How the natural environment can support health and wellbeing through social prescribing

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About the authors

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Dr Marie Polley is Director of Marie Polley Consultancy Ltd, a biomedical scientist and has a PhD in molecular biology of how cancer develops. Marie also co-founded and co-chairs the Social Prescribing Network, which has led a social movement around the use of non-medical activities to support people’s wider determinants of health and provide additional routes of support to traditional pharmaceutical prescribing. Marie led the team to write the first national guidance for social prescribing, the first economic overview of social prescribing on health service usage and recently mapped all outcomes associated with social prescribing to support discussion on inclusive ways of researching and evaluating this growing field.
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Introduction

It is now well-established that humans have an innate need to experience the natural world [1]. As such, there is a large body of evidence associating nature exposure to several facets of positive physiological and psychological outcomes. However, this association is dependent on a range of socio-demographic factors and there remain some gaps in the literature evidencing causal mechanisms.

This evidence review provides a summary of this literature, with a particular focus on nature-based social prescribing interventions. The evidence presented below is mostly derived from nature exposure (i.e., proximity, access, frequency, and time spent in nature and/or quality of nature) rather than research looking at how people feel about their connection to nature or “nature connectedness”. As the evidence base grows these two areas of research will become more distinct.¹

Outlined below is a brief summary of the benefits of green social prescribing on health and wellbeing, the benefits of the natural environment on populations at greatest risk of health inequalities, and social prescribing pathways and recommendations. In addition, the Rapid Evidence Review methodology that was used to scope, organise and assess the validity of the available literature on this topic is presented. This is followed by a summary of the reliability of this data alongside future recommendations for social prescribing referrals and pathways.

Methodology

- Scoping is defined in this piece of work as exploring a range of evidence sources to populate an understanding of the concepts, boundaries, outcomes, and critical ingredients to achieve defined and emergent outcomes. Our method was therefore guided by our aim to explore information available on websites about real-world projects or services as well as published literature.

- A Rapid Evidence Review approach was used to provide this evidence synthesis. Rapid Evidence Reviews streamline the steps of systematic reviews under an accelerated time frame to produce evidence in a shortened time frame. We searched the Cochrane Library, MEDLINE, PubMed, Google Scholar, and sources of grey literature including Google, greylit.org and opengrey.eu.

- The following terms were used to identify relevant social prescribing literature: (1) social prescri* OR community refer*. Search terms were established using the PICO (population, intervention, control, outcome) method. Only adult populations were included within this review. Interventions included: nature, conservation, natural environment, regeneration, garden, wild, rewild, environment, nature, rural, countryside, outdoor, outside, wood, park, meadow, horticulture, floriculture, botanical, arboretum, allotment, forest, rainforest, moor, dale, marsh, mountain, blue space, beach, river, lake, canal, waterway, wetland, open spaces, protected areas, green, footpath, trail, coast, cliff, dune. Outcomes included wellbeing, general health, mental health, maternal health, cardiovascular disease, type 2 diabetes, obesity, chronic respiratory disease, cancer and hypertension. MeSH terms were used where possible. To keep the review manageable, the searches were limited to the last 5 years only, when the majority of social prescribing publications have been produced.

- For searching in Google, we combined social prescribing OR community referral to get an initial series of hits. Further search terms on physical activity as listed in search 2 above were individually applied to these hits to identify social prescribing related to the natural environment. Where multiple pages were found, up to the first 10 pages were searched.

- Studies included reviews (including scoping reviews, Cochrane reviews, meta-analyses and narrative reviews), cohort studies, longitudinal analyses, analyses of secondary data and grey literature. Studies were included if they explicitly assessed the relationship between the specified outdoor environments alongside one of the identified outcomes, if they pertained to adult populations, and were written in English. All other literature was excluded.

- The first broad search and screening of abstracts was conducted by HS and RM to make a preliminary selection of studies for consideration. Rayyan.ai software was used to organise all sources of information, for screening and
for independent review of each paper. Final selections for inclusion were then made by both authors (HS and RM) when reading the studies in full. Results of the review process were compared, and any discrepancies discussed and resolved.

**Results of the search Strategy**

- A total of 1,108 studies were identified. Sixty-four addressed the relationship between the natural environment and health and wellbeing that met the additional inclusion criteria. Seventeen pertained to natural environments and physical health outcomes including diabetes, obesity, physical decline, aerobic fitness, stroke, adiposity, cardiovascular health, eating disorders, COVID, somatic disease, hypertension and cancer [1-17]. Seventeen studies assessed the relationship between natural environments and mental health and wellbeing outcomes such as affect, eudemonic and hedonic wellbeing, perceived happiness, resilience, stress, depression, anxiety and general mental health [19-34]. Thirty studies assessed the relationship between natural environments and a combination of physical and psychological outcomes [35-64].

- Included literature comprised of cohort studies (n=4) [2,10,16,49], cross sectional studies (n=1) [1], grey literature (n=12) [53-64], an intervention study (n=1) [24], longitudinal studies/secondary data analyses (n=4) [4,18,19,52], meta analyses (n=4) [37,44,45,51], a pilot study (n=1) [20], pre-post evaluation (n=1) [33], qualitative study (n=1) [34], rapid review (n=1) [3], randomised control trial (n=1) [43], narrative reviews (n=7) [8,12,26,36,40,46,50], scoping reviews (n=5) [17,29,30,31,35], survey data (n=4) [21,23,27,47] and systematic reviews (n=14) [5-7,13,15,22,25,28,32,38-40,42,48].

- Longitudinal and secondary analyses were based on data from the Whitehall II online dataset assessing 5,759 participants over 11 years [4], the British Household Panel Survey dataset assessing 65,407 participants over 8 years [19] and the PHENOTYPE project assessing 3,585 participants over one year [52].

- Natural environment interventions included access to local green space (n=6) [10,11,15,16,27,57], blue space such as lakes, canals, wetlands, waterways, rivers and coastal areas (n=7) [1,4,7,31,43,47,48], forests (n=1) [37], gardening (n=3) [17,35,36], green exercise (n=3) [9,56,59], general green space (n=18) [2,3,8,13,19,22,23,28,32,38,39,41,45,49,53-55,64], houseplants (n=1) [21], general ‘nature’ (n=21) [5,6,12,14,18,20,24-26,29,30,40,44,46,50-52,60-63], urban nature (n=1) [58], and wildlands (n=1) [42].

- Note, at review point with this evidence summary three extra grey literature documents were suggested by a panel of expert reviewers [71,72,73]. These documents were not part of the initial search findings due to grey literature not being listed with key search terms. These documents related to overviews of green social prescribing evidence.
The impact of the natural environment on health and wellbeing

- There is now a large body of literature that evidences the positive association between good health and wellbeing and time spent in nature. Such evidence also points towards the benefits of nature-based social prescriptions on long term health and wellbeing [12,34,35,50]. Overwhelmingly, our search found positive associations between health and wellbeing and nature exposure, however causal mechanisms are less understood.

- Shorter distances to nature, such as local green and blue spaces within walking distance from individuals’ homes, were associated with a variety of health benefits including lower adiposity (body fat) [15], fewer cardiovascular and respiratory problems [16] and obesity [10].

- Although there is a scarcity of data on the effect of blue space on psychological and physical health, a systematic review of 33 articles found that mental health - particularly psychosocial wellbeing - was improved with increased blue space exposure [48]. Increased blue space exposure was additionally associated with better cardiovascular health [1] and increased levels of subjective wellbeing [43,47,48].

- Exposure to forest environments was associated with several health benefits including reduced systolic and diastolic blood pressure, heart rate, sympathetic nervous activity, salivary cortisol and increased parasympathetic nervous activity [37].

- Gardening, when incorporated into therapeutic and mindfulness activities can have a wide range of psychological and physiological health benefits including decreased hypertension, and decreased negative symptomatology of post-traumatic stress disorder, adjustment disorders and attention deficit hyperactivity disorders [36]. One systematic review conducted by Howarth et al. [35] assessing 77 intervention studies found significant effects of gardening on mental wellbeing, physical activity and reduced social isolation.

- Increased exposure to green space and nature was associated with slower cognitive decline [38], lowered risk of COVID [23], reduced risk of diabetes [39], reduced risk of obesity [2] and increased physical activity [45]. Exposure to green spaces additionally positively impacted mental health [54], increased mindfulness practice [49], perceived happiness, resilience [55] and subjective wellbeing [22,64].

- Greater access to greenery in the immediate home surroundings, including keeping and maintaining houseplants, was associated with better markers of mental health amongst individuals during lockdown [21].

- There are several theoretical mechanisms that may be involved in the relationship between natural environments and increased physical and psychological health and wellbeing: Stress Reduction Theory [65] is based on
the idea that environmental features induce subconscious affective reactions which support psychophysiological stress recovery: for example landscape features such as vegetation and water inspire positive emotions and reduce negative thoughts, while maintaining non-vigilant attention. Attention Restoration Theory [66] is based on the idea that nature has the capacity to renew attention and promotes wellness via reduced mental fatigue. Theories of biophilia [67] are based on the idea that people possess an innate tendency to focus on life and lifelike processes and respond with emotional intensity to the natural world. In this sense, humans are drawn to nature like patterns and stimuli and lifelike processes because of a primary exposure to nature during human evolution. As such, there has been little genetic adaptation to modern urban environments [67].

Social prescribing and natural environments

- Social prescribing facilitates salutogenic (meaning non-medical) interventions that can work alongside existing treatments to support health and wellbeing. These can include a variety of in-community activities including arts on prescription, walking clubs, cycling schemes, community gardening, nature hikes, local befriending services or in certain instances help with housing, benefits or work-related concerns [12, 34,68]. In recent years there has been an increase in social prescriptions through a number of different referral pathways including GPs and social care services [50]. Simultaneously and as a result of the COVID-19 pandemic there has been a large increase in the general appetite for outdoor related activity [12, 34,35,50].

- Social prescriptions link patients with third sector organisations such as local voluntary, community and social enterprise (VCSE) organisations, local municipalities (e.g., social services and schools), recreational facilities, and neighbourhood organisations. Such partnerships represent a holistic strategy for confronting persistent health inequities, addressing unmet psychosocial needs, and reducing GP visits [50]. Green Social Prescribing is part of the NHS Long Term Plan to improve mental health outcomes, reduce health inequalities, reduce demand on the NHS, and develop best practice to make green social activities sustainable and accessible, particularly to those audiences at greatest risk of health inequalities [68].

- Nature based social prescribing interventions connect those latter populations to the wider community and in turn foster feelings of social connectedness, connectedness to nature and decrease feelings of social isolation; in turn positively impacting perceived happiness and wellbeing [50]. A 2020 scoping review published in the British Medical Journal, assessing 77 intervention studies, found that social prescriptions to community-based gardening within hospitals, care homes, hospices and third sector organisations have shown to improve the health and wellbeing of populations at the greatest risk of health inequalities [35].

- To achieve the maximum benefit of Green Social Prescribing, NHS referral pathways need to be further developed, with greater emphasis on outreach
to audiences at risk of health inequalities, alongside retaining patients with long term conditions [34].

- In the UK the benefits of nature and wellbeing have been acted upon by the recent UK government commitment in 2020 to fund £5.77 million for preventing and tackling mental ill-health through green social prescribing projects [68].

- Reviews of the evidence find that while there is evidence for the benefits of nature and health there is a need for more research looking at the impact of nature-based health-based interventions like green social prescribing [71-73]. There are currently live streams of research investigating the recent UK government funding of green social prescribing [74].

**Natural environments and populations at the risk of greatest risk of health inequalities**

Several articles assessed the impact of the natural environment on populations at risk of health inequalities:

- Individuals with dementia and cognitive loss [3,6,8,38]: One rapid evidence review published in the British Medical Journal assessed 22 intervention and pre/post studies on outdoor green space exposure and brain health in individuals with age related cognitive loss. Authors found that 77% of the studies they assessed found a positive association between brain health and green space exposure whereas 33% found no, little or inverse effects [3].

- Caregivers facing mental exhaustion can be supported with therapeutic interventions based in the natural environment. One scoping review by Lehto and colleague [26] which assessed studies over a ten-year period found some, limited, evidence that caregiver burden and stress can be relieved through natural environment interventions. The review concluded there is a need for further evidence in this area [26].

- Cancer patients [9]: In a mixed methods-controlled study conducted by Morris and colleagues [9], individuals with cancer with increased exposure to nature-based activities had significantly improved aerobic fitness and fatigue symptomatology, alongside positive psychological benefits.

- Severe mental ill-health [24,33, 39]: Alongside talking therapy and a range of holistic interventions, nature walks can help individuals with severe mental ill-health connect, be active, notice and be mindful. These concepts are key to behavioural change avenues related to relapse prevention and increased self-efficacy [24]. A systematic review conducted by Geneshka et al [39] assessed 44 studies, looking at the impact of green and blue spaces on severe mental ill-health and non-communicable disease prevention. Whilst there is an abundance of evidence for the positive impact of green space on severe mental ill-health, less evidence exists looking at blue space [39]. Museums on prescription using green spaces were found to positively
impact the wellbeing of mental health service users, who experienced increased nature connectedness and psychosocial wellbeing [33].

- **Lonely, socially isolated individuals [31,50,58]:** Loneliness and social isolation can compromise physical and psychological health [50]. Social prescription activities based in nature can improve connectedness and belonging, particularly when social prescriptions work alongside community organisations such as local farms or community gardens. Such activities can promote nature contact, strengthen social structures, and improve longer term mental and physical health by activating intrapersonal, interpersonal, and environmental processes [50].

- **Socioeconomic status [63]:** Socioeconomic factors are associated with visits to natural spaces. Those on lower incomes, with fewer educational qualifications, those who are unemployed or living in the most deprived areas are least likely to visit natural spaces [63]. Research conducted by the Environment Agency and Forest Research [63] found that 44% of people living in households earning £15,000 or less (below the relative poverty line) in England visit natural spaces, compared to 70% of people living in households earning £50,000 or above. Only 45% of adults in England living in areas ranked as most deprived had visited a natural space in the last 14 days, compared to 68% of adults in the least deprived areas [63].

**Social prescribing pathways: barriers and enablers**

- **A qualitative study conducted by McHale et al. [34] assessed the opinions of social prescribing link workers. Link Workers working with populations at greatest risk of health inequalities felt that ‘Green Health Partnerships’ were useful in enabling community-based interventions for patients with long term conditions. Such partnerships were best suited to multi-disciplinary bodies including health, local authority, social care and third sector organisations.**

- **Link workers within the study conducted by McHale et al. [34] recommended that ‘Green Health Partnerships’ ought to engage political and health representatives from the third sector and local community.** This would work alongside developed referral pathways, embedding NHS Green Social Prescribing initiatives into strategic planning, targeting mental health in the community services, and developing better messaging [34].

**How reliable is this data?**

- **A sampling technique was used to assess the reliability of the data contained within this review. Grey literature was sampled and assessed using the Accuracy, Authority, Coverage, Objectivity, Date and Significance (AACODS) Checklist [69]. Pre/post studies using interventions were randomly sampled and assessed using the Cochrane grading system of Platinum, Gold, Silver, Bronze [70]. Seventy five percent of the grey literature sampled (9 out of 12) met quality thresholds for AACODS (i.e. scored above 22).** Lack of referencing, date of publication, methodology and expertise in authorship...
were reasons that articles did not meet quality thresholds. Ninety three percent of sampled pre/post intervention studies (14 out of 15) scored the lowest level of ‘Cochrane Bronze’ whilst one scored ‘Silver’. This was due mainly to the absence of control groups within the sampled studies.

- Between the systematic reviews, scoping reviews, narrative reviews and meta-analyses included within this paper, 985 studies were examined. The overwhelming majority of these studies reported significant positive associations between natural environment exposure and health and wellbeing. However, whilst there are positive associations between natural environment exposure and health and wellbeing, we cannot ascribe a causality to this relationship until there is more controlled and long-term intervention evidence. A study may have reported on a significant positive impact on a health outcome - for example, fewer cardiovascular and respiratory problems were found to be associated with closer proximity to green spaces [16]. It must be taken into consideration however that such results can also be attributed to varying and compounding sociodemographic factors, alongside the effect of lower levels of air pollution that are naturally found in greener areas.

**Recommendations**

- Better developed working partnerships (alongside multi-disciplinary partnerships) between local organisations, social and health care bodies and those providing referral pathways would enable greater access to green social prescribing.

- Patients tend to value green open space and are knowledgeable of their benefit [7]. But since there is still a lack of representation from audiences at greatest risk of health inequalities due to access restrictions and other barriers, service ‘nudges’ and greater outreach initiatives would benefit wider audiences who may not prioritise green prescriptions.

- The development and standardisation of better evaluation tools would enable third sector organisations to calculate and understand the impact of Green Social Prescribing initiatives more accurately.

- Museums with parks and gardens could consider integrating programmes of outdoor and indoor collections inspired activities permitting combined engagement with nature, art and wellbeing [33].

**References**


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