Nature-based social prescribing for connectedness and mental well-being:

A scoping review of the prevalence, nature and effectiveness of green and blue referral in the UK and Wales

A Report

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Introduction & background

Social prescribing is defined in Wales as 'connecting citizens to community support to better manage their health and wellbeing' (Rees et al, 2019; WG, 2022), although various models and definitions of social prescribing exist (Kimberlee, 2015; SCIE, 2020). Wales has developed a cross-sectional model of social prescribing that is integrated with existing community and statutory services (Public Health Wales, 2018; Wallace et al., 2021) and which uses holistic and person-centred methods (Pringle & Jesurasa, 2022) to help empower individuals to recognise their own needs and strengths, and to connect with their communities for support with their health and well-being (Welsh Government, 2022).

In 2019, a 2-year realist evaluation research project was undertaken by Wrexham Glyndwr University (WGU), in partnership with the University of South Wales, Coleg Cambria and third-sector organisations. The project primarily aimed to understand the underpinning theory of how, why, for whom and to what extent the model of social prescribing used in WGU worked (Wallace et al, 2022a,b). A secondary aim of the project was to translate what was learnt for use across the higher- and further education sectors via a replicable model of social prescribing, to enhance student well-being, build resilience, and promote new ways of working and supporting students. WGU received funding from the Higher Education Funding Council of Wales (HEFCW) to build on this previous work (Wallace et al., 2022a, b) to develop a nature-based social prescribing intervention for their students.

The use of nature-based activities and interventions (NBIs) has become increasingly prevalent within social prescribing (Brag & Leck, 2017; Howarth and Lister, 2019; Shanahan et al., 2019). The referral to such activities builds upon the earlier concepts of referral for exercise or diet-based interventions (Patel et al., 2011). NBIs is an umbrella term for interventions that use nature-based organisations to support individuals to become physically and mentally healthier through contact with nature and spending time in natural or semi-natural environments (Newstead et al., 2023). NBIs Include interventions such as green referral, blue referral, care farming, therapeutic horticulture and ecotherapy. NBIs include activities that fall under the umbrella of 'green referral' (Newstead et al., 2023) such as conservation activities, nature walks, gardening & therapeutic horticulture, and care farming (taking part in normal farming practices for health, socialisation and education) (Husk et al., 2018; Robinson et al., 2020). NBIS also include activities such as surfing, swimming or kayaking (Hope et al., 2022; Gibbs et al 2022; Wilkie et al., 2022) that fall under the umbrella of 'blue referral' (Newstead et al., 2023). Evidence suggests that NBIs provide a means to engage different populations to benefit social and community cohesion (Gonzalez et al, 2010), reduce inflammation (Van den Bosch and Bird, 2019) and can result in significant positive mental and physical health benefits (Bakolis et al, 2018; Li, 2009; McEwan et al., 2019; Sarris et al., 2019; White et al., 2019).

This project aims to evaluate green referral pathways and identify student priorities and how universities can utilise nature-based assets, both on campus and in the community, to improve the mental well-being and social connectedness of a broad demographic of students. This scoping review forms one element of the mixed methods approach used for the project. The scoping review aims to explore the prevalence, nature and effectiveness of nature-based social prescribing interventions in the peer-reviewed literature of the UK and grey literature of Wales.

Method

A scoping review of peer-reviewed journal articles and grey literature that described nature-based interventions in Wales was conducted. A scoping review provides a means to systematically map, report and discuss the characteristics/concepts within a body of literature (Munn et al., 2018), without assessing the quality of the included studies (Arksey & O'Malley, 2005). The scoping process incorporates a comprehensive search for information, guided by an a priori protocol (Peters et al., 2015), and structured reinterpretation of the literature (Davis et al., 2009; Levac et al., 2010; Peters et al., 2015). As is common with scoping reviews, the scoping process was iterative and required reflexive engagement as familiarity and an appreciation of the breadth of material were gained (Peters et al., 2015).

The protocol for the scoping review was based on the methodological framework proposed by Arksey & O'Malley (2005), which employs a five-stage process (outlined below).

Protocol

Stage 1: Identifying the research question.

Our research question was: "What does the literature say about the prevalence, nature and effectiveness of nature-based social prescribing interventions in the UK and Wales?"

Stage 2: Identification of relevant studies.

Peer-reviewed literature was identified by searching 6 electronic databases for a list of 25 terms that had been identified as relevant to nature-based social prescribing interventions by members of the WSPRN and WSSPR steering group. Welsh grey literature was sourced from web searches, using a list of seven search terms and via a request for literature through the WSSPR network (Table 1). A smaller list was used for the Google searches due to the similarity to multiple terms and the broad scope of a Google search, which would result in a high number of duplicate results.

Searches were conducted between 22/02/2023 and 11/07/2023 and were restricted by date (post-2018), language (English only) and location (UK-peer, Wales-grey). For peer-reviewed literature, the location was set as the UK instead of Wales due to the absence of a Wales filter on some of the databases and the known prevalence of UK peer-reviewed research on nature-based social prescribing interventions. The types of documents deemed eligible for inclusion were peer-reviewed articles in academic journals including case studies, reviews, evaluations and experiments. The types of documents deemed eligible for grey literature inclusion were guidance, reports, website articles, government documents, blog posts, and evaluations.

To further increase our information capture, snowball searches were conducted on all items deemed relevant. Items accepted for inclusions were searched for citations relating to our search, which were then subsequently sourced and examined.

Table 1. Search terms and literature sources

Electronic databases	CINAHL
	Medline
	PscyhInfo (ProQuest)
	Scopus
	Social Science Database
	Social Science Open Access Repository
Search string/terms	"green prescribing" OR "green prescription" OR "green referral" OR "green gyms" OR "green care" OR "green health" OR "blue prescribing" OR "blue prescription" OR "blue referral" OR "blue gyms" OR "blue care" OR "care farming" OR "ecotherapy" OR "social farming" OR " therapeutic horticulture" OR "nature-based interventions" OR "nature-based activities" OR "nature-based health" OR "nature-based organisations" OR "nature-based solutions" OR "nature-based groups" OR "nature prescribing" OR "nature prescription" OR "forest therapy" OR "open spaces referral"
Grey literature searches	Google
	Grey literature database 'Open Grey'
	WSSPR network request
Search string/terms	"green prescribing Wales", "blue prescribing Wales", "care farming Wales", "ecotherapy Wales", "nature-based interventions Wales", "therapeutic horticulture Wales" and "open spaces referral Wales".

Stage 3: Selection of studies/literature

The selection of documentation for analysis and identification of social prescribing-related terminology underwent a two-step eligibility screening process:

Step 1: Titles and abstracts from peer-reviewed literature and the title and overview/foreword from grey literature, were screened to determine if they held relevance to the nature of our review.

Step 2: The text of each document was screened to determine if it held relevance to the nature of our review. As a quality control measure, consensus for inclusion/exclusion following full-text screening was reached by both researchers.

Stage 4: Charting the literature and data

The data from items that were deemed relevant following the full-text screening was input into an Excel database to create a data charting form (by the authors, SN & SR). Where relevant, the data that was collated in the data charting form included: document ID number, reference, source (peer-reviewed/grey literature), a description of the content of the document/articles, the nature of activity/intervention described, a description of the assessed and target populations, method(s) of assessment of efficacy, established efficacy, the UK nation that produced the literature or the activity/intervention described within it.

Stage 5: Collating, summarising, and reporting the results

The number of documents and articles were summarised by source (peer-reviewed and grey literature) and the nation of the UK in which described activities/interventions/research took place, the nature of the research or interventions described within them, and the target population for the activities/interventions described. Additionally, the benefits of the activities/interventions/research that were described and the identified barriers, challenges, and enablers to effective implementation of NBIs, and the methods used to establish outcomes and efficacy were listed. Charting the information from the articles identified in our research allowed us to present a basic numerical analysis of the information collated, as well as a narrative of our findings.

Findings

The full text of 490 articles and documents were screened, and data was charted from 53 articles and documents: 19 Welsh grey literature documents/articles and 34 peer-reviewed articles from across the UK (Figure 1). An overview of all documents and articles examined can be found in Appendices, Table 1. The location of the activity/intervention or research described within the peer-reviewed articles is as follows: England = 16, Scotland = 5, England & Scotland = 1, Wales = 4, UK-wide = 8. There were no articles from Northern Ireland.
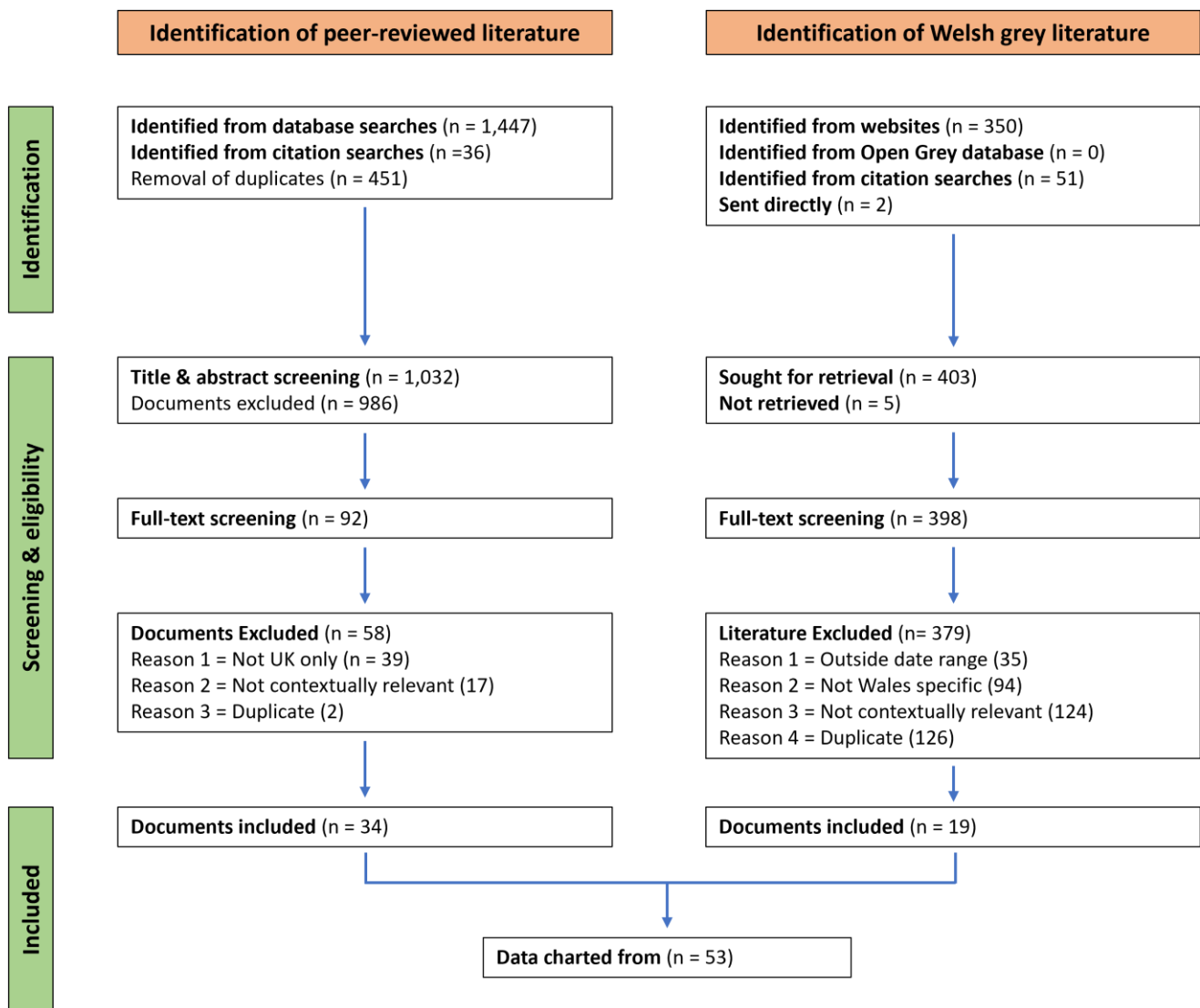
Identification of peer-reviewed literature

Identified from database searches (n = 1,447)
Identified from citation searches (n = 36)
Removal of duplicates (n = 451)

Title & abstract screening (n = 1,032)
Documents excluded (n = 986)

Full-text screening (n = 92)

Documents Excluded (n = 58)
Reason 1 = Not UK only (n = 39)
Reason 2 = Not contextually relevant (17)
Reason 3 = Duplicate (2)

Documents included (n = 34)

Identification of Welsh grey literature

Identified from websites (n = 350)
Identified from Open Grey database (n = 0)
Identified from citation searches (n = 51)
Sent directly (n = 2)

Sought for retrieval (n = 403)
Not retrieved (n = 5)

Full-text screening (n = 398)

Literature Excluded (n= 379)
Reason 1 = Outside date range (35)
Reason 2 = Not Wales specific (94)
Reason 3 = Not contextually relevant (124)
Reason 4 = Duplicate (126)

Documents included (n = 19)

Data charted from (n = 53)

Identification

Screening & eligibility

Included

Figure 1. Scoping review PRISMA flow diagram

Nature of described activity, intervention or research & the target population

Articles were charted by the nature of the intervention, activity or research described within them (Table 2). These could be divided into two categories of nature-based intervention, green referral and blue referral. The greatest proportion of documents and articles related to green referral. The largest proportion of documents/articles relating to green referral were those that explored the views and/or pathways associated with green referral activities. The most reported specific nature-based interventions related to woodland and horticulture-based activities, some of which also incorporated creative and/or meditative activities.

Table 2. Nature of intervention/activity/research described and literature sources

Nature of intervention/activity	Peer-reviewed literature	Welsh grey literature	Total
Green referral			
Woodland (e.g., bushcraft, conservation, campfires, creative, meditation)	5	3	8
Horticulture (e.g., design & creation of green spaces, gardening, creative)	6	2	8
Farm-based activities	3		3
Walking	3	2	5
Creative (e.g., basket weaving, woodworking, pottery)		2	2
Meditation (e.g., forest bathing, gong sound baths)	1	1	2
Various (e.g., describes a mixture of the above activities)	3	4	7
General (e.g., explores views and/or pathways relating to "green" activities)	9	3	13
Blue referral			
Surfing	2		2
Swimming		1	1
Wetland	1		1
General (e.g., explores views and/or pathways relating to "blue" activities)	1		1
Total	**34**	**19**	**53**

Nearly 45% of the documents/articles described interventions, activities or research that were open to all, including vulnerable individuals and individuals with defined needs (Table 3). The greatest specific representations of target audience were found in articles and documents in which the interventions, activities or research were aimed at adults with mental health issues, and vulnerable and disadvantaged adults, young people and children. Only two articles described research in which the activities, walking (Boyde, 2022) and meditation (Owens & Bunce, 2022), were aimed specifically at university students.

Table 3. Target population described and literature sources

Target population described	Peer-reviewed literature	Welsh grey literature	Total
All (including vulnerable individuals and individuals with defined needs)	11	13	24
Vulnerable and disadvantaged adults, young people and children (e.g., mental health, addiction, neurodivergence & behavioural problems)	4	2	6
Adults with mental health issues (e.g., depression, anxiety, psychosis)	7	1	8
Adults with long-term health conditions	2		2
Neurological problems (e.g., dementia, acquired brain injury & spinal issues)	4	1	5
Institutional (i.e., rehabilitation, recovery and residential full-time care)	2		2
Children and/or young people		2	2
University students	2		2
Older adults	2		2
Total	**34**	**19**	**53**

The nature of the interventions, activities or research and the target population described within the articles/documents were then cross-referenced (Appendices, Table 2). Results revealed that the highest concentrations of articles were found to describe:

- A general exploration of the views and/or pathways relating to green referral activities that were open to all (Fixen & Barrett, 2022; McHale et al., 2020; Robinson et al., 2020; West Wales Action for Mental Health & Pembrokeshire Coast National Park Authority, 2017; Pembrokeshire Coast National Park Authority, 2021; He et al., 2022; Coed Lleol, 2023).

- A variety of green referral activities that were open to all (Davies et al, 2022; Pretty & Barton, 2020; Rogerson et al., 2020; The Wildlife Trust Gwent, 2021; Y Dref Werdd, 2023; Wildlife Trust Wales, 2023).

- Woodland-based activities that were open to all (Coed Lleol, 2021; Gittins et al., 2023; McEwen et al., 2021; The Wildlife Trust Montgomeryshire, 2021).

- Horticulture-based activities that were aimed at adults with mental health issues (Cwmbran Life, 2020; Howarth et al., 2018; Thomson et al., 2020; Wood et al., 2022).

- Woodland-based activities that were aimed at vulnerable and disadvantaged adults, young people and children (O'Brien, 2018; Davies et al., 2020; Coed Lleol, 2022).

Duration of interventions or activities

Only some of the documents and articles that described specific activities and interventions provided details on the duration of these. The provision of this information was most commonly found within articles that described:

- Woodland- and horticulture-based activities, with programmes generally running 2-4 hour sessions/week for a duration of 10-12 weeks.
- Walking groups or activities, with programmes generally running for a duration of 10-12 weeks, although the frequency and duration of those varied.
- Water-based activities, with programmes generally running 2-hour sessions/week for a duration of 5-6 weeks.

Methods used to establish efficacy and gain insight

A variety of methods were used to establish efficacy, the general success of projects, and gain insight into the various opinions of professionals and attendees. These included:

- Warwick–Edinburgh mental wellbeing scale
- Mental Well-Being Impact Assessment (MWIA)
- Questionnaire on the Process of Recovery
- NHS Friends and Family Test
- World Health Organization Well-Being Index
- Wellbeing Check Cards.
- Visual analogue scales
- Resting heart rate variability
- Digital trackers
- Focus groups and semi-structured interviews
- Observations and informal feedback
- Questionnaires (general/not validated) and self-report

The most frequently reported validated measures that were used were the full and short forms of the Warwick Edinburgh Mental Wellbeing Scale.

Barriers, challengers and enablers

Various barriers, challenges and enablers to successful implementation and delivery of NBIs were identified from the literature, of which the barriers and challenges could effectively be grouped into four subcategories (Table 4). Additionally, 21 documents provided details of additional professional and/or voluntary support for activities, of which several highlighted the importance of this support for the success of the project, retention of attendance and improvements in outcomes measures for the attendees. Additional professional and/or voluntary support for activities included:

- Youth, community and project support workers (O'Brien, 2018; Coed Lleol, 2023; Wood et al., 2022).
- Mental health support staff and qualified therapists (Chiumento et al., 2018; Cuthbert et al., 2021; Gardiner et al., 2022; Wood et al., 2022).

- Horticulturists and farmers (Chiumento et al., 2018; Horatios Garden, 2023; Howarth et al., 2021; Murray et al., 2019; Russel et al., 2021; Thomson et al., 2020).

- Artists (Gordon, 2022; Thomson et al., 2020; Wallace et al., 2023).

- Qualified outdoor activity specialists (Hope et al., 2022; Gibbs et al., 2022; Welsh Government, 2018; Wilkie et al., 2022).

- Voluntary support (Horatios Garden, 2023; Irvine et al., 2020, 2022; O'Brien, 2018; Thomson et al., 2020).

- Peer support (Gordon, 2022; Smyth et al., 2022)

Table 4. Barriers/challenges and enablers described

Barriers/challenges

Primary health care
Lack of GP awareness of the concept of NBIs &/or knowledge of the NBIs available
Difficult for NBIs to effectively engage with GPs and other primary care professionals
Promotion of cross-disciplinary communication pathways
Lack of GP time for in-depth informed discussions with patients regarding the benefits of NBIs
Lack of sufficient &/or suitable human resources within surgeries to provide an effective referral route

Design & Implementation of NBIs
A lack of effective engagement methods to understand and respond to the diversity of local needs
Problems identifying knowing what form NBIs should take once funding/access is granted
Sustainability of funding

Those who deliver NBIs
Difficulties translating intentions of NBIs into practice
Difficulties fitting NBIs commitments around existing work

Attendees of NBIs
Psychological and practical obstacles (e.g., health anxieties, mobility issues, child care and chronic ill health)
Challenges associated with travel for attendance (e.g., logistical, cost, anxiety)
Socio-economic disadvantage

Enablers

Multi-sectoral coordination
Development of coordinator roles as professional funded roles (rather than as voluntary positions)
Suitable training for those who deliver NBIs
Support structure for those who deliver NBIs
Access to suitable facilities for those who deliver the NBIs
Organised travel to/from the site (for attendees & those who deliver NBIs)
Effective advertising of NBIs
Activity/intervention supported by trained specialists (e.g., youth workers, psychotherapists, mental health support workers)

Conclusion

The scoping review aimed to explore the prevalence, nature and effectiveness of nature-based social prescribing interventions in the peer-reviewed literature of the UK and grey literature of Wales. The scoping process provided a means to systematically search the literature and then collate and present the information found within that literature (Davis et al., 2009; Levac et al., 2010; Peters et al., 2015). A mixture of documents and articles were examined and from the examination of their content several conclusions can be made:

- The number of contemporary peer-reviewed articles describing research into the efficacy of specific NBIs is relatively small. The greatest concentration was found in articles that described woodland- and horticulture-based activities or which explored the views and/or pathways relating to 'green' activities and were either open to all or targeted individuals with mental health issues or vulnerable and disadvantaged adults, young people and children.
- Green referral activities can effectively incorporate aspects of creativity and/or meditation.
- Both green and blue referral activities seem to offer numerous benefits for physical, psychological, and social well-being, although the success of the activity may depend on the use of specialist support, particularly for vulnerable individuals and those with mental health issues.
- There are several barriers and challenges to overcome to ensure effective implementation and delivery of the activities, the longevity of the service on offer and to maintain attendance. The use of digital trackers or apps appears to be effective for activities such as walking, and the provision of transport appears to help reduce barriers to engagement.

There are however several limitations to the scoping process that need to be considered when making conclusions based on the findings. The scoping process does not assess the quality of the included studies (Arksey & O'Malley, 2005). Many of the peer-reviewed articles appeared to have limitations to their research, such as small sample size, and much of the grey literature did not provide details on aspects such as the size of the population on which their conclusions or statements were made. Additionally, in both the peer-reviewed and grey literature a variety of methods were used to establish efficacy and record the outcomes from activities. These included some validated measures but also included more informal methods, such as observation.

As with any review, what is desired needs to be balanced with what is feasible within a given timeframe. The restrictions placed on the search and the timeframe within which they were conducted means that potentially useful documents may not have been included. For example, one article was recently published that is not included in the results, which indicates that there may be a positive social return on investment for walking programmes (Makanjoual et al., 2023) and several potentially useful reviews were not included due to their date of publication of the global nature of the research contained within them (e.g., Alejandre et al., 2022; Britton et al 2022; Johansson et al., 2022).

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Appendices

Table 1. Overview of all documents and articles from which was data was charted

			Green referral			
Reference	**Nature of intervention/activity described**	**Supported by**	**Duration**	**Target populations**	**Location**	**Established efficacy**
Gittins et al., (2023) P	**Woodland** Activities include bushcraft, woodland walks & gym, conservation, campfire cooking, foraging and mindfulness.		Programme: 4-12 weeks Sessions: 2-4 hours	All	Wales	Mixed methods evaluation NBIs can broaden access to woodlands by attracting atypical users, breaking down barriers to use, and increasing knowledge, awareness and perceived value of them.
O'Brien. (2018) P	**Woodland, Creative** Activities include woodland management and maintenance, creative and sensory activities, and social activities – cooking & eating food together.	Youth and community workers. Volunteers	5 hours per week/fortnight	Vulnerable and disadvantaged adults, young people and children: including mental health, addiction, autism and behavioural problems.	England	Mixed methods evaluation Range of well-being benefits via three engagement types: (1) social, (2) woodland craft, and (3) creative and sensory. Flexibility & adaptability of NBI programmes can meet the needs of & provide meaningful engagement for individuals with mental health, addiction, autism & behavioural problems. Small groups can provide an immersive experience that encourages an emotional affinity with nature.
Cuthbert yet al., (2021) P	**Woodland** Various group activities: short walks, refreshments, contemplative time and activities such as learning about plants and habitats, maintaining the woodland area and cooking.	Early Incident of Psychosis staff	10 week intervention 0.5 days/week	Adults with mental health issues: 18- to 30-year-olds who had experienced a first episode of psychosis	England	Mixed methods evaluation Improved group attendance over time Improvement on recovery outcome measures sense of well-being and 'peacefulness' and new perspectives on psychotic experiences. increased insight and contextualisation of difficulties, alongside distraction from problematic symptoms.
Davies et al., (2020) P	**Woodland** Group-based sustainable construction to improve mental health and social connectedness		8 weeks 1 day/week	Vulnerable and disadvantaged adults, young people and children	Wales	Quantitative Statistically and clinically significant improvements in depression, anxiety, resilience and social connection, compared to baseline. Significant mental health and social benefits to a range of vulnerable and hard-to-reach groups.
Coed Lleol (2021) G	**Woodland** National & local Zoom sessions, taster sessions; walking groups, woodland sessions			All	Wales	Mixed methods increased well-being, physical activity, and happiness Improvements across the 5-ways to wellbeing.
Coed Lleol (2022) G	**Woodland** Woodland wellbeing sessions			Vulnerable and disadvantaged adults,	Wales	Consultation for improvements more community groups and activities (39%), concern for local environmental issues (53%), desire for local change (76%), and

				young people and children		suggestions and Coed Lleol should offer different activities (26%), work with more people (14%) and form partnerships
The Wildlife Trust Montgomeryshire. (2021) G	**Woodland, Ecotherapy** Multiple projects mentioned that include activities such as: foraging, cooking over an open fire and pruning fruit trees, reserve maintenance		12-week ecotherapy programme	All	Wales	Participant feedback Quotes provided describe well-being and social benefits from taking part in the programme as well as enjoyment of the sessions
McEwen et al., (2021) P	**Woodland, Meditation** Forest bathing including guided discovery and mindful appreciation of woodland, seated self-guided mindfulness, sharing circles		1 session, 2-3 hours	All	England	Mixed methods, between subjects No significant difference in HRV or questionnaire scores. Equivalent performance to compassionate mind training control condition.
Chiumento et al., (2018) P	**Horticulture, Creative.** School-based social and therapeutic horticulture - Design of a green space.	Horticulturists Child and Adolescent Mental Health Service (CAMHS) psychotherapist.	Monthly session 6 months, 2 hrs/session	Vulnerable and disadvantaged young people and children: 9–15 years experiencing behavioural, emotional and social difficulties	England	Mixed Methods Improved mental well-being Increased pro-social behaviour, such as "feeling involved", "having a valued role", "sense of belonging" and "social networks and relationships".
Thomson et al., (2020) P	**Horticulture, Creative.** Outdoor horticultural activities and indoor nature-based creative activities	Horticultural specialist Art tutor Museum volunteer	10 weeks 2 hours/week	Adults with mental health issues	England	Mixed Methods Increased psychological well-being, improved self-esteem, decreased social isolation and the formation of communities of practice. Combined arts- and nature-based activities have synergistic benefits that can positively impact on the psychosocial well-being of adult mental health service users.
Horatios Garden (2023) G	**Horticulture, Creative** Group and 1:1 horticultural therapy workshops & creative workshops within the garden.	Head gardener Volunteers		Neurological problems: Spinal health care patients	Wales	Not evaluated Designed to complement the clinical care of the spinal centre and support physical and psychological rehabilitation. Quotes by service users indicate it is tranquil & uplifting:
Howarth et al., (2021) P	**Horticulture, Creative.** Therapeutic horticulture - Design and construction of a social prescribing green space.	Well-being volunteers RHS's Therapeutic horticulturalist.		Adults with long-term health conditions	England	Qualitative improved social connectivity, sense of well-being and purpose. The WB Programme offered space to grow, heal and reconnect. Participants felt they were 'part of something larger' which enabled 'transformation of their health and wellbeing'. transformative impact on individuals.
Cwmbran Life. (2020) G	**Horticulture, Creative** Growing Space that provides a community garden and orchard as well as offering woodworking and cookery classes.			Adults with mental health issues	Wales	Not evaluated Quotes by service users indicate that it provides structure and a sense of purpose and reduces social isolation.
Wood et al., (2022) P	**Horticulture.** Therapeutic community gardening.	Horticultural project workers		Adults with mental health issues	England	Qualitative

Author	Intervention	Facilitator	Duration/Group	Population	Country	Methods/Findings
	Uses garden space and gardening activities, such as sowing seeds, potting, and general garden maintenance. to help people improve their mental health, build social skills, and develop confidence.	General public volunteers Qualified therapist or Mental health support worker.				Provides participants with a distraction from mental illness, an opportunity to let off steam & helps them connect with nature. Builds confidence, social and practical skills, & provides a sense of worth, purpose and belonging. Helped people understand more about their mental health, and develop self-management strategies and resilience.
Howarth et al., (2018) P	**Horticulture.** Social and therapeutic horticulture. A range of green activities, such as gardening, to promote well-being & mental health recovery			Adults with mental health issues	England	Mixed Methods Enabled integration into the community by providing a space to grow & building self-confidence while re-engaging with society. Working towards self-reliance.
Smyth et al., (2022) P	**Horticulture/Green Gyms** Attendees complete a range of practical activities, such as planting trees, managing wildflowers, and community growing or path improvements, with nature connection activities, such as learning about species or habitats.	Peer support		All	UK-wide	Quantitative Sustained increases in well-being shown for continued engagement. Attendees who did not continue to engage tended to be less deprived and younger. Acquisition of new skills, knowledge and confidence, and social connections.
Aldridge. (2023) P	**Ecotherapy - Farm-based.** Uses transactional analysis (TA) to provide structure, recognition, and stimulation, while growing food for the local community.			Adults with mental health issues	England	Observational Case Study Connection of participants to themselves enhances autonomy and well-being. Persisting in a shared endeavour that ultimately leads to a harvest can be a radical act for someone who feels disorganized, distressed, and insecure.
Murray et al., (2019) P	**Social Farming** Part of a commercial farm or agricultural landscape, used to promote mental and physical health through normal farming activities and other work (such as meal preparation, camping, tractor driving).	Farmer/supervisor		Institutional: offenders	England	Qualitative Appears to aid personal growth through meaningful, motivating, stimulating and calming interactions that enable offenders to see beyond their own needs and develop new skills. These changes appear to be the precursors to personal development & changing behaviours.
Russel et al., (2021) P	**Social Crofting** A type of care farming that belongs to 'a grey zone occupied by agriculture, social, education and health sectors' and requires a transdisciplinary approach. No examples of activities described.	Crofters		All	Scotland	Qualitative Improved quality of life for, and connection to self, food, nature community.
Boyde (2022) P	**Walking** The mobile phone app called 'Shmapped' functioned as an intervention and a research tool for data collection.		A group walk at the beginning of the week followed by a solo walk at the weekend.	University students	England	Mixed Methods Results indicate a need for a whole university approach that considers intervention and campus design simultaneously. There was a strong desire for shelter from the city to have 'wild' spaces and the acute awareness of the Sheffield street tree issues
Irvine et al., (2020) P	**Walking** Short, safe, social, local, low-level, led walk using an activity tracker.	Run by third-sector or community agencies Locally based, trained volunteer walk leaders	12 weeks Less than an hour/walk	Older adults	Scotland	Mixed Methods By week 12, all participants met national physical activity guidelines. Activity trackers enhanced the recruitment of older adults, aided in motivation and retention, and allowed for the quantification of physical activity, corroborating self-report.

						Improvements in sleep, energy, focus, joy & calmness.
Irvine et al., (2022) P	**Walking** Short, safe, social, local, low-level, led walk using an activity tracker.	Run by third-sector or community agencies Locally based, trained volunteer walk leaders	12 weeks Less than an hour/walk	Older adults	Scotland	Mixed Methods Reduced feelings of isolation and loneliness isolation and loneliness. Develops and strengthens relationships, a sense of belonging, and empathy for others - fosters casual interpersonal interactions through spontaneous mixing during and after the walk
Cardiff University (2021) G	**Walking** Community-developed nature trail in the Cynon Valley, serving the local community. Uses an online tool to measure the well-being of individuals engaging with the trail.			All	Wales	Not Evaluated Aims to promote improved well-being and long-term health outcomes.
Welsh Government (2018) G	**Walking** Including the following activities: Mindfulness; History and Place Names of the area; Biodiversity; Geology and Geography; Inspiration and the Arts. Introduction to map work, the importance of eating correctly and drinking, and mountain safety.	Mountain leaders Walks would be presented by Cwm Idwal Partnership Officer.	10 weeks 1 walk/week	Vulnerable and disadvantaged adults, young people and children: Individuals with physical health, mental health, and social challenges. Referral from the health service	Wales	Not Evaluated
Gordon (2022) G	**Creative** A community-developed sculpture space that includes opportunities for: Art classes & local artists, addressing discrimination and disadvantage, producing creativity that is grounded in the locality and the Welsh language.	Artist Peer mentor		All	Wales	Not Evaluated Aims to get people outdoors and being creative.
Wallace et al., (2023) G	**Creative** Nature-based activities taking a holistic and community-based approach to promote "social and personal regeneration" by practising traditional crafts in natural habitats. Activities could include basket weaving, woodworking, pottery etc	Makers/artists		All Three interventions: Young people General public Those suffering from work-based stress (particularly NHS)	Wales	Qualitative Participants described skill development, and reconnection with themselves, with nature and with their communities.
Owens & Bunce (2022) P	**Meditation** Nature-based meditation, accompanied by a specially designed audio file to be listened to independently via a portable device.			University students	England	Mixed Methods Decreased depressive rumination and depressive symptoms Improved well-being.
GNAW. (2023) G	**Meditation** gong sound bath, group walking, forest bathing, group singing			All	Wales	Not Evaluated Participant feedback indicates a positive experience with forest bathing and gong sound bathing including experiencing relaxation and helping with ADHD symptoms, help with sleep and anxiety.

Evans et al., (2022) P	**Various** Various NBIs and activities including farm-based ecotherapy and care farms.	Neurological problems: People living with dementia	UK-wide	Qualitative improved mood, social connection and mental well-being for participants with dementia and family carers. Increased levels of physical activity, feelings of connection with natures and independence and a reinforced sense of identity.
Pretty & Barton (2020) P	**Various** Assesses four nature-based and mind–body interventions (NBIs and MBIs) programmes: woodland therapy, therapeutic horticulture, ecotherapy/green care, and tai chi.	All: Including individuals with mental health issues and learning and physical needs.	England	Mixed Methods Improved life satisfaction and happiness that helped offset negative events and stressors. UK population average, particularly for the three NBIs, shows that the less well and happy are able to benefit. Positive SROI -avoided costs on public health and other services, increased life satisfaction/happiness, preventative costs.
Rogerson et al., (2020) P	**Various** Woodland conservation & crafts and ecotherapy, horticulture, walking, meditation.	All: Including vulnerable individuals and individuals with defined needs.	UK-wide	Quantitative Lower starting well-being exhibited greatest improvements. Improvements did not significantly differ between age groups, but the oldest age category did report the greatest well-being improvement.
The Wildlife Trust Gwent. (2021) G	**Various** Activities include: geocaching, litter picking, invasive species removal, wildlife walks and bushcraft.	All	Wales	Informal Feedback Increased understanding and appreciation of wildlife Improvement to their health and wellbeing.
Y Dref Werdd. (2023) G	**Various** Activities include: nature walks, natural arts and crafts, mindfulness, wild cooking, poetry in the woods, farm visits, pilates, Tai Chi, and hiking.	All	Wales	No Evaluation
Wildlife Trusts Wales. (2023) G	**Various** Volunteering, workdays and recreational activities at nature reserves, local green & wild spaces.	All	Wales	No Evaluation Participants reported increased physical activity and improved mental well-being
Davies et al (2022) G	**Various** Evaluation of a pilot of NBI delivery model.	All	Wales	Mixed Methods Pilot increased awareness of NBIs among professionals. Willingness of providers to be involved Improved well-being The coordinator role appeared to work well Barriers & challanges: Lack of knowledge of the NBIs available Lack of GP time for in-depth informed discussions with patients Lack of sufficient and/or suitable human resources within surgeries to provide an effective prescribing route

				Coordinator roles need to be developed as a professional role rather than voluntary.
Fixen & Barrett (2022) P	**General** Examines the challenges and opportunities of delivering green social prescribing (various and not described in detail) during and in the aftermath of COVID-19	All	Scotland & England	Qualitative Alleviation of some of the negative mental health effects compounded by the pandemic. Psychological and practical obstacles, including health anxieties, mobility issues, and transport deficits. Social disadvantage, chronic ill health and health crises all limit easy access to green and blue spaces
Marx & More. (2022) P	**General** Outlines the development of a Green Health Prescription pathway designed to link patients with appropriate nature-based interventions and to support attendance.	Adults with long-term conditions.	Scotland	Qualitative Aims: Connect patients with appropriate interventions based on their physical and mental health needs, Ensure pathway is accessible for all service-users and healthcare professionals and there is a smooth transition between services. Can support: Low level MH issues, addiction, recovering or chronic health conditions, neurodivergence, dementia, mobility issues, or vision impairments. Barriers: Sustainability of funding,
Masterton et al., (2022) P	**General** Examination of proposed framework to show how greenspace programmes could support people with problem substance use.	Vulnerable and disadvantaged adults, young people and children: People with problem substance use and poor mental health	UK-wide	Mixed Methods Findings indicated that greenspace programmes support individuals by providing: feelings of escape; space to reflect; physical activity; self-efficacy; feelings of purpose; relationships; and shared experiences. Barriers: Adequate support for clients; funding, stakeholder buy-in; and the impact of COVID-19.
McHale et al., (2020) P	**General** Explores the views and experiences of a range of professionals involved in the establishment of green health partnerships.	All	Scotland	Qualitative Interventions require embedding into core planning for all sectors to ensure integration into non-medical prescribing models. Barriers & challenges: Sustainability of funding, clear referral pathways, NHS culture change, addressing equity, clear marketing of green health interventions, volunteering capacity, workforce development and monitoring and evaluation of activity.
Robinson et al., (2020) P	**General** Spatial analyses & exploration of awareness, constraints and opportunities associated with green prescribing.	All	UK-wide	Quantitative Barriers & challenges: A shortfall of funding and time, and a (perceived) lack of GP awareness of the green prescribing concept, difficulties (NBIs) engaging with GPs and other primary care professionals, a need to promote cross-disciplinary communication pathways. Higher levels of green prescribing provision associated with NBI presence & greenspace proximity to GP surgeries.

Lower levels of deprivation were associated with a higher frequency of NBIs.

Reference	Description	Population	Location	Evaluation
West Wales Action for Mental Health & Pembrokeshire Coast National Park Authority. (2017) G	**General** Newsletter disseminating the impact of projects associated with network. Activities included: Woodland crafts & ecotherapy, and walking.	All	Wales	No Evaluation Network offers peer support and guidance and is a platform to share and learn. Described projects appear to be well-received by participants. Funding issues for project longevity highlighted. Challenges with travel for attendance highlighted as barrier to engagement.
Pembrokeshire Coast National Park Authority. (2021) G	**General** Health & well-being action plan. Supported walking opportunities, volunteering, outdoor learning	All	Wales	No Evaluation Aims to promote physical and mental well-being and address social isolation. Barriers to engagement: Physical disability, rural and child poverty and socio-economic disadvantage
Moeller et al., (2018) P	**General** Review of literature on nature-based interventions that could be conducted in institutional settings where people reside full-time for care or rehabilitation purposes. NBIs include: Gardening and horticulture-based therapies, animal-assisted therapies, care farming	Institutional: settings where people reside full-time for care or rehabilitation purposes.	UK-wide	Qualitative Different intervention types were more popular in different institutional setting and with particular groups: Care farms: structured, work-based format particularly suited to individuals with occupational needs, such as re-entry into paid work and overcoming drug and alcohol addiction. Therapeutic horticulture: useful therapeutic modality for interventions that aim for general improvements in wellbeing, often used in residential care settings. Animal-assisted therapy: particularly popular in prison settings, well suited to the context and desired outcomes– such as taking responsibility for an animal's wellbeing, and learning how to care for and train them.
He et al., (2022) P	**General** Reports on challenges and enablers in implementing NBIs	All	England	Mixed Methods Identified eight categories of challenges faced by multiple sectors in implementing community-led NBIs: perception and knowledge, political, financial, access to natural spaces, engagement, institutional and organisational, coordination, GP and service referral Multi-sectoral coordination is essential for implementing community-led NBI projects. Problems knowing what form NBIs should take once access is granted. A lack of effective engagement methods to understand and respond to the diversity of local needs.
Bray et al., (2022) P	**General** Examines enablers and challenges to implementing NBIs for people living with dementia	Neurological problems: People living with dementia	UK-wide	Mixed Methods Those delivering NBIs require a suitable training, a stable support structure, transport and access to suitable facilities. Barriers & challenges: advertising, translating intentions into practice, fitted NBIs with existing work
Hinde et al., (2021) P	**General**	Adults with mental health issues	UK-wide	Qualitative

Reference	Nature of intervention/activity described	Supported by	Duration	Target populations	Location	Established efficacy
	Explores the capacity for ecotherapy to be cost-effective as a healthcare intervention.					Ecotherapy offers participants opportunities to develop skills and the confidence to self-manage their health, with increased physical activity evident Increased programme. An absence of evidence about long-term mental and physical health benefits. Nature-based interventions such as ecotherapy also confer potential social and wider returns on investment, strengthening the case for further research to better inform robust commissioning.
Woodcock (2017) G	**General** Discusses the impact the Wild Coasts project could expect to have on the lives of the young people and their communities.			Young people	Wales	No Evaluation Provides evidence in favour of the impact of NBIs on wellbeing: increased attainment and skill building; empowerment and social equity; increased attractiveness and accessibility of green space; improved physical and mental health; positive emotion; sense of belonging; sense of purpose. It also identified a number of factors that could influence project outcomes: biodiversity; immersion; activity type; relationship building; values development; motivators and activity design.
Coed Lleol. (2023) G	**General** Describes the Outdoor Health Project - a Welsh gov funding project to increase NBI referrals.	Delivered by qualified and trained outdoor professionals who specialise in supporting people with their wellbeing.	Six weeks	All	Wales	No Evaluation Activities are adapted to support the needs of the participants. programmes are based with established providers in local communities to enable participants to continue with activities if they wish once their initial programme has finished.

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Blue referral

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Reference	Nature of intervention/activity described	Supported by	Duration	Target populations	Location	Established efficacy
Maund (2019) P	**Wetland** Wetland centre activities including bird watching, guided walks and canoeing.	Wetland staff	6 weeks 2hrs/week	Adults with mental health issues: Individuals with anxiety and/or depression	England	Mixed Methods Significant improvements in mental health across a range of indicators, including mental well-being, anxiety, stress and emotional well-being. Improved physical health and reduced social isolation. Travelling as a group via minibus relieved anxiety many would experience when going somewhere new.
Hope et al., (2022) P	**General outdoor water-based activities.** Kayaking, coasteering, SUP, sea swimming, ocean skiing, surfing, lifeguard courses	Outdoor water-based practitioners		All	England	Not Evaluated Potential to support varied aspects of health and wellbeing. A 'blue care skillset' is integral to the delivery of 'safe' (physically, socially and emotionally) blue prescriptions. Use of different aquatic environments is important to bring water awareness into the body, gradually build water confidence among participants, and ensure that the choice to tackle more challenging situations rests with the participating individual.
Wilkie et al., (2022) P	**Surfing**	Community-based third-sector surfing organisation	Five weeks Weekly two-hour sessions	Neurological problems: Individuals	Wales	Mixed Methods Improved mental well-being, mindfulness, happiness, relationships, community participation and connection to nature.

				with acquired brain injury (ABI)		Reduced anxiety. The physical and psychological experience of a nature-based challenge initiated a mindset shift in participants, which ultimately led to them adopting wellbeing-promoting long-term behaviour changes.
Gibbs et al., (2022) P	Surfing	Outdoor water-based practitioners	Five weeks Weekly two-hour sessions	Neurological problems: Individuals with acquired brain injury (ABI)	Wales	Qualitative Improved connection to nature, meaning and purpose, feelings of trust, safety and positive emotion, ability to manage and accept difficult emotions, and social connection. Immersing ABI survivors in their natural and social ecologies can facilitate a cascade of mechanisms for positive change.
Gardiner et al., (2022) G	Swimming Sea swimming instruction and psychoeducation. Includes a safety briefing, breathing techniques and swimming instruction, a campfire and hot chocolate, as well as therapeutic conversations regarding the Take 5 Steps to Wellbeing approach.	Mental health practitioners	Six x two-hour sessions	Children & young people (and parents)	England	Mixed Methods Improved confidence, sense of achievement, and social and emotional well-being. Parents reported that attending the group improved their relationship with their child

Table 2. Nature of intervention/activity/research by target population described

Nature of intervention/activity/research described and literature sources

Target population described	Green referral								Blue referral				Total
	Woodland	Horticulture	Farm-based activities	Walking	Creative	Meditation	Various	General	Surfing	Swimming	Wetland	General	
All	4	1	1	1	2	1	6	7				1	**24**
Vulnerable and disadvantaged adults, young people and children	3	1		1				1					**6**
Adults with mental health issues	1	4	1					1			1		**8**
Adults with long-term health conditions		1						1					**2**
Neurological problems		1					1	1	2				**5**

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	Total
Institutional			1					1					**2**
Children and/or young people										1	1		**2**
University students				1		1							**2**
Older adults				2									**2**
Total	**8**	**8**	**3**	**5**	**2**	**2**	**7**	**13**	**2**	**1**	**1**	**1**	