderately Deprived (IMD Deciles 5-7)	38 (201)	19%
Affluent (IMD Deciles 8-10)	31 (201)	16%
Main Health Conditions		
Mental health condition	165 (224)	74%
Any other long-term illness or health condition	46 (224)	21%
Dyslexia or an autistic spectrum disorder	38 (224)	17%
Health Status		
Limited in ADL	179 (223)	80%
Not limited in ADL	44 (223)	20%

3.2.2 Referral Reasons and Pathways to GSP

Referral Reasons

The majority of participants were referred to GSP for a mental health reason (74%), while 15% of participants were referred for both mental and physical health reasons. Five participants did not declare a mental health difficulty and reported referral for a physical health reason (Table 7).

Table 7: Referral Reasons to GSP

Referral Reason	N=219	% Overall
Mental Health	163	74%
Physical Health	5	2%
Both Mental and Physical Health	32	15%
Other	19	9%

Referral Pathways

The three main referral pathways for GSP included self-referral (31%), mental health services (23%), and Hull and East Yorkshire Mind (16%; a unique referral pathway developed for Forum SP service for the HNY GSP programme) (Table 8).

Table 8: Referral Pathways for GSP

Referral Pathway	N=219	% Overall
Self-Referral	67	31%
GP	18	8%
Other Primary Care	5	2%
Mental Health Services	50	23%
Secondary Care Services	1	1%
Local Authority Services	3	1%
Voluntary or Community Group	30	14%
Other	9	4%
Hull and East Yorkshire Mind*	36	16%

**Referenced as HEY Mind on survey*

3.2.3 GSP Intervention

GSP Activities

Of the 173 completed 'After' surveys, 200 separate GSP activities were recorded by participants. Of these, 173 participants reported engaging with just one type of GSP activity. However, 32 participants engaged with one or more GSP activity type (delivered by the same nature-based provider), and four participants engaged with two or more GSP activities delivered by separate nature-based providers (Table 9).

The three main GSP categories (categorised according to the Nature on Prescription Handbook) identified were horticulture and gardening (47%), exercise focused (23%), and creativity focused (14%). Creativity focused was the most diverse GSP category consisting of seven different GSP typologies (i.e., crafting, mindful photography, creative writing, woodwork, site specific drama, setting up a Santa event in the park, and bike repair). Sport Aligned was the least reported GSP category, with only two participants engaging with this type of GSP (i.e., model boat and fishing and walking football) (Table 9). (See Appendix 6 for all GSP subcategories).

A total of 33 GSP providers oversaw the delivery of GSP activities from February 2022 to February 2023 (Appendix 7). Of these, the main GSP providers were Grimsby Garden Centre in North East Lincolnshire delivering gardening activities (23%), All Things Good and Nice CIC in North East Lincolnshire delivering green exercise activities (16%), Nunny's Farm in North East Lincolnshire delivering animal care activities (11%), Sage and Bellflower in North East Lincolnshire delivering foraging activities (6%), and Down 2 Earth in North Yorkshire delivering gardening and crafting activities (5%).

Table 9: GSP activity categories

GSP Activity	**N=200**	**% GSP activity**	**% Overall (N=173)**
Horticulture and Gardening	82	41%	47%
Exercise focused	40	20%	23%
Care Farming	19	10%	11%
Wilderness Focused	17	9%	10%
Conservation	5	3%	3%
Creativity Focused	25	13%	14%
Integrating Alternative Therapies	9	5%	5%
Sport Aligned	2	1%	1%
Other	1	1%	1%

GSP Duration and Frequency

The majority of GSP activities had a duration of between 5-8 weeks (37%), with just under one third of activities with a duration between 1-4 weeks or 9-12 weeks plus. Inclusive of activities that were 1-4 weeks in duration were single workshops and activities where participants only attended once or for a single taster session (Table 10). The majority of GSP activities were attended on a weekly basis (80%), while the 'other' category included participants who attended a single workshop or once off only (n=18), two workshops (n=3), a weekend of GSP activities (n=3), three sessions or more (n=2), every three weeks (n=1), when could attend (n=1), and not sure (n=1).

Table 10: GSP Duration and Frequency

Variable	N=173	% Overall
GSP Duration		
1-4 weeks	56	32%
5-8 weeks	63	37%
9-12 weeks*	54	31%
GSP Frequency		
More than once a week	4	2%
Weekly	135	80%
Every Fortnight	3	2%
Every Month	2	1%
Other	24	14%

*****_Some gardening GSP activities had a duration of > 12 weeks (i.e., 12-16 weeks)_

3.2.4 Mental Health and Wellbeing Outcomes

ONS-4

A total of 171 completed surveys compared before and after mental health outcomes for wellbeing and anxiety as measured by the ONS-4. The results showed that GSP had a significant effect in increasing life satisfaction (medium to high threshold) after engagement with GSP (mean difference =1.57; 95% CI 1.21 to1.94). A medium effect size was found for life satisfaction (SMD = 0.65; 95% CI 0.49 to 0.82). GSP also significantly increased feelings that life is worthwhile (medium to high threshold), (mean difference = 1.48; 95% CI 1.11 to 1.85). The result for feelings of life being worthwhile was equivalent to a SMD of 0.61 (95% CI 0.45 to 0.77). Additionally, GSP significantly increased happiness (medium to high threshold) from before to after engagement with GSP (mean difference = 1.56; 95% CI 1.08 to 2.03), equivalent to a medium effect size (SMD = 0.50; 95% CI 0.34 to 0.66). The results also showed that GSP significantly reduced anxiety from before to after engagement with GSP (mean difference = -1.28; 95% CI -1.78 to -0.78), equivalent to small effect size (SMD = -0.39; 95% CI -0.54 to -0.23) (Tables 11 and 12).

Table 11: Comparison of wellbeing and anxiety scores (ONS-4) from before to after engagement with GSP

	Mean (SD)		Difference (95% CI) (Before-After)	P-Value
ONS-4 Subscale	**Before**	**After**		
Overall, how satisfied are you with your life nowadays?	5.10 (2.33)	6.67 (1.90)	1.57 (1.21 to 1.94)	< 0.001
Overall, to what extent do you feel that the things you do in your life are worthwhile?	5.36 (2.43)	6.84 (1.99)	1.48 (1.11 to 1.85)	< 0.001
Overall, how happy did you feel yesterday?	5.15 (2.60)	6.71 (2.29)	1.56 (1.08 to 2.03)	< 0.001
Overall, how anxious did you feel yesterday?	5.35 (2.75)	4.06 (2.58)	-1.28 (-1.78 to -0.78)	< 0.001

Table 12: Cohen's d effect sizes for ONS-4 subscales

ONS-4 Item	Effect Size (95% CI)
Overall, how satisfied are you with your life nowadays?	0.65 (0.49 to 0.82)
Overall, to what extent do you feel that the things you do in your life are worthwhile?	0.61 (0.45 to 0.77)
Overall, how happy did you feel yesterday?	0.50 (0.34 to 0.66)
Overall, how anxious did you feel yesterday?	-0.39 (-0.54 to -0.23)

HADS

A total of 171 completed surveys compared before and after mental health outcomes for anxiety and depression as measured by the HADS. GSP significantly decreased anxiety from a moderate to a low threshold (mean difference = -2.63; 95% CI -3.35 to -1.90). The result for anxiety is equivalent to a medium effect size (SMD = -0.55; 95% CI -0.71 to -0.38) and exceeds the MID. For the depression subscale of the HADS, results showed that GSP significantly decreased depression from a low to normal threshold (mean difference = -2.54; 95% CI -3.29 to -1.79), The result for depression is equivalent to a medium effect size (SMD = -0.51; 95% CI -0.67 to -0.35) and exceeds the MID (Tables 13 and 14).

Table 13: Comparison of anxiety and depression scores (HADS) from before to after engagement with GSP

	Mean (SD)		**Difference (95% CI) (Before-After)**	**P-Value**
HADS Subscale	**Before**	**After**		
Anxiety	11.12 (4.69)	8.50 (4.40)	-2.63 (-3.35 to -1.90)	< 0.001
Depression	8.11 (4.48)	5.57 (4.43)	-2.54 (-3.29 to -1.79)	< 0.001

Table 14: Cohen's d effect sizes for HADS subscales

HADS Subscale	**Effect Size (95% CI)**
Anxiety	-0.55 (-0.71 to -0.38)
Depression	-0.51 (-0.67 to -0.35)

3.3 Multivariable Analyses

ONS-4

In the adjusted multivariable model, 9 to 12 weeks of GSP activity, in comparison with 1 to 4 weeks, was associated with significant improvements in life satisfaction, feelings of life being worthwhile, and happiness. There was also a statistically significant effect for 5 to 8 weeks of GSP activity compared with 1 to 4 weeks on the happiness subscale of the ONS-4. Undertaking GSP activity for 1 to 4 weeks was not associated with significant gains in wellbeing (Table 15).

Table 15: Changes in Life Satisfaction, Worthwhile and Happiness from univariable and multivariable regression models

ONS-4	Unadjusted β (95% CI)	P-Value	Adjusted β (95% CI)	P-Value
Life Satisfaction				
5-8 weeks (v 1-4 weeks)	0.94 (0.07 to 1.80)	0.03	0.73 (-0.20 to 1.65)	0.12
9-12 weeks (v 1-4 weeks)	1.43 (0.53 to 2.32)	0.002	1.32 (0.39 to 2.24)	0.01
9-12 weeks (v 5-8 weeks)	0.49 (-0.37 to 1.35)	0.26	0.59 (-0.30 to 1.49)	0.19
Worthwhile				
5-8 weeks (v 1-4 weeks)	0.79 (-0.07 to 1.65)	0.07	0.74 (-0.20 to 1.68)	0.12
9-12 weeks (v 1-4 weeks)	1.59 (0.70 to 2.49)	0.001	1.50 (0.56 to 2.45)	0.002
9-12 weeks (v 5-8 weeks)	0.80 (-0.06 to 1.66)	0.07	0.76 (-0.15 to 1.67)	0.10
Happiness				
5-8 weeks (v 1-4 weeks)	1.67 (0.56 to 2.79)	0.003	1.83 (0.59 to 3.08)	0.004
9-12 weeks (v 1-4 weeks)	1.44 (-0.29 to 2.60)	0.02	1.48 (0.24 to 2.73)	0.02
9-12 weeks (v 5-8 weeks)	-0.23 (-1.34 to 0.88)	0.68	-0.35 (-1.56 to 0.86)	0.57

HADS

In the adjusted multivariable model, 5 to 8 weeks of GSP activity, in comparison to 1 to 4 weeks, was associated with significant reductions in anxiety and depression scores on the HADS. On average, participants who took part in GSP activities for 5 to 8 weeks compared with 1 to 4 weeks scored 2.32 points lower on the anxiety subscale, and 2.47 points lower on the depression subscale. The size of the effect associated with 5 to 8 weeks of GSP activity exceeds the MID for both anxiety and depression. There was no significant effect found for 9 to 12 weeks GSP activity in comparison to 1 to 4 weeks or 5 to 8 weeks GSP activity for either anxiety or depression in the unadjusted or adjusted models (Table 16).

Table 16: Changes in Anxiety and Depression from univariable and multivariable regression models

HADS	Unadjusted β (95% CI)	P-Value	Adjusted β (95% CI)	P-Value
Anxiety				
5-8 weeks (v 1-4 weeks)	-1.93 (-3.67 to -0.18)	0.03	-2.32 (-4.22 to -0.42)	0.02
9-12 weeks (v 1-4 weeks)	-0.20 (-2.01 to 1.60)	0.82	-0.27 (-2.18 to 1.64)	0.78
9-12 weeks (v 5-8 weeks)	1.72 (-0.02 to 3.46)	0.05	2.05 (0.21 to 3.89)	0.03
Depression				
5-8 weeks (v 1-4 weeks)	-2.14 (-3.94 to -0.34)	0.02	-2.47 (-4.46 to -0.48)	0.02
9-12 weeks (v 1-4 weeks)	-1.67 (-3.53 to 0.20)	0.08	-1.74 (-3.73 to 0.26)	0.09
9-12 weeks (v 5-8 weeks)	0.48 (-1.32 to 2.28)	0.60	0.73 (-1.20 to 2.67)	0.45

4. Discussion

The HNY GSP programme followed a cohort of 224 adults with mild to moderate mental ill-health to determine the impact of GSP activities on wellbeing and mental health outcomes. Participating in GSP activities was associated with significant improvements in hedonic (i.e., happiness) and eudemonic (i.e., life satisfaction and feelings of life being worthwhile) wellbeing over the short term. The greatest wellbeing benefits were associated with taking part in GSP activities for 9 to 12 weeks compared with shorter durations of 1 to 4 weeks. Similarly, participating in GSP activities was associated with significant reductions in anxiety and depression symptoms over the short term. Taking part in GSP activities for between 5 and 8 weeks compared to 1 to 4 weeks was associated with the greatest benefit for anxiety and depression.

4.1 Comparisons with previous research

The present findings align with previous research on NBI's which showed that outdoor NBIs in green or blue spaces are effective in improving mental health outcomes in community-based adults (Coventry et al., 2021). Specifically, this meta-analysis showed that gardening, green exercise, and nature-based therapies improved depressive mood and reduced anxiety, and the most effective interventions were offered for between 8 and 12 weeks. The HNY GSP cohort evaluation included referral to a similar range of NBIs and our findings similarly show that the greatest benefits for wellbeing and mental health were associated with offers of between 5 to 12 weeks.

In the context of primary care mental health services people with less severe depression (i.e., subthreshold and mild depression) might be offered psychological therapies such as individual or group based behavioural activation or cognitive behavioural therapy (CBT) over the course of eight sessions (NICE, 2004). Meta-analysis shows that behavioural activation is an effective treatment for depression (Ekers et al., 2014). Ekers et al (2014) showed that when compared with any kind of control, behavioural activation at the end of treatment is associated with a large effect size of -0.74 (95% CI -0.91 to -0.56) for depression. This is larger than the effect size for depression reported for GSP activity. However, in sub-group analysis, Ekers et al (2014) showed that the effect size for behavioural activation in people with mild to moderate depression was -0.41 (95% CI -0.67 to -0.14). Similarly, CBT is an effective treatment for depression. In meta-analysis CBT is superior to any type of control for depression, with an effect size of 0.20 (095% CI 0.10 to 0.29) (Santoft et al., 2019). The population in the HNY cohort had less severe or mild to moderate depression and in that sense, the size of the effects for mental health outcomes for GSP compare very favourably to those reported for behavioural activation and CBT.

While previous research has highlighted the components of NBIs as integral in impacting mental health and wellbeing i.e., the nature-based activity, the setting, and the social environment (Bragg & Atkins, 2016; Sempik, 2010), qualitative research on GSP programmes have focused on how GSP can benefit participants' wellbeing. Specifically, Wood et al (2022) explored the effects of Therapeutic Community Gardening (as one type of GSP) and found that nature engagement, hope for the future and social support were key mechanisms in how GSP impacted users' wellbeing. Similarly, Kenyon et al (2023) explored the impact of nine different GSP interventions across West Yorkshire (i.e., horticulture and gardening, exercised based, integrating alternative therapies, conservation, and creativity focused GSP activities). Five health and wellbeing themes were identified by

participants who engaged with GSP programmes: the restorative and replenishing effects of being in nature; participation supported autonomy and self-determination with evidence of 'up-skilling' and education; natural environments aided recovery and supported overall health; participation supported community cohesion and combatted social isolation; and engagement with GSP facilitated an innate connection with nature. Furthermore, Coventry et al (2019) have shown that an important pathway to wellbeing benefits is through taking part in outdoor NBIs that are considered purposeful and have capacity to confer health and environmental co-benefits.

This points to the important role GSP can play in improving hedonic but also eudemonic wellbeing, which is associated with living a purposeful and meaningful life. In the HNY programme, taking part in GSP activities was associated with significant improvements in wellbeing with the largest gains in life satisfaction and living a worthwhile life. However, in the HNY cohort sample the average scores for all the subscales of the ONS-4 after engaging with GSP were still below the average ratings for personal wellbeing for the UK population (ONS, 2016). This might be partly explained by the fact that the sample in the HNY cohort had worse wellbeing and higher anxiety at baseline than the UK population as a whole. A large proportion of the sample lived in the most deprived parts of the region and potentially exposed to greater cost of living challenges. Additionally, across the UK, people in their early and middle years report the lowest average ratings for wellbeing and higher anxiety on the ONS-4. The bulk of the sample in the cohort was drawn from people under 54 years of age, suggesting that addressing wellbeing and anxiety in younger and middle-aged populations is a key priority for healthcare providers.

4.2 Referral and Recruitment Challenges

The HNY GSP programme also provided valuable learning as a 'test and learn' project, with key challenges identified by SP/referring teams over the duration of the cohort evaluation. Specifically, it was a challenge to identify appropriate referrals to GSP, and there were barriers to recruiting participants for the cohort evaluation. SP link workers/support workers highlighted that many people presented with a complex mix of unmet need, such as financial and housing problems, exacerbated by the cost-of-living crisis, making GSP potentially less relevant. Other challenges noted were specific to individual services. For example, some services reported that because their service users were typically drawn from older adult populations, some of the GSP activities were not suitable. Lack of public transportation also created barriers for service users in accessing GSP activities in more rural areas of the HNY region. While some services had an established nature-based activity as part of their service, other services focused their efforts on establishing relationships and creating connections with green providers in their community to ensure the sustainability of GSP beyond the lifetime of the 'test and learn' project. While previous research has highlighted challenges associated with GSP for both referral and uptake of GSP activities in populations experiencing higher levels of deprivation (Robinson et al., 2020), a notable strength of the present evaluation was that two thirds of participants referred to and engaged with GSP were living in the most deprived communities (i.e., IMD Deciles 1-4).

However, the three main referral pathways identified for the HNY GSP evaluation (i.e., self-referral, mental health service and Hull and East Yorkshire Mind) also reflect those SP services which were able to mitigate against some of the above challenges. NAViGO had an established commercial garden centre as part of their mental health

service with eligible participants referred to as one type of GSP intervention. Another SP service integrated social media pathways to promote their nature-based activities, generating a greater number of self-referrals for the evaluation. Hull and East Yorkshire Mind was a unique referral pathway attached to the Forum SP service and sought to address the initial complexity of cases by only referring service users suitable for GSP.

In addition to challenges associated with generating GSP referrals, SP link workers/support workers also identified key challenges in recruiting participants to the cohort. The academic language of the cohort evaluation information material and the appropriate language to promote the evaluation were identified as initial challenges in recruiting eligible participants. To address these concerns, the UoY research team co-designed a plain English participant information sheet with two SP services (Part A - About the Study and Part 2 - How data is managed; Appendix 2). A SP link workers script was also co-designed with SP link workers which could be used as a reference for the initial 'What Matters to You' conversation, in addition to a webpage in plain English hosted by the UoY. Other identified challenges included an initial age cap of 65 years, subsequently removed to support recruitment of older participants eligible for GSP. To further support recruitment and data collection processes, problem solve and highlight learning and opportunities, regular collaborative meetings were facilitated by HEY Smile Foundation with teams from the participating SP/referring services and the UoY research team.

4.3 Wider Challenges

It is instructive to recognise that some of the specific challenges identified by SP services across the HNY region have also been encountered across other SP pathways are also present (e.g., Defra, 2022; Westlake et al., 2023). Specifically, where GSP is *"not a single intervention, delivered by one organisation, but rather a series of processes and relationships, involving different organisations"* as identified in the light-touch interim (unpublished) report by the national evaluation team (Defra, 2022), creates potential challenges in the delivery of GSP across services where relationships and processes may differ or have not yet been fully established. Similarly, in a recent commentary in the BMJ, Westlake et al (2023) note that *"social prescribing is a complex intervention set within complex social systems, and implementation models vary across organisations and locations"*. The complexity of SP/GSP as an intervention where implementation models may vary (as reflected by the SP/referring services in this evaluation) poses challenges not only for referral and recruitment processes, but also has implications in establishing a robust evidence-base for SP/GSP where such models can be replicated (Marx & More, 2022; Rugel, 2015) and evaluated (Kiely et al., 2022; Sandhu et al., 2022).

Challenges about the sustainability of SP/GSP are also recognised, which have also been identified by those involved in establishing green prescription pathways in Scotland (Marx & More, 2022). Specifically, the requirement of a current place-based directory of vetted nature-based providers to ensure service users are offered choice and appropriate GSP interventions based on their specific physical and mental health needs, alongside longer-term funding for nature-based providers to support the continued delivery of GSP interventions.

4.4 Clinical Implications and Future Research

Previous research has highlighted the importance of brief contact with nature, such as sitting or exercising in nature for 10 to 20 minutes can increase positive affect, decrease negative affect and stress (Bowler et al., 2010; McMahan & Estes, 2015) and increase feelings of connectedness to nature (Sheffield et al., 2022). This is significant as we generally tend to underestimate the extent to which even brief contact with nature can result in positive impacts (Nisbet & Zelenski, 2011). It also may have implications for adherence to a GSP programme delivered over a sustained period. This evaluation found that a GSP duration of 9 to 12 weeks plus had greater benefit for overall wellbeing, and those of 5 to 8 weeks had greater benefit for mental health outcomes. Positive affect associated with participating in NBIs, may therefore be important not only for engagement with the intervention, but also adherence, as reflected by research on green exercise (e.g., Kinnafick & Thøgersen-Ntoumani, 2014; Lacharité-Lemieux et al., 2015). Positive affect may also be an important consideration in the intention-behaviour gap in the promotion of NBIs as a health and wellbeing intervention.

Future research should also consider if GSP interventions facilitate transferable skills, and lead to progression to other roles and opportunities (e.g., volunteering, employment). Research on nature-based rehabilitation showed that 68% of participants returned to workplace activities after engaging in an 8, 12 or 24-week horticultural programme (Grahn et al., 2017). Previous research has also found good evidence for positive psychological impacts of NBIs for people with a LTC (Taylor et al., 2022), with lifestyle modifications identified as beneficial in symptom management of LTCs (e.g., Keefe et al., 2008; Martinsen, 2008; Middeldorp et al., 2020; Moffatt et al., 2017). As people with LTCs often present with comorbid mental health conditions (Naylor et al., 2012), future research should explore if GSP can be helpful in supporting not only positive mental health outcomes, but symptom management for people living with LTCs.

4.5 Limitations

The limitations of the present research are recognised. The evaluation used an uncontrolled and non-randomised study design with a self-selected sample using self-reported wellbeing and mental health outcome. As such the research is likely to be affected by selection and response biases, and unable to establish a definitive link between exposure to GSP activities and improvements in wellbeing and mental health outcomes. The survey also focused exclusively on mental health outcomes of participants who received a GSP intervention at the end point of the GSP pathway. Specifically, the role of SP link workers as part of the intervention in the GSP pathway is not considered, albeit this was not the aim of the present evaluation.

There was also significant heterogeneity in GSP interventions offered across services, specifically in relation to GSP activity type and frequency. For example, GSP activities such as gardening were often facilitated in a highly structured (e.g., garden centre) and familiar environment (e.g., in a mental health service with support staff) on a weekly basis over a period of 12 to16 weeks. In comparison, other GSP interventions such as half-day workshops (i.e., Confidence Building and Menopause Support) were delivered as stand-alone offers within a greenspace environment, with participants having an opportunity to explore the greenspace in an unstructured way afterwards. While this evaluation shows benefit of GSP in improving mental health and wellbeing outcomes, it is unclear whether the amount or type of greenspace was an important driver of these outcomes. Additionally, the quality of

the natural environment space may also be an important consideration, where research has found that the ecological quality of natural environments is an important factor for well-being (Knight et al., 2022).

4.6 Conclusion

The HNY GSP programme followed a cohort of adults with mild to moderate mental ill-health to determine the impact of GSP on mental health outcomes. Engaging with a wide variety of GSP activities was associated with significant gains in wellbeing and improvements in anxiety and depression. Findings are consistent with previous research about outdoor nature-based activities, which has shown good evidence for benefits to mental health. Additionally, the size of the intervention effects for GSP are comparable and in some instances superior to effect sizes reported for brief and low-intensity psychological interventions offered in primary care, such as behavioural activation and CBT. GSP offers between 5 and 12 weeks appear to confer the greatest wellbeing and mental health benefits, which has implications for healthcare providers and SP services with large waiting lists for mental health. There is scope for further work to identify the active ingredients of GSP to enable delivery of more targeted and tailored offers for people with both mental health problems but also with LTCs.

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Appendices

Appendix 1 – Consent Form, 'Before' and 'After' Surveys

Humber and North Yorkshire Health and Care Partnership

Green social prescribing evaluation

CONSENT FORM

Name of person administering questionnaire: ……..

Organisation: …….

		Please initial box
1.	I confirm that I have read and understand the information sheet provided for the above and have had the opportunity to consider my participation.	☐
2.	I confirm that I have had the opportunity to ask questions and that these have been answered satisfactorily.	☐
3.	I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.	☐
4.	I understand that if I choose to withdraw from the service evaluation, the data I provide until that point will be retained and used, unless I request for it to be deleted within 2 weeks of withdrawing.	☐
5.	I understand the information I provide will remain confidential and my identity will be anonymous (all identifying information will be removed).	☐
6.	I understand that the information I provide may be used to support other research in the future. Any information shared will not reveal my identity. This research will be by suitably qualified researchers and will have received appropriate ethical clearance.	☐
7.	I agree to take part in the service evaluation	☐

In addition, the respondent should indicate their preference below with respect to these further items, by ticking the relevant box if they agree with the statement.

8.	I am happy to be contacted by researchers during the service evaluation to clarify my data if there are any clarifications required.	☐
9.	I would be interested in being contacted about future research projects by the project team. I understand I can ask to withdraw this permission at any point.	☐
10.	I would like to be informed about the results of the service evaluation when they are available.	☐

Name of Participant	Date	Signature

Humber and North Yorkshire Health and Care Partnership

Green social prescribing evaluation

Before Survey

Thank you for taking the time to answer some questions about your experience of taking part in the green social prescribing project. Please take a moment to read the information sheet and complete the consent form before starting the survey.

Project Information

1. Location of Social Prescribing service:

☐ Vale of York

☐ Hull

☐ North East Lincolnshire

☐ North Yorkshire

☐ East Yorkshire

☐ North Lincolnshire

2. Name of Social Prescribing Service

☐ York CVS

☐ Forum

☐ NAViGO

☐ Age UK North Yorkshire Coast & Moors*

☐ Humber Teaching NHS Foundation Trust

☐ Citizens Advice North Lincolnshire

☐ North Yorkshire County Council

☐ Other, please specify _____

☐ Selby Town PCN

☐ Tadcaster and Rural Selby PCN

☐ Heartbeat CIC

☐ Humber Teaching NHS Foundation Trust (Occupational Therapists)

**Referenced as Age UK on survey*

Background information

1. What is your full postcode? _____

2. This question is about your gender. Which of the following do you identify as? (Select the option that applies to you)

   ☐ Male

   ☐ Female

   ☐ Non-Binary / Third Gender

   ☐ Prefer not to say

3. How old are you? (Select the option that applies to you)

   ☐ Under 18

   ☐ 18 to 24

   ☐ 25 to 34

   ☐ 35 to 44

   ☐ 45 to 54

   ☐ 55 to 64

   ☐ 65 to 74

   ☐ 75 to 84

   ☐ 85 or over

   ☐ Prefer not to say

4. What is your ethnic group? (Select the option that applies to you)

☐ White

☐ British

☐ Irish

☐ Other White ethnic group

☐ Mixed

☐ White and Black Caribbean

☐ White and Black African

☐ White and Asian

☐ Any other Mixed background

☐ Asian or Asian British

☐ Pakistani

☐ Indian

☐ Bangladeshi

☐ Chinese

☐ Any other Asian background

☐ Black or Black British

☐ Caribbean

☐ African

☐ Any other Black background

☐ Other ethnic group

☐ Arab

☐ Other

☐ Don’t know

☐ Prefer not to say

5. Are your day-to-day activities limited because of a physical or mental health condition or disability which has lasted, or is expected to last, at least 12 months? (Select ONE option only)

☐ Yes - limited substantially*

☐ Yes - limited but not substantially*

☐ No

*5.1 If you've answered 'yes' above - Do you have any of the following impairments or health conditions? Select ANY boxes that apply. If you've answer 'no' above, please skip to Question 6.

☐ A physical impairment such as difficulty using your arms or mobility difficulties which require you to use a wheelchair or other mobility aid

☐ A sensory impairment such as blindness or deafness

☐ A mental health condition such as depression or anxiety

☐ A learning difficulty / disability or cognitive impairment such as Down's syndrome

☐ Dyslexia or an autistic spectrum disorder

☐ A long-term health condition such as HIV, cancer, heart / respiratory condition

☐ Any other long-term illness or health condition that has lasted, or is expected to last, at least 12 months

Education and Employment Status

6. Which of these circumstances best describes what you are doing at present? If more than one of these applies to you, please select the MAIN ONE only.

☐ Full-time paid work (30 hours or more each week)

☐ Part-time paid work (under 30 hours each week)

☐ In education or training

☐ Unemployed

☐ Voluntary worker

☐ Unable to work because of long-term disability or ill health

☐ Retired from paid work

☐ Looking after the family or home

☐ Other

7. What is your highest educational qualification? Please select ONE box only.

☐ None

☐ GCSE / O Level or equivalent

☐ A / AS level or equivalent

☐ Diploma / foundation degree or other level 5 qualification

(level 5 award, certificate, NVQ, diploma)

☐ Undergraduate degree with honours (for example BA Hons, BSc)

☐ A higher degree for example PhD or Masters

☐ Other (please state): _____

☐ Prefer not to say

Information on your referral and the support you will receive

8. Why were you referred to Social Prescribing services?

☐ Mental health condition

☐ Physical health condition

☐ Both mental and physical health conditions

☐ Other (Please state) _____

9. Who referred you to the Social Prescribing service?

☐ Self-referral

☐ GP

☐ Other Primary Care services

☐ Mental Health services

☐ Secondary Care Services

☐ Local Authority services e.g. Adult Social Care

☐ Voluntary or community group

☐ Other. Please state _____

Your health and wellbeing

We would like to ask you four questions about your feelings on aspects of your life. There are no right or wrong answers. For each of these questions I'd like you to give an answer on a scale of 0 to 10, where 0 is "not at all" and 10 is "completely".

Q1 - Overall, how satisfied are you with your life nowadays?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

Q2 - Overall, to what extent do you feel that the things you do in your life are worthwhile?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

Q3 - Overall, how happy did you feel yesterday?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

Q4 - Overall, how anxious did you feel yesterday?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

The next questions are designed to help us know how you feel. Read each item and select the option which comes closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate reaction to each question will probably be more accurate than a long thought-out response.

Q1 – I feel tense or 'wound up'

☐ Most of the time

☐ A lot of the time

☐ From time to time, occasionally

☐ Not at all

Q2 – I get a sort of frightened feeling as if something awful is about to happen

☐ Yes, definitely and quite badly

☐ Yes, but not too badly

☐ A little, but it doesn't worry me

☐ Not at all

Q3 – Worrying thoughts go through my mind

☐ A great deal of the time

☐ A lot of the time

☐ From time to time, but not too often

☐ Only occasionally

Q4 – I can sit at ease and feel relaxed

☐ Definitely

☐ Usually

☐ Not often

☐ Not at all

Q5 – I get a sort of frightened feeling, like “butterflies” in the stomach

☐ Not at all

☐ Occasionally

☐ Quite often

☐ Very often

Q6 – I feel restless as I have to be on the move

☐ Very much indeed

☐ Quite a lot

☐ Not very much

☐ Not at all

Q7 – I get sudden feelings of panic

☐ Very often indeed

☐ Quite often

☐ Not very often

☐ Not at all

Q8 – I still enjoy the things I used to enjoy

☐ Definitely as much

☐ Not quite as much

☐ Only a little

☐ Hardly at all

Q9 – I can laugh and see the funny side of things

☐ As much as I always could

☐ Not quite as much now

☐ Definitely not so much now

☐ Not at all

Q10 – I feel cheerful

☐ Not at all

☐ Not often

☐ Sometimes

☐ Most of the time

Q11 – I feel as if I am slowed down

☐ Nearly all the time

☐ Very often

☐ Sometimes

☐ Not at all

Q12 – I have lost interest in my appearance

☐ Definitely

☐ I don't take as much care as I should

☐ I may not take quite as much care

☐ I take just as much care as ever

Q13 – I look forward with enjoyment to things

☐ As much as I ever did

☐ Rather less than I used to

☐ Definitely less than I used to

☐ Hardly at all

Q14 – I can enjoy a good book or radio or TV program

☐ Often

☐ Sometimes

☐ Not often

☐ Seldom

Thank you for taking the time to complete this questionnaire

Humber and North Yorkshire Health and Care Partnership

Green social prescribing evaluation

After Survey

Thank you for taking the time to answer some questions about your experience of taking part in the green social prescribing project.

Please insert your participant ID from the first survey _____

Project information

- Location of Social Prescribing service:

  ☐ Vale of York

  ☐ Hull

  ☐ North East Lincolnshire

  ☐ North Yorkshire

  ☐ East Yorkshire

  ☐ North Lincolnshire

- Name of Social Prescribing Service

  ☐ York CVS

  ☐ Forum

  ☐ NAViGO

  ☐ Age UK North Yorkshire Coast & Moors*

  ☐ Humber Teaching NHS Foundation Trust

  ☐ Citizens Advice North Lincolnshire

  ☐ North Yorkshire County Council

  ☐ Other, please specify _____

  ☐ Selby Town PCN

☐ Tadcaster and Rural Selby PCN

☐ Heartbeat CIC

☐ Humber Teaching NHS Foundation Trust (Occupational Therapists)

**Referenced as Age UK on survey*

- What is the name of the green social prescribing project you took part in? (For example, the name of the organisation you were referred to)

_____

- What activity or activities did you take part in?

☐ Gardening

☐ Food growing

☐ Conservation

☐ Green Exercise

☐ Crafting

☐ Bush craft (e.g., forage, tool making, fire craft)

☐ Yoga, or other mind-body activity

☐ Other, please state _____

- How long did you take part in the activity?

☐ 1 to 4 weeks

☐ 5 to 8 weeks

☐ 9 to 12 weeks

- How often were the activity sessions?

☐ More than once a week

☐ Weekly

☐ Every fortnight

☐ Every month

☐ Other, please state_____

Your health and wellbeing

We would like to ask you four questions about your feelings on aspects of your life. There are no right or wrong answers. For each of these questions I'd like you to give an answer on a scale of 0 to 10, where 0 is "not at all" and 10 is "completely

Q1 - Overall, how satisfied are you with your life nowadays?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

Q2 - Overall, to what extent do you feel that the things you do in your life are worthwhile?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

Q3 - Overall, how happy did you feel yesterday?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

Q4 - Overall, how anxious did you feel yesterday?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
0	1	2	3	4	5	6	7	8	9	10

Not at all Completely

The next questions are designed to help us know how you feel. Read each item and select the option which comes closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate reaction to each question will probably be more accurate than a long thought-out response.

Q1 – I feel tense or 'wound up'

☐ Most of the time

☐ A lot of the time

☐ From time to time, occasionally

☐ Not at all

Q2 – I get a sort of frightened feeling as if something awful is about to happen

☐ Yes, definitely and quite badly

☐ Yes, but not too badly

☐ A little, but it doesn't worry me

☐ Not at all

Q3 – Worrying thoughts go through my mind

☐ A great deal of the time

☐ A lot of the time

☐ From time to time, but not too often

☐ Only occasionally

Q4 – I can sit at ease and feel relaxed

☐ Definitely

☐ Usually

☐ Not often

☐ Not at all

Q5 – I get a sort of frightened feeling, like “butterflies” in the stomach

☐ Not at all

☐ Occasionally

☐ Quite often

☐ Very often

Q6 – I feel restless as I have to be on the move

☐ Very much indeed

☐ Quite a lot

☐ Not very much

☐ Not at all

Q7 – I get sudden feelings of panic

☐ Very often indeed

☐ Quite often

☐ Not very often

☐ Not at all

Q8 – I still enjoy the things I used to enjoy

☐ Definitely as much

☐ Not quite as much

☐ Only a little

☐ Hardly at all

Q9 – I can laugh and see the funny side of things

☐ As much as I always could

☐ Not quite as much now

☐ Definitely not so much now

☐ Not at all

Q10 – I feel cheerful

☐ Not at all

☐ Not often

☐ Sometimes

☐ Most of the time

Q11 – I feel as if I am slowed down

☐ Nearly all the time

☐ Very often

☐ Sometimes

☐ Not at all

Q12 – I have lost interest in my appearance

☐ Definitely

☐ I don't take as much care as I should

☐ I may not take quite as much care

☐ I take just as much care as ever

Q13 – I look forward with enjoyment to things

☐ As much as I ever did

☐ Rather less than I used to

☐ Definitely less than I used to

☐ Hardly at all

Q14 – I can enjoy a good book or radio or TV program

☐ Often

☐ Sometimes

☐ Not often

☐ Seldom

Appendix 2 – Plain English Information Sheet

Humber and North Yorkshire - Green Social Prescribing Service Evaluation

PARTICIPANT INFORMATION SHEET

Part 1 - Service Evaluation Details

What is the purpose of the service evaluation?

The Humber and North Yorkshire Health and Care Partnership has received funding to run a 'test and learn' site looking at Green Social Prescribing. The programme is being delivered by HEY Smile Foundation and is working across the six places of: North East Lincolnshire; North Lincolnshire; Hull; East Yorkshire; the Vale of York; and North Yorkshire.

Social prescribing and community-based support help GPs, other health and care professionals and local agencies to refer people to a link worker. The link worker gives people time and focuses on what matters to the person.

For some people this will be *green social prescribing*. *Green social prescribing* is about doing activities in nature which benefits the person's health and wellbeing. *Green social prescribing* connects people to activities such as local walking for health activities, community gardening and food-growing projects.

A service evaluation will take place across the Humber and North Yorkshire region to find out more about how connecting people to activities in nature might benefit their health and wellbeing.

Who is undertaking the service evaluation?

The service evaluation is being conducted by a team of researchers from the University of York.

What does the service evaluation involve?

The service evaluation involves completing two questionnaires –

- The first questionnaire is to find out some background information about you and your health and wellbeing. You complete this before taking part in the activity in nature.
- The second questionnaire focuses more on your experience of the nature activity you took part in. You complete this after you have finished taking part in the nature activity, or at 3 months after you started the activity (whichever is sooner).

What are the potential benefits of taking part?

We are interested in your experience of these activities and how they might benefit you. This information will help increase awareness of the benefits of taking part in activities in nature.

In the longer term, we hope that the findings of this service evaluation will help people use more activities in nature to improve their physical and mental health and wellbeing and promote more more investment in similar projects in the future.

We will send everyone who took part a summary of our findings.

Do I have to take part?

No. It is your decision whether you wish to take part in the service evaluation. If you decide to take part, you can still stop at any time without giving any reason for this. If you do choose to take part in the service evaluation and then change your mind, you would be free to stop your participation, without needing to provide a reason. You could also ask for your information to be removed for up to two weeks after you have completed the second questionnaire, by contacting the researchers.

Are there any risks to taking part?

The questionnaires involve thinking about your mental and physical health and for some people this may bring up difficult feelings. Please be assured that the person helping with the questionnaire will be led by what you are happy to answer.

What will happen to the results of this service evaluation?

We plan to publish the findings in -

- a report to the Humber and North Yorkshire Health and Care Partnership.
- an academic journal (which will be free to read) and present them at academic conferences.

We will also share our findings with a national team who are assessing green social prescribing activities across England.

How will my information be kept confidential?

All your personal details and information you provide will be kept strictly confidential and stored securely. Your personal details such as your contact details will be stored separately from the service evaluation information that we collect. Your name and any other information that might identify you will be removed so you cannot be recognised. You can find further details about how we will manage and store your data in Part 2 of this document.

Who has reviewed this?

The questionnaires have been reviewed by people with experience of working with a range of physical and mental health difficulties. They have been approved by the Ethics Committee of the Department of Environment and Geography at the University of York.

Who is funding this project?

This service evaluation is funded by HEY Smile Foundation on behalf of the Humber and North Yorkshire Health and Care Partnership.

Further information

If you have any further questions, please feel free to contact the project team,
Dr Peter Coventry, Professor Piran White, or Trish Darcy.

Any of them would be happy to talk through the details of this service evaluation with you and answer any questions you may have. Please contact us if you feel there are any challenges in taking part, but please note whilst contact numbers and emails are monitored there may be times when these are not checked frequently.

For medical advice and support please contact your GP.

Dr Peter Coventry
Department of Health Sciences, University of York, York YO10 5DD
Email: peter.coventry@york.ac.uk

Professor Piran White
Department of Environment and Geography, University of York, York YO10 5NG
Email: piran.white@york.ac.uk

Trish Darcy
Department of Health Sciences, University of York, York Y010 5DD
Email: trish.darcy@york.ac.uk

Part 2 - How we manage your Information

Further details about how we process your data
The responses from the questionnaire will be collected by the lead of the project you are taking part in, and then transferred securely to the project team for processing and analysis. As part of the process, the information you provide will be anonymised (i.e., any information that may identify you will be removed), so that the information you provide cannot be linked to you as an individual, only to your characteristics.

Analysis of the data and presentation of the research results will not involve any identification of you as an individual. Similarly, no information that identifies you will be shared with other researchers. If you wish however, you can choose in the consent form to be contacted by our research team about taking part in any future studies we run.

The University of York processes personal data for the purposes of carrying out research in the public interest. The University will make every effort to be transparent about its processing of your personal data and this information sheet should provide a clear explanation of this. If you do have any queries about the University's processing of your personal data that cannot be answered by the research team, further information may be obtained from the University's Data Protection Officer by emailing dataprotection@york.ac.uk or at www.york.ac.uk/records-management/dp/ .

Privacy notice
This Privacy Notice tells you what to expect when you take part in this service evaluation. This is being carried out by, at the University of York. For details of how your personal information is used in other ways, please see the other University Privacy Notices www.york.ac.uk/records-management/dp/your-info.

For the purposes of this privacy notice, University of York is the Data Controller as defined in the General Data Protection Regulation (GDPR). We are registered with the Information Commissioner's Office and our entry can be found here. Our registration number is: Z4855807.

What is our legal basis for processing your data?
Under GDPR, the University must identify a legal basis for processing personal data and, where appropriate, an additional condition for processing special category data.

In line with our charter which states that we advance learning and knowledge by teaching and research, the University processes personal data for research purposes under Article 6 (1e) of the GDPR: "*Processing is necessary for the performance of a task carried out in the public interest*". Special category data is processed under Article 9 (2j): *"Processing is necessary for archiving purposes in the public interest, or scientific and historical research purposes or statistical purposes".*

Research will only be carried out where ethical approval has been granted, where there is a clear public interest and where appropriate safeguards have been put in place to protect data. In line with ethical expectations and to act in accordance with common law duty of confidentiality, we will seek your consent to take part in research. This consent will not, however, be our legal basis for processing your data under the GDPR.

How do we keep your data secure?
The University takes information security seriously and has applied appropriate technical and organisational measures to protect personal data and special category data. Access to information is restricted on a need-to-know basis and security arrangements are regularly reviewed to ensure their continued suitability. For further information see www.york.ac.uk/it-services/security/.

How long will we keep your data?
Your data will be kept in an anonymised form (i.e., any information that may identify you will be removed) indefinitely for research purposes only.

What rights do you have in relation to your data?
Under GDPR, you have a right of access to your data, a right to rectification, erasure (in certain circumstances), restriction, objection, or portability (in certain circumstances). You also have a right to withdraw consent (where this applies).
For more information, see: https://www.york.ac.uk/records-management/generaldataprotectionregulation/individualsrights/.

Please note that, as data in this service evaluation will be anonymised (i.e., any information that may identify you will be removed), it will not be possible for you to use these rights after this point. This is because it will not be possible for us to identify your record once it has been anonymised.

Right to complain
If you are unhappy with the way in which the University has handled your personal data, we ask you to contact us in the first instance, so that we can try to put things right. If you are unhappy with our response, you have a right to complain to the Information Commissioner's Office. For information on reporting a concern to the Information Commissioner's Office, see www.ico.org.uk/concerns.

Appendix 3 - Link/Support Workers Script

Please use this script as a guide when speaking to participants about the service evaluation and adapt to the conversation you are having with your participant. You may wish to add to the suggestions below or omit those that are not relevant/appropriate to your conversation/service. Please use the plain English participant information sheet_V2 and the University of York project webpage [https://www.york.ac.uk/healthsciences/research/mental-health/projects/humber-north-yorkshire-green-social-prescribing/] to support this conversation as needed.

Background

- Green social prescribing is about doing activities in nature such as local walking for health activities, community gardening and food-growing projects. There is evidence that doing these kinds of activities could benefit people's health and wellbeing.
- Green social prescribing is an important part of the government's Covid-19 mental health recovery plan.
- In 2021 Defra, NHS England, Sport England, and other bodies made an investment of over £5.5 million in Green Social Prescribing.
- Seven 'test and learn' Green Social Prescribing sites were identified in England, including the Humber and North Yorkshire Green Social Prescribing programme.

Who is undertaking the service evaluation?

- A service evaluation will take place across the Humber and North Yorkshire region to find out more about how connecting people to activities in nature might benefit their health and wellbeing.
- The Green Social Prescribing programme is being delivered by the HEY Smile Foundation on behalf of the Humber and North Yorkshire Health and Care partnership.
- A team of researchers at the University of York are evaluating green social prescribing on behalf of HEY Smile Foundation.

Why participate in the service evaluation?

We are interested in your experiences of taking part in nature-based activities. Using your feedback, we will be able to know more about the benefits of taking part in activities in nature and raise awareness, potentially benefiting others.

Why is this service evaluation important?

Your experience matters, we hope that through your and others feedback, we can use these findings to:

a) Support more people to use activities in nature to improve their mental and physical health

b) Promote more investment in similar projects in the future

More information about the service evaluation

- If you are interested in learning more about the service evaluation and how you can be part of it, I can provide you with some further information that explains what is involved [Plain English Participant Information Sheet_V2]
- We also have a webpage that explains what the service evaluation is about and who is undertaking it [https://www.york.ac.uk/healthsciences/research/mental-health/projects/humber-north-yorkshire-green-social-prescribing/]
- I/link worker/support worker can help you to complete the questionnaires and will be led by what you are happy to answer.

Provide reassurance!

- All information you provide on the questionnaires is anonymous.
- You will not need to provide any personal information, such as your name, and any information that might identify you will be removed, so you cannot be recognised.
- There are two surveys (before you take part in the activity in nature, and afterwards when you finish your activity in nature), which take about 10 minutes each to complete.
- You can complete a paper version of each survey if you prefer not to complete an online version

Appendix 4 – Nature on Prescription Handbook Categories

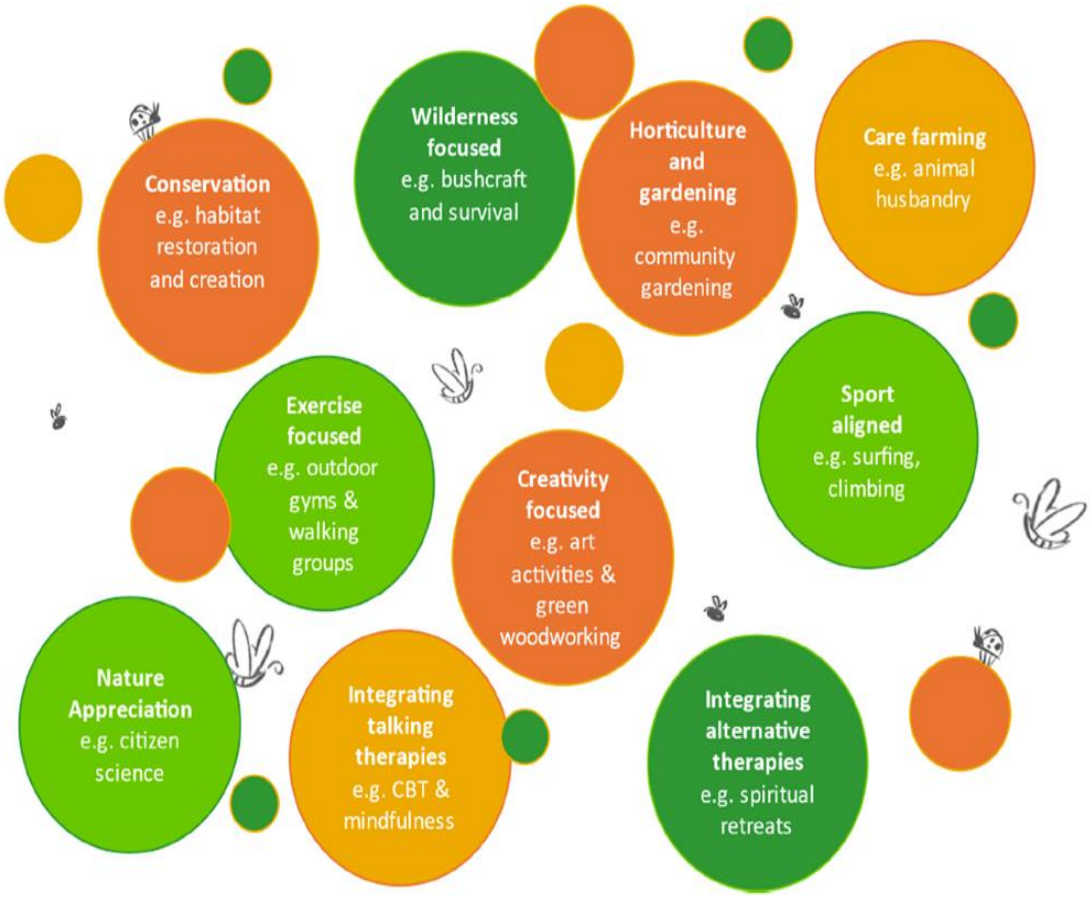

Figure A1: Nature on Prescription Handbook categories for nature-based interventions

Appendix 5 – Reasons for Lost to Follow-Up

Table A1: Reasons for Lost to Follow-Up

#	Reasons for Lost to Follow-up
1.	Participant in hospital and no firm plans to engage with GSP
2.	Participant hasn't engaged with any green programme and no intentions to at present
3.	Participant hasn't started GSP activity yet but meeting with GSP provider [No After survey submitted]
4.	Never made it to the nursery
5.	Attended 6 + times independently. Closed due to client been abusive to staff and not wanting to continue with project [No After survey submitted]
6.	Attended GSP twice. Would like to continue with engaging but in a few months when less busy [No After survey submitted]
7.	No GSP activity attended
8.	No GSP activity attended
9.	Disengaged from all services
10.	Attended GSP twice initially. Link worker to identify new project in Oct '22 as client wishes to continue [No After survey submitted]
11.	No activity attended, only introduction meeting with provider to learn what they offer
12.	No activity attended due to client work schedule/availability
13.	Case closed. No activities attended due to a change in commitments (case was put on hold) when picked back up there was a decline in physical health and client unable to participate in activities as a result
14.	Not ready to start yet due to personal circumstances and did not respond to link worker follow-up
15.	Participant only attended for one week. Pulled out as they are no longer able to attend, case closed
16.	Many attempts of support made however client unable to commit due to anxiety and recent loss – did not attend a GSP activity
17.	Case closed; no activity attended. Reason given - does not want to continue
18.	Work commitments changed – did not attend a GSP activity
19.	Closed due to changes with work situation and too stressed to participate
20.	3-months attending GSP but link worker unable to make contact to complete After survey
21.	1-month attending GSP however link worker unable to make contact with participant to complete After survey

22.	No GSP activity attended
23.	Closed; 1x GSP activity attended. End survey not completed as client left service for full time job
24.	Participant left and SPLW was unable to attain an After Survey
25.	Never attended after his initial survey; GSP was not for him
26.	*No After survey submitted*
27.	*No After survey submitted*
28.	*No After survey submitted*
29.	*No After survey submitted*
30.	*No After survey submitted*
31.	*No After survey submitted*
32.	*No After survey submitted*
33.	*No After survey submitted*
34.	*No After survey submitted*
35.	*No After survey submitted*
36.	*No After survey submitted**
37.	Did not attend GSP activity
38.	Did not attend GSP activity
39.	*No After survey submitted**
40.	Unable to complete after survey due to illness/injury preventing access to service
41.	*No After survey submitted*
42.	*No After survey submitted*
43.	*No After survey submitted**
44.	*No After survey submitted**
45.	Never attended any of the workshops
46.	No GSP activity attended
47.	*No After survey submitted**
48.	The allotment was on hold over Christmas and has now restarted but the time has changed from 10am to 1pm. The participant signed up can no longer attend as they have to pick their son from school and haven't actually attended any of the sessions and can no longer attend future sessions

49.	*No After survey submitted**
50.	*No After survey submitted**
51.	*No After survey submitted**

***Before survey submitted, but participant ID not recognised for follow-up

Appendix 6 – GSP Activities

Table A2: GSP categories and subcategories of GSP activities

GSP Activity	N=200	% GSP activity	% Overall (N=173)
Horticulture and Gardening			**47%**
Gardening	69	35%	
Food Growing	13	6%	
Exercise focused			**23%**
Green Exercise	40	20%	
Care Farming			**11%**
Animal Care	19	10%	
Wilderness Focused			**10%**
Bushcraft	17	9%	
Conservation			**3%**
Conservation	5	3%	
Creativity Focused			**14%**
Mindful Photography	7	4%	
Crafting	13	7%	
Woodwork	1	1%	
Creative Writing	1	1%	
Site specific Drama	1	1%	
Setting up Santa event in park	1	1%	
Bike Repair	1	1%	
Integrating Alternative Therapies			**5%**
Mindfulness movement/meditation	5	3%	
Confidence Building	2	1%	
Menopause support	2	1%	
Sport Aligned			**1%**
Model Boat and Fishing	1	1%	
Walking football	1	1%	
Other			**1%**
Community Cafe	1	1%	

Appendix 7 – GSP Providers

Table A3: GSP Provider organisations and associated GSP activity

GSP Provider Name	GSP activity	N=173	% Overall
Grimsby Garden Centre	Gardening	40	23%
All Things Good and Nice CIC	Green Exercise	28	16%
Nunny's Farm	Animal Care	19	11%
Sage and Bellflower	Foraging	10	6%
Down 2 Earth	Gardening, Crafting	9	5%
WEA – Mindful Photography	Nature Photography	7	4%
Selby & District AVS – Growing in Confidence	Gardening	7	4%
Raincliffe Wood Community Enterprise CIC	Bushcraft	6	3%
Ali Cutler - How to be happy coach	Mindful Meditation/Movement	5	3%
Fit Mums and Friends	Green Exercise	4	2%
Rainbow Community Garden	Gardening	3	2%
North Yorkshire Moors Railway	Conservation	3	2%
Bakersville Occupational Therapy Allotment Plot	Gardening	3	2%
St Nicks	Gardening, Food Growing, Creative Writing, Crafting, Bushcraft	3	2%
Down to Earth – Hull	Gardening, Food Growing, Crafting, Conservation	3	2%
Timebank Hull & East Riding - Marfleet Community Centre Allotment	Gardening, Food Growing, Bike Repair, Community Café	3	2%
Community Garden Guerrillas	Gardening, Food Growing	2	1%
Move the Masses	Green Exercise	1	1%
Walking the Way to Health in North Lincolnshire	Green Exercise	1	1%
Ongo Reconnect Project	Green Exercise	1	1%

Cleethorpes Boating Lake Model Boat Association	Model Boat & Fishing	1	1%
Age UK North Yorkshire Coast & Moors	Menopause Support	1	1%
Citizen's Advice North Lincolnshire Social Prescribing Team	Green Exercise	1	1%
The Tiger Trail Expressive Arts for Health and Wellbeing	Site Specific Drama	1	1%
Poppleton Community Railway Nursery	Gardening	1	1%
York Bike Belles	Green Exercise	1	1%
Recycling Unlimited	Crafting - Woodwork	1	1%
TCV Hull & Humber	Conservation	1	1%
Groundwork Hull	Crafting	1	1%
Friends of Alderman Kneeshaw Park	Gardening, Food Growing, Crafting, Helping set up Santa event in the park	1	1%
Tigers Trust - Walking Football	Sport Aligned GSP	1	1%
No organisation or N/A	Green Exercise	1	1%
Age UK & North Yorkshire County Council	Confidence Building	1	1%
North Yorkshire Sport	Green Exercise	1	1%