



Connection to nature in nature based social prescribing: A scoping review of evidence, gaps, and policy implications

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ABSTRACT

Nature-based social prescribing (NBSP) is gaining traction as an approach to support health and wellbeing (HWB). Yet the role of Connection to Nature (CTN) within NBSP remains poorly understood. This scoping review examined how CTN is conceptualised, measured and integrated into NBSP interventions and its impact on HWB outcomes. Following PRISMAScR guidelines, we searched four databases (APA PsycInfo, CINAHL, EMBASE and MEDLINE) for studies published between 2016 and 2025, identifying 21 eligible papers. Studies were grouped into four categories: review papers; gardening and horticulture; green care; and structured nature engagement and educational interventions. Across intervention types, CTN was consistently associated with improvements in mood, stress regulation, confidence, social connectedness, and overall wellbeing. CTN appeared malleable and responsive to meaningful or reflective nature engagement, suggesting it may function as a pathway linking nature contact to HWB. Findings indicate that intentionally incorporating CTN into NBSP design, practitioner training, and evaluation may enhance intervention impact and promote equitable access to nature based wellbeing benefits.

CTN was rarely defined consistently or measured using validated tools and was often inferred qualitatively rather than assessed directly. This variability limits understanding of CTN's unique contribution relative to other NBSP mechanisms such as social connection, physical activity, and immersive sensory experiences. To advance the field, future research should adopt clearer CTN definitions, use conceptually aligned measures, distinguish between state and trait CTN, and employ longitudinal or mixed methods designs. Embedding CTN within NBSP policy and practice offers potential to strengthen both individual wellbeing and broader public and environmental health goals.

1. Introduction

1.1. Background

While the association between nature contact (NC) and health and wellbeing (HWB) is well established, the mechanisms underlying this relationship remain less clearly understood. One potential explanatory factor is an individual's Connection to nature (CTN). The concept of CTN can be defined as an individual's subjective perception of their relationship with the natural environment (Capaldi et al., 2015), including the extent to which they feel part of nature (Sierra-Barón et al., 2023). The importance of CTN is related to an intrinsic human inclination to affiliate with nature, known as the biophilia hypothesis (Wilson, 1984). This theory proposes that our evolutionary background has instilled a profound bond with nature, reflected in our psychological, emotional, and behavioural functioning. Recent research supports this by demonstrating how nature can be restorative to health (Berto et al., 2018) and fulfil psychological needs (Ostermiller and Anderson, 2024).

People with a stronger sense of connectedness to nature tend to experience greater psychological and behavioural benefits from time spent outdoors (Capaldi et al., 2015) and are more likely to seek out nature contact and gain associated HWB benefits (Chang et al., 2024). As such, enabling contact with nature may help to support HWB outcomes at both individual and population levels.

Supporting HWB through approaches that extend beyond biomedical treatment alone is increasingly urgent, given ageing populations, the rising prevalence of long-term conditions, and the growing burden of mental ill-health exacerbated by COVID-19 and prolonged lockdowns. One way in which this can be done is through Social Prescribing (SP). SP is used as a noun and a verb and happens when someone is referred to a non-medical community intervention by a healthcare worker to support their health and/or wellbeing (Muhl et al., 2023). There has been substantial investment in SP in the UK, including funding for link workers (who act as a link between participants and the activities into which they are referred (Mulholland et al., 2025; NHS, 2019)). SP forms part of the concept of 'personalised care', giving people choice and control over

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their healthcare (NHS, 2019). Whilst the specific link worker model of SP was developed in England, similar models exist, and are growing in prominence, in other countries (Lwin et al., 2026; Morse et al., 2022; Scarpetti et al., 2024). For example, Morse et al. (2022) identified 17 countries, spanning five continents (North America, Europe, Asia and Australia), where people with an unmet social need were referred to non-medical interventions. Although SP is operationalised differently across varied health systems, it is largely restricted to upper-middle income countries in well-resourced environments (Sonke et al., 2023). Recent research suggests that SP may be taking place in other countries, but is not yet formally recognised as such (Indriyani et al., 2025; WHO, 2026).

Nature-based Social Prescribing (NBSP) (also known as green social prescribing, GSP) involves an element of nature in the intervention (de Bell et al., 2024). Nature-based activities are recognised as one of four key pillars of social prescribing by the National Academy of Social Prescribing: Physical Activities; Arts, Culture & Heritage; Debt & Practical Advice; and Nature-Based Activities (Haywood et al., 2024). NBSP has been associated with significant improvements in HWB and in the UK, estimates of the social return on investment are up to £2.42 for every £1 spent on NBSP (Haywood et al., 2024). Beyond the UK, the RECETAS project, focusing on nature in cities across nine countries, has demonstrated evidence on reducing loneliness and social isolation alongside enhancing CTN (RECETAS, n.d.). Together, these developments point to NBSP as a promising, although variably implemented, approach within communities.

NBSP may also be important for reducing health inequalities. Supporting improvements in HWB is particularly important for disadvantaged groups who typically have worse health than their more advantaged counterparts. Tackling such health inequalities and supporting improved health outcomes across the population is a global health priority (World Health Organization, 2025). People from disadvantaged or marginalised backgrounds are less likely to have regular contact with nature (Biernacka et al., 2022; Sun et al., 2022; Waite et al., 2023). However, when NC does occur, these groups appear to derive disproportionate benefit from NC (Martin et al., 2020; Mitchell and Popham, 2008), highlighting NC as a potential mechanism for ameliorating health inequalities by supporting disadvantaged groups. Consequently, NBSP is well-positioned to support HWB as it prompts and supports people to access nature, and provides opportunities for NC, including for people who may not otherwise have the opportunity or inclination to do so.

If CTN has an important role to play in the nature-wellbeing association, then this should form part of the NBSP offer, which should embed CTN as part of its design, delivery, and evaluation, so that interventions can maximise their potential to support HWB. Although the literature on SP has more recently begun to acknowledge CTN (for example, de Bell et al., 2024; Richardson et al., 2021), the role of CTN in NBSP is frequently omitted from NBSP design and evaluations. This review therefore examines how CTN has been conceptualised within NBSP studies, including its role as a potential pathway linking NC to wellbeing, the ways contextual factors may shape who benefits most, and the extent to which CTN is measured as an outcome within NBSP interventions. Accordingly, this review therefore examines evidence on CTN within NBSP, identifies conceptual and methodological gaps, and considers implications for intervention design, research, and policy.

We begin with an overview of current measures of CTN and associations between NC, CTN and HWB. NC can take a multitude of forms, including when people see, hear, touch, exercise in, interact with or simply 'be' in nature. Such contact may be deliberate or passive and can occur in any type of natural environment, from forests, seas and mountains to urban gardens or a single leaf. In this paper, we use the term 'nature contact' to represent any form of real-time contact with real nature. This definition excludes virtual reality nature or recordings of nature via pictures or sounds.

Following this overview we outline our literature search

methodology into CTN, HWB and NBSP and the subsequent implications for NBSP. By drawing together these strands, this review aims to clarify CTN's relevance within NBSP and to argue that greater attention to CTN may enhance both intervention design and equitable access to nature-based HWB benefits. To the authors' knowledge this is the first exploration of CTN in NBSP summarising approaches to measuring CTN, synthesising evidence on its role in HWB.

1.2. Measures of connection to nature

Reviewing all measures of CTN in depth is beyond the scope of this review. However, we have identified several key quantitative measures of CTN that are frequently reported in the literature, as summarised in Table 1. Most of these measures are self-report scales which have undergone psychometric testing, but they also incorporate pictorial formats. Across these instruments, there is considerable heterogeneity in the specific dimensions, constructs and theoretical assumptions underpinning CTN. This diversity presents both challenges and opportunities for NBSP research and evaluation.

Many of the measures conceptualise CTN as a multidimensional construct capturing behavioural, emotional and cognitive aspects of people's relationship with nature (Antonio et al., 2023; Cuadrado et al., 2023; Dutcher et al., 2007; Hatty et al., 2020; Martin and Czellar, 2016; Mayer and Frantz, 2004; Meis-Harris et al., 2021; Nisbet et al., 2009; Nisbet and Zelenski, 2013; Perkins, 2010; Perrin, 2018; Richardson et al., 2019; Schultz, 2001; Sobko et al., 2018; Zhai and Gao, 2024). When considering CTN as interrelated across behavioural, emotional and cognitive domains, Nisbet et al. (2009) acknowledged that this may include 1) an 'ecological self', related to the strength of which people identify with the natural environment; 2) a 'perspective' which considers how individuals hold relationships with the environment based on attitudes and behaviours; and 3) an 'experience' which considers the physical aspects of familiarity and attraction one may have with nature. Moreover, some studies have acknowledged the importance of spiritual and cultural aspects of CTN and HWB (Antonio et al., 2023). This is important to consider when examining nature connectedness as a globally relevant phenomenon, where cultural and contextual differences may shape how CTN is experienced by non-Western as compared with Western communities.

The presence of diverse conceptualisations raises important considerations for NBSP. First, selecting validated, theoretically aligned measures is essential for ensuring that evaluations capture the aspects of CTN most relevant to a given intervention. Second, multidimensional measures may help identify which components of CTN are most responsive to NBSP activities, for example, whether interventions primarily influence affective engagement, cognitive identification with nature, or observable nature related behaviours. Importantly, heterogeneity in measurement allows nature-based practitioners and researchers to select tools that best suit the aims of their intervention, the characteristics of their population, and the mechanisms they expect NBSP to activate. This is particularly relevant for complex interventions such as NBSP, where CTN may coexist and interact with other processes including social interaction, physical activity, and emotional regulation. Different measures also illuminate how CTN varies across demographic groups and cultural contexts.

Table 1 summarises commonly used CTN instruments, highlighting variations in format, dimensions, and psychometric properties. Collectively, these measures highlight the complexity of CTN and illustrate why a consistent approach to measurement is needed to understand how CTN contributes to HWB outcomes within NBSP.

1.2.1. CTN: state versus trait

Existing research conceptualises CTN both as a relatively stable trait and a fluctuating state in response to situational influences (Tam et al., 2023; Tiscareno-Osorno et al., 2023). As a *trait*, CTN reflects enduring individual differences shaped by genetic, cultural, or experiential factors

Table 1
Summary of key connection to nature (CTN) measures reported in the literature.

Measure	Authors & Year	Country	Measure Format	Subscales (if applicable)	Psychometric properties (Cronbach's α)	Description
1. Connectedness to Nature Scale (CNS)	Mayer and Frantz (2004)	USA	14-item, 5-point Likert	None	Cronbach's $\alpha = 0.82$ -.84	Measures affective and experiential connection to nature
2. Nature Relatedness Scale	Nisbet et al. (2009)	Canada	21-item, 5-point Likert	Self, Experience Perspective	Cronbach's α overall = .87, NR-Self = .84 NR-Perspective = .66 NR-Experience = .80	Measures cognitive, affective, and behavioural aspects of nature connectedness
3. A Brief Measure of Nature Relatedness Scale (NR-6)	Nisbet and Zelenski (2013)	Canada	6-item, 5-point Likert	Self, Experience		Measures self and experience aspects of nature connectedness
4. Multidimensional AIMES Scale	Meis-Harris et al. (2021)	Australia	18-item, 7-point Likert	Affective, Identity, Materialism, Experiential, Spiritual	Cronbach's $\alpha = 0.90$	Captures diverse dimensions of nature connectedness
5. ABC Connectedness to Nature Scale	Cuadrado et al. (2023)	Spain	12-item, 5-point Likert	Affective, Behavioural, Cognitive	Cronbach's $\alpha = 0.85$	Breaks nature connection into three core psychological domains
6. Nature Connection Index (NCI)	Richardson et al. (2019)	UK	6 items	None	Cronbach's $\alpha = 0.92$	Simple measure for assessing nature connection in adults and children
7. Ke Ola O Ka 'Āina: 'Āina Connectedness Scale	Antonio et al. (2023)	Hawai'i, USA	5-point Likert	None	Not reported	Indigenous-focused measure of land and nature connectedness
8. Inclusion of Nature in Self (INS)	Schultz (2001)	USA	Single-item pictorial	None	Not reported	Uses overlapping circles to represent perceived closeness to nature
9. Extended Inclusion of Nature in Self scale	Martin and Czellar (2016)	Switzerland	4 items pictorial	None	Cronbach's $\alpha = 0.82$	Uses spatial metaphors
10. State/Trait Connectedness to Nature (CN-12)	Hatty et al. (2020)	Germany	12-item, 5-point Likert	Identity, Experience, Philosophy	CN-Total, $\alpha = 0.93$; CN-Identity, $\alpha = 0.87$; CN-Experience, $\alpha = 0.90$; CN-Philosophy, $\alpha = 0.75$.	Distinguishes between temporary and enduring nature connectedness
11. Love and Care for Nature (LCN)	Perkins (2010)	UK	15-item, 7-point Likert	None	Cronbach's $\alpha = 0.97$.	Assesses intrinsic motivation to care for nature
12. Connectivity with Nature Scale (CWN)	Dutcher et al. (2007)	USA	6-item, 5-point Likert Scale 7th item was a pictorial numerical scoring sociometric scale	None	Cronbach's $\alpha = 0.72$.	Captures cognitive beliefs about the human-nature relationship
13. Connectedness to Nature Index for Parents of Preschool Children (CNI-PPC).	Sobko et al. (2018)	Hong Kong	16 item, 7-point Likert	Enjoyment of nature Empathy for nature Responsibility towards nature Awareness of nature	Cronbach's α were respectively Enjoyment, $\alpha = .86$, Empathy, $\alpha = 0.87$, Responsibility, $\alpha = 0.75$ Awareness, $\alpha = 0.80$	Focuses on parents' perceptions of their children's nature connectedness
14. Extension of the Inclusion of Nature in Self Scale	Kleespies et al. (2021)	Germany	Pictorial	Relational values, emotional connection, ethical responsibility	Not applicable	Examines the role of relational values in shaping human-nature connections, emphasising social and ethical dimensions of nature connectedness

(Mayer and Frantz, 2004; Nisbet et al., 2009). People with higher trait CTN tend to show stable preferences for natural environments (McMahan and Josh, 2017) and are more likely to engage in pro-environmental behaviours (Liu et al., 2022; Whitburn et al., 2020). Trait CTN therefore captures a consistent affinity towards nature that influences long-term behavioural patterns.

In contrast, as a *state*, CTN varies in response to short-term influences such as environmental exposure, situational contexts, and personal experiences (Capaldi et al., 2014; Tam et al., 2023). Distinguishing between trait and state CTN is essential for capturing the complexity and temporality of nature connectedness. CTN as a state captures the dynamic and temporary aspects of nature connectedness. It reflects shifts in perception, emotions, and behaviours influenced by immediate surroundings or specific encounters with nature (Capaldi et al., 2015). State CTN is therefore particularly relevant for understanding short-term changes resulting from NBSP activities and other nature-based interventions.

Understanding the difference between state and trait CTN is important for NBSP evaluation (Hatty et al., 2020). This distinction is valuable because it allows researchers to examine how CTN fluctuates during or immediately after NBSP activities, while also recognising the influence of more enduring nature related tendencies. Interventions may have varying effects on these components, for instance, activities such as nature noticing or sensory engagement may produce immediate increases in state CTN, whereas longer term participation in community gardening or ecotherapy may influence trait CTN over time. Considering state and trait CTN together therefore supports a more nuanced understanding of how CTN contributes to HWB within NBSP. People's level of pre-existing levels of trait CTN (if any) may also affect how people engage with and respond to interventions.

1.3. CTN's role in the relationship between NC and HWB outcomes

Connection to nature (CTN) has been consistently associated with

higher happiness, wellbeing and quality of life (Baceviciene and Jan-kauskienė, 2022; Capaldi et al., 2014; Martin et al., 2020; Passmore and Krause, 2023; Rahe and Jansen, 2024; Richardson et al., 2016). Evidence also links CTN with improved mental health outcomes, including reduction in depression and anxiety (Berman et al., 2012; Martyn and Brymer, 2016) alongside enhanced psychological wellbeing (Grabowska-Chenczke et al., 2022; Ostermiller and Anderson, 2024; Zhang et al., 2024). Studies have also shown physical health benefits from being connected to nature, such as for chronic conditions (Frank et al., 2022; Taylor et al., 2022) and stress-induced illnesses (Ma et al., 2024). There are also positive associations between exposure to nature and immunoregulation (Andersen et al., 2021; Roviello et al., 2022). A global systematic review of meta-analyses found psychological connection with nature positively correlated with mental, physical and social (e.g. greater sense of community belonging and moral responsibility to others) HWB (Barragan-Jason et al., 2021).

Research has also shown that duration of contact is important, that for people with high CTN brief visits are sufficient to improve HWB but for people who have lower CTN, regular access to nature is important for leveraging wellbeing outcomes. For example, Martin et al. (2020) found that for people with lower CTN, eudaimonic wellbeing was higher amongst those with higher NC (at least weekly visits compared with less than weekly visits) but for people with higher CTN, there was no difference in the association between NC and eudaimonic happiness. Other evidence has found that restricted access to nature has a more detrimental effect on those with high CTN than those with low CTN (Anders et al., 2023), indicating that access may be particularly crucial for individuals with strong nature connection (Anders et al., 2023; Anders et al., 2023). The type of nature may also be important for those with higher CTN, with a German study reporting more wellbeing benefit from places they perceived as ‘wilder’, whereas for people with low CTN ‘wildness’ had little impact on HWB outcomes (Samus et al., 2022).

Alongside this, studies have explored “disconnection from nature” (Barrable and Booth, 2022; Beery et al., 2023; Kesebir and Kesebir, 2017). This refers to a reduced emotional or experiential relationship with the natural world, often shaped by modern lifestyles and limited access to green spaces. Studies with veterans demonstrate that enhancing nature connection, through forest immersion or gardening therapy, can reduce PTSD symptoms, anxiety, and negative mood states, suggesting that inadequate nature connection may contribute to worsened psychological outcomes (Gil et al., 2025; Poulsen et al., 2018). This suggests that disconnection from nature may function as a meaningful psychosocial risk factor, while rebuilding nature connection supports emotional regulation and mental wellbeing.

CTN may also have a protective effect in adverse contexts. For example, during the COVID-19 pandemic, CTN was associated with better mental wellbeing, and nature relatedness predicted mental wellbeing (Darcy et al., 2022; Poortinga et al., 2021; Selvaraj et al., 2022). CTN may moderate responses to traumatic environmental events, but the evidence is mixed. For example, in the 2009 ‘Black Saturday’ bushfires (Australia), stronger environmental attachment was associated with lower distress and depression, reduced fire-related PTSD, and higher resilience, post-traumatic growth, and life satisfaction yet qualitative accounts also described grief and loss tied to environmental destruction (Block et al., 2019). This suggests CTN may function both as a resource (through restoration and meaning) and a vulnerability (through heightened sensitivity to environmental damage).

Several studies provide evidence that CTN mediates the relationship between NC and HWB. For example, Richardson et al. (2016) found that CTN significantly mediated the relationship between daily nature engagement and happiness in their ‘30 days wild’ experiment that asked people to engage in a nature-based activity every day for a month. Rahe and Jansen (2024) found that CTN mediated the relationship between self-love and psychological wellbeing. Li et al. (2024) showed that CTN mediated the association between tree visibility and mental wellbeing.

Importantly, CTN has been shown to be malleable; for instance,

spending time in immersive natural settings such as forests (Cudworth and Lumber, 2021) or coastal areas (Kelly, 2018), can momentarily strengthen one’s sense of CTN (Berto et al., 2018). The ‘schmapped’ study, using smartphones to prompt people to notice urban nature in real time, produced clinically meaningful improvements in quality of life and CTN sustained at one-month follow-up, including among participants with diagnosed mental health conditions (McEwan et al., 2019). Brief interventions such as noticing “three good things in nature” have been shown to increase CTN and positive affect while reducing negative mood (Keenan et al., 2021). Nature based programmes with children and adolescents demonstrate similar effects, with longer interventions producing more sustained increases in CTN (Choe et al., 2025)

In an experimental study of 110 adolescents in Hong Kong, Choe et al. (2025) assigned participants to a 1-day or 4-day nature-based intervention or no intervention CTN (measured using the Inclusion in Nature Scale [INS]) increased in both intervention groups but not the control group. However, the higher INS scores only persisted at one month follow up for the longer intervention group. Furthermore, these studies are important because many studies relating to CTN and HWB involve qualitative or correlational designs. Using experimental study designs as described here provides evidence of a causal association between NC, CTN and HWB. Moreover, the literature has found consistent correlations between CTN and NC (Anders et al., 2023; Garza-Teran et al., 2022; Keenan et al., 2021; Li et al., 2022), with evidence of the association in both directions with higher NC leading to higher CTN and higher CTN leading people to seek out NC. The causal pathways of influence of CTN are summarised in in Fig. 1 showing (i) direct associations between CTN and HWB, (ii) a mediating influence in the association between NC and HWB and (iii) a positive association between NC and CTN.

However, important caveats remain. Some evidence found that NC may have stronger effects than CTN, which implies the association between CTN and HWB is not always the most important aspect of the NC and HWB relationship (Anders et al., 2023; McNeil et al., 2022). For some, higher CTN has been shown to be associated with negative health outcomes, particularly when these are related to eco-anxiety (Dömötör et al., 2019). Moreover, much of the evidence comes from cross-sectional designs, making it impossible to infer the direction of causation. In addition, studies that invite participants to self-select are vulnerable to selection bias, which is likely to skew results towards a positive association since people who have higher CTN are more likely to take part in nature-based initiatives. However, experimental and longitudinal designs increasingly support the modifiability of CTN through NC and the plausibility of CTN as a pathway linking NC to HWB.

Together, Sections 2.1–2.3 highlight that CTN is a multifaceted construct, shaped by both stable and situational factors, and that it plays an important, although arguably inconsistently defined, role in the relationship between NC and HWB. Overall, although the evidence base remains heterogeneous and often methodologically limited, experimental and longitudinal studies increasingly support the plausibility of CTN as a modifiable mechanism linking NC with HWB. This highlights the importance of assessing CTN within NBSP research and evaluation, particularly given the potential for NBSP to provide repeated, meaningful nature contact that can influence both state and potentially trait CTN over time. Despite this growing body of evidence, it remains unclear how CTN is incorporated into NBSP research and practice; how it is conceptualised, measured, and positioned within intervention pathways. To address these uncertainties, we conducted a scoping review to map how CTN has been examined within NBSP studies, identify conceptual and methodological gaps, and consider implications for intervention design, research, and policy. The methods for this review are outlined below.

2. Methods

This review adopted a scoping review methodology, following the

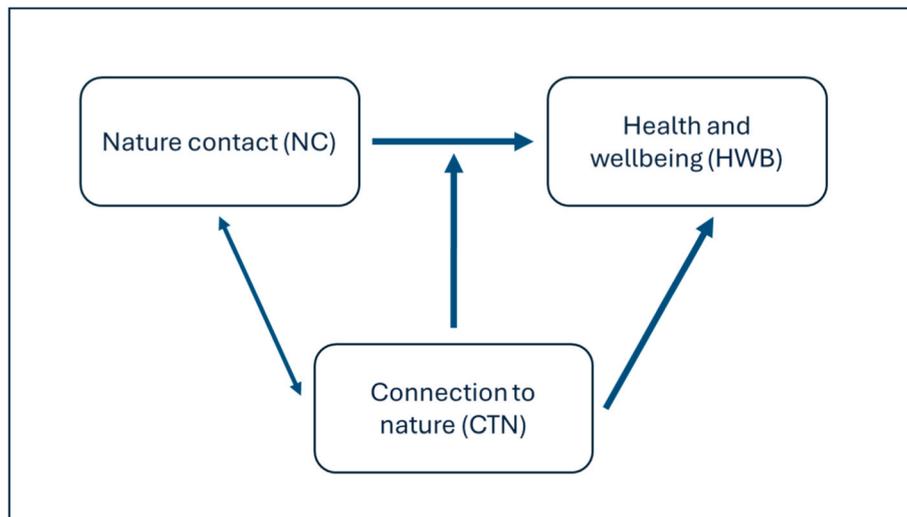


Fig. 1. Summary of relationships between connection to nature, nature contact and health and wellbeing.

PRISMA Extension for Scoping Reviews (PRISMA-ScR) to ensure transparent and comprehensive reporting (Tricco et al., 2018). A scoping approach was selected to map the breadth of evidence on NBSP, CTN and HWB, given the heterogeneity of study designs and the emerging nature of CTN within NBSP research.

2.1. Search strategy

A systematic search strategy was developed in consultation with an academic librarian. Searches were conducted in APA Psycinfo, CINAHL, EMBASE and MEDLINE for studies published between January 2016 to July 2025. We selected 2016 as the start date because at that time social prescribing initiatives began expanding rapidly in the UK (Morse et al., 2022).

The PICO framework (Population, Intervention, Comparison and Outcome) (Higgins et al., 2019) was used pragmatically to structure the search. For this review, the primary focus was on Intervention (nature-based social prescribing activities, including connection to nature) and Outcome (health and wellbeing indicators). Comparators were omitted because eligible studies seldom included consistent control conditions. Population terms were retained only to improve search precision (e.g. adults or children) and were not used an exclusion criterion or analytic stratifiers. Reference lists of included articles and relevant reviews were hand-searched to identify additional sources.

We include our inclusion and exclusion criteria in Table 2. We selected only studies where people were supported or referred into nature based social prescribing interventions (to avoid bias from self-selection). We focused specifically on real-time contact with real nature, excluding virtual/simulated/recorded exposures (e.g., virtual reality, photographs, nature sounds). Although these alternative ways of accessing nature offer an interesting and promising avenue of research, including for people who, for example, have very limited mobility or phobias, for example, this type of nature access was considered beyond the scope of this review.

The Search terms combined controlled vocabulary (e.g., MeSH terms) and free-text keywords relating to “social prescribing”, “green prescribing”, “nature-based interventions”, and “wellbeing”. The full search string used across all three databases was as follows: Nature OR outdoor* OR green* OR “blue space*” OR environment OR garden* OR mountain* OR wild* OR outside OR wood* OR forest* OR park* OR “therapeutic landscape” OR natural OR lake OR stream* OR sea OR water OR blue OR ocean AND connect* OR “relat*” OR “attachment” OR biophili* AND nature AND “physical activit*” OR social OR “mental health” OR “health outcome*” OR lonel* OR health* OR wellbeing OR

Table 2
Inclusion and Exclusion Criteria for the literature search.

Domain	Inclusion Criteria	Exclusion Criteria
Population	Adults and/or children engaging in or referred to social prescribing interventions; healthcare professionals, link workers, community organisations involved in delivery.	Studies focusing solely on pharmacological, clinical, or inpatient interventions with no community or nature-based/ social prescribing element; stakeholder only studies (e.g., healthcare professionals, link workers, community organisations) with no participant outcomes.
Intervention/ Exposure	Social prescribing interventions, schemes, or referrals, with a focus on nature-based activities (e.g., gardening, green walking groups, park runs, conservation volunteering, cultural or wellbeing activities linked to health); real-time contact with nature.	Evidence relating to ‘second hand’ virtual or digital nature such as VR, pictures, photographs or nature sound recordings rather than real time contact to maintain a focus on direct, physical interaction Interventions not involving social prescribing (e.g., standard health promotion campaigns, general physical activity interventions without referral/social prescribing context)
Outcome(s)	Outcomes relating to health and wellbeing (e.g., mental health, loneliness, physical health, social connectedness, quality of life, connection to nature, health service use).	Outcomes unrelated to wellbeing or health (e.g., purely environmental or economic without link to health/wellbeing).
Study Design	Empirical peer-reviewed studies: qualitative, quantitative, mixed-methods, case studies, systematic reviews, realist reviews.	Editorials, opinion pieces, conference abstracts without full data, protocols
Language/ Timeframe	English language; 2016-2025	Non-English studies; outside timeframe.

“well-being” OR “Quality of life” OR stress OR psychology* OR psychosocial OR “physical health” OR restor* OR “self determination” OR self-determination OR curative OR recover* OR isolat* OR cohesion OR resilience AND “social prescri*” OR “adventure based social prescri*” OR “community refer*” OR “community prescri*.”

2.2. Study selection

All identified references were imported into EndNote for de-duplication. Titles and abstracts were screened independently by two reviewers against the inclusion criteria. Full texts of potentially eligible articles were then retrieved and assessed. Discrepancies were resolved through discussion or consultation with a third reviewer. A PRISMA flow diagram (Page et al., 2021) was used to document the selection process, including reasons for exclusion at the full-text stage (Fig. 2).

2.3. Data extraction and analysis

A standardised data charting form in Excel was developed iteratively by the review team to ensure consistency in data extraction. For each included study, we extracted bibliographic details (author, year, country), study characteristics (design, setting, sample), and information

relevant to the review aims. We extracted the following: Sample (e.g., age group, health condition, community group); Intervention (e.g. nature-based activity); Who prescribed or referred the nature-based intervention; Outcomes reported (health and wellbeing); Barriers to the intervention (e.g. location) and other key findings (i.e. relevant to the role of nature and/or social prescribing). Data were extracted independently by two reviewers, with discrepancies resolved through discussion or consultation with a third reviewer. The extracted data were managed in Excel.

Data analysis followed a descriptive and thematic synthesis approach, appropriate for scoping review methodology (Tricco et al., 2018). Quantitative data were summarised narratively and tabulated to provide an overview of study characteristics, populations, interventions, and outcomes. Qualitative data (e.g., data extracts from the published paper) were synthesised thematically.

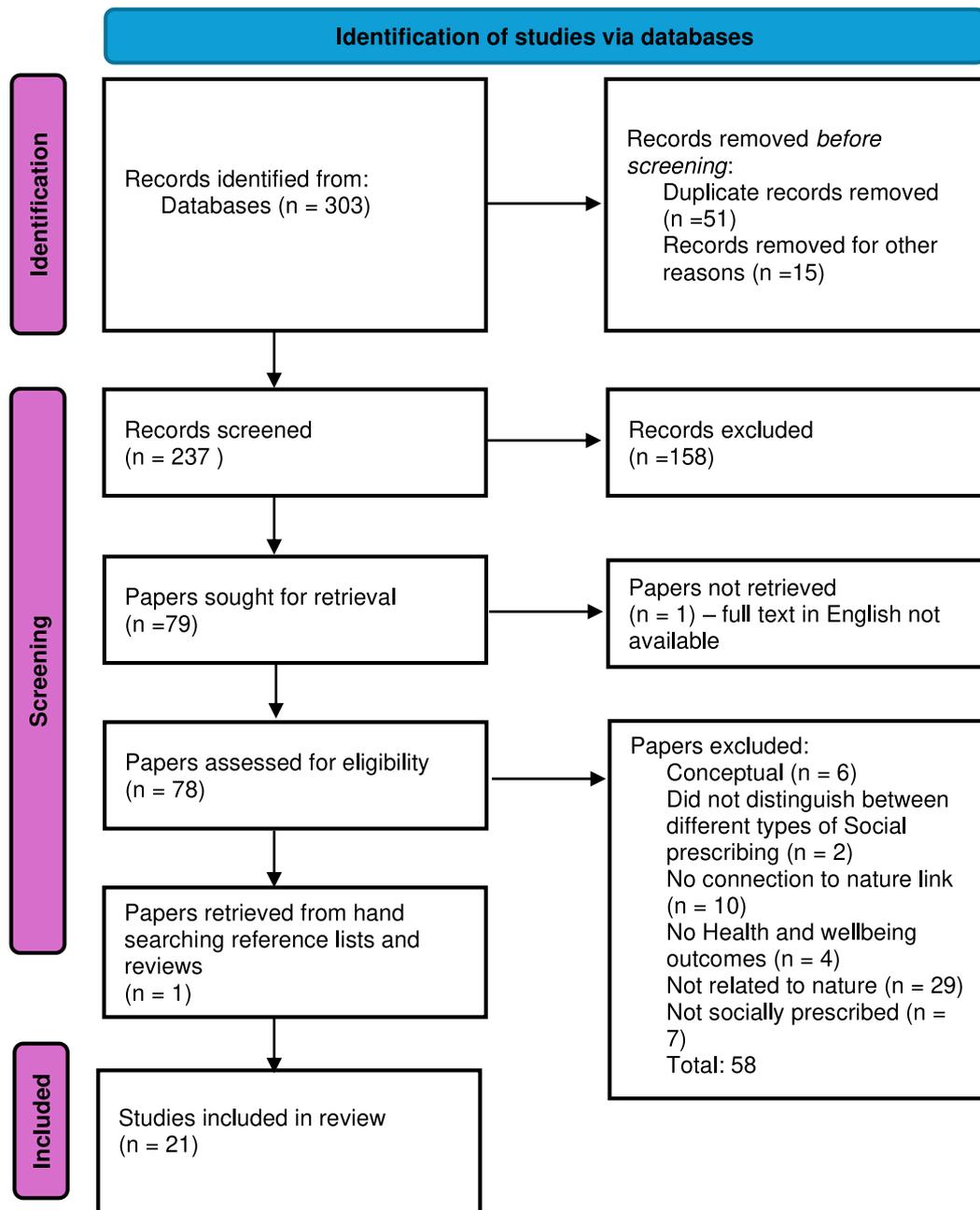


Fig. 2. PRISMA Diagram – flow of studies selected for inclusion in the review.

3. Results

3.1. Nature-based socially prescribed interventions

We identified four categories of nature-based socially prescribed interventions: review papers (Section 4.1.1); gardening and horticulture (Section 4.1.2); green care: park prescriptions and ecotherapy (Section 4.1.3) and structured nature engagement and educational interventions (Section 4.1.4). Each of these nature-based social prescriptions were linked to NC either through specific activities or key measures. [Table 3](#) provides an overview of the 21 papers included in our review, summarising their geographical spread, research design, sample, CTN related findings and HWB outcomes. We further discuss these narratively in the proceeding section.

3.1.1. Review studies

We identified four review papers that met our inclusion criteria ([Baker et al., 2024](#); [Menhas et al., 2024](#); [Robinson et al., 2022](#); [Thomas et al., 2022](#)).

[Baker et al. \(2024\)](#) conducted a systematic scoping review examining pro-ecological, group-based community activities and their effects on mental wellbeing. They explain how these types of nature-based activities, such as tree planting, go beyond “being in” to “doing with” nature. They contend that the multiple components of exposure to nature, social connection, exercise, pro-social and pro-environmental behaviours all contribute to increased mental wellbeing. Although heterogeneity prevented formal synthesis of wellbeing outcomes, the majority of studies reported improvements in mental wellbeing and mood. CTN was identified as a therapeutically influential component in 32% of studies, although only three explicitly measured CTN. The majority of studies (68%) reported factors such as social interaction and social inclusion as therapeutic mechanisms. The authors suggest that instead of operating in isolation these therapeutic mechanisms compound in a single activity which requires new theoretical understanding. This study outlines CTN as one of many mechanisms that lead to positive outcomes in nature-based interventions.

[Menhas et al. \(2024\)](#) conducted a systematic review and meta-analysis of 50 NBSP studies across more than 18 countries. The authors found a positive association between engagement with green spaces and mental wellbeing, which they interpret through the therapeutic benefits of human–nature connection. They suggest that spending time in green spaces and outdoors has a positive impact on health and happiness in relation to human-nature connection. However, the review does not report whether CTN was formally measured in the included studies. As a result, the specific role of CTN in driving mental health outcomes cannot be determined, despite the authors’ interpretive emphasis on human–nature connection.

[Robinson et al. \(2022\)](#) undertook a narrative review examining psychosocial and economic barriers to green space access among racialised individuals in the UK and USA. Although not focused on NBSP specifically, the review identifies low “nature affinity” as a barrier to accessing nature related wellbeing benefits. While the review does not define nature affinity or describe how it was measured, the concept aligns with CTN and highlights important equity issues relevant to NBSP provision. This review highlights the barriers racialised individuals experience access to in green space which need to be removed for nature-based social prescribing to be accessible to this demographic.

[Thomas et al. \(2022\)](#) conducted a scoping review of socially prescribed nature therapy for adults with mental illness living in the community, identifying six studies from the UK and Australia. All studies demonstrated improvements in biopsychosocial wellbeing, demonstrating that NBSP could enhance biopsychosocial wellbeing and CTN in adults with mental illness. The authors also highlight the potential for longer-term impacts of CTN, noting that nature therapy can help people develop new ways of connecting with nature that encourage continued engagement beyond the intervention period. They further report that

nature-based settings facilitate social connection, with improved social relationships observed across all studies. Overall, the review identifies CTN as a key mechanism for enhancing health and wellbeing, with the potential to generate sustained benefits.

Taken together, these review papers suggest that CTN is frequently acknowledged as a potentially important mechanism within nature based interventions but is inconsistently defined, infrequently measured, and rarely synthesised in relation to NBSP outcomes. This highlights the need for more systematic examination of CTN within NBSP, including clearer conceptualisation and standardised approaches to measurement.

3.1.2. Gardening and horticulture based interventions

Gardening and horticulture programmes were the most frequently published type of NBSP intervention found by the literature search. Most of the evidence was from the UK ($n = 9$) ([Aughterson et al., 2024](#); [Evans et al., 2019](#); [Fixsen and Barrett, 2022](#); [Gorenberg et al., 2023](#); [Howarth et al., 2018, 2021](#); [Moore and Thew, 2023](#); [Wood et al., 2022](#)) and one study was from Asia ([Wong et al., 2025](#)). These interventions typically involved structured community or therapeutic gardening schemes, delivered through voluntary sector organisations, health service partnerships, or workplace wellbeing programmes.

Several studies highlighted the social and psychological benefits of community gardening for people experiencing mental health challenges. For example, [Aughterson et al. \(2024\)](#), in an ethnographic study of therapeutic gardening groups in the UK, found that participation generated a sense of achievement through tangible outcomes (e.g., growing plants, maintaining spaces), alongside improvements in confidence and reductions in social anxiety. Here, CTN was fostered through the design of the gardening group which involved doing hands-on-work with the natural environment. The visible impact of gardening tasks was consistently reported as meaningful, with participants describing enhanced self-worth and pride in their contributions. This study reported the qualitative findings in relation to psychological, social and behavioural impacts, reflecting quantitative measures that conceptualise CTN as a multidimensional construct.

These findings echo those of [Wood et al. \(2022\)](#), who, through interviews with garden members and staff, emphasised how therapeutic community gardening facilitated distraction from illness, encouraged mindfulness, and helped generate peer support networks. [Howarth et al. \(2018, 2021\)](#) reported that community gardening in urban allotments, which was considered the central mechanism for CTN, also facilitated skill acquisition and cognitive engagement, alongside promoting social cohesion and resilience in participants with longstanding mental health conditions. These studies suggest that gardening interventions that use activities that are explicitly designed for connecting to nature can tap into health and wellbeing dynamics. For these interventions, being immersed in gardening and the activities allowed members to cultivate a sense of identity and belonging within a shared community, to those who have similar lived experiences of mental health. This suggests that CTN may be mediated by such community interventions, where groups can immerse themselves in nature together for psychosocial benefits.

Horticulture-based programmes also emerged as important in care settings for older adults. [Evans et al. \(2019\)](#), in a study across care homes in the UK, reported that gardening clubs, woodland walks, and pet care activities improved mood, promoted relaxation, and reduced reliance on medication among residents with dementia. Staff observed fewer falls, greater engagement, and more positive interactions between residents, suggesting that nature-based activities may contribute to both psychosocial and physiological outcomes. While this study did not explicitly measure participants connection to nature through quantitative measures, the residents reported being in nature gave them a sense of freedom and increased their social interaction. Similarly, [Gorenberg et al. \(2023\)](#) found that visits to botanic gardens offered older participants feelings of tranquillity and distraction from daily stressors. Individuals qualitatively reported nature connectedness through

Table 3
Studies included in the review.

Intervention	Author	Design	Country	Sample/Population	Connection to Nature (CTN) Outcomes	Health and wellbeing (HWB) Outcomes
Review Papers	Baker et al. (2024)	Systematic scoping review	Multiple countries	Adults and youth	Synthesised evidence showed group-based pro-ecological community interventions can enhance CTN	Reported improvements in mental wellbeing, community connectedness
	Menhas et al. (2024)	Systematic review and meta-analysis	International	Adults	Nature-based social prescribing associated with improved CTN engagement across interventions	Significant positive impact on mental health outcomes
	Robinson et al. (2022)	Narrative literature review	International	Adults including families	Identified barriers and facilitators to access green spaces and nature engagement	Psychosocial and economic barriers mediated access to wellbeing benefits
	Thomas et al. (2022)	Scoping Review	International	Adults with mental illness	Social prescribing of nature therapy linked to increased opportunities for CTN	Reported psychological wellbeing benefits and improved community participation
Gardening and Horticulture	Aughterson et al. (2024)	Qualitative (ethnography and in-depth interviews)	UK	Adults with mental health challenges	Increased engagement with plants and gardening tasks; enhanced CTN	Improved confidence, reduced social anxiety, sense of achievement
	Evans et al. (2019)	Mixed methods (cross-sectional quantitative survey and qualitative interviews)	UK	Older adults in care homes	Increased interaction with gardens and animals; more nature observation	Improved mood, relaxation, reduced medication reliance, enhanced social contact
	Howarth et al. (2018)	Mixed methods (Longitudinal wellbeing measures involved pre and post design). Qualitative: Interviews and focus groups	UK	Adults	Gardening facilitated awareness and engagement with plants	Enhanced confidence, mental wellbeing, social inclusion
	Howarth et al. (2021)	Qualitative (semi-structured interviews)	UK	Adults with mental health issues	Community gardening increased interaction with nature	Improved self-esteem, social interaction, sense of purpose
	Moore and Thew (2023)	Qualitative (semi-structured interviews)	UK	Adults with mild mental health difficulties	Gardening increased feelings of connection and mindfulness	Reduced stress, improved self-efficacy, social bonding
	Wood et al. (2022)	Mixed-methods (quantitative survey and qualitative interviews) Survey was longitudinal at 5 time points	UK	Community garden participants	Mindful engagement with plants enhanced CTN	Improved mental wellbeing, peer support, distraction from illness
	Fixsen and Barrett (2022)	Qualitative (semi-structured interviews)	UK	Adults	Green social prescribing increased opportunities for nature contact (gardens/parks)	Reduced stress and increased mood
	Gorenberg et al. (2023)	Qualitative (interviews)	UK	Older adults in care settings	Exposure to botanic gardens and natural spaces	Feelings of tranquillity, reduced stress, social engagement;
	Wong et al. (2025)	Qualitative	Singapore	Hospital staff	Terrarium workshops and office plant projects enhanced CTN	Reduced stress, positive emotions, better team cohesion
Green Care: Park Prescriptions and Ecotherapy	Westwood et al. (2025)	Mixed-methods: Qualitative interviews and longitudinal quantitative (pilot evaluation)	UK	Youth aged 11–18 with mild/moderate mental health issues	Ecotherapy walks and mindfulness enhanced CTN	Improved emotional regulation, reduced anxiety, social connectedness
	Lord (2023)	Qualitative (ethnography)	UK	Adults	Woodland activities including trail running supported nature engagement	Improved social skills, confidence, mood, and emotional regulation
	Razani et al. (2018)	Randomised trial (quantitative)	USA	Low-income parents and families	Independent park prescriptions increased nature contact	Reduced stress, improved parental wellbeing, stronger family interactions
Structured Nature Engagement and Educational Interventions	Sachs et al. (2022)	Mixed-methods (feasibility study) Quantitative cross-sectional surveys and interviews and focus groups	USA	University students	Weekly park walks + journaling enhanced CTN	Reduced stress, improved mood, reflective wellbeing
	Vert et al. (2024)	Feasibility study (Multi-site) Mixed methods: cross-sectional surveys and interviews	Europe	Adults	“Friends in Nature” programme improved CTN	Increased positive affect, enjoyment of nature, social cohesion
	Kolster et al. (2025)	Quantitative: cross-sectional survey	Finland	Adults	Sustained structured engagement promoted long-term CTN	Long-term wellbeing benefits, mood improvement
	Kolster et al. (2023)	Controlled Trial (quasi-experimental)	Finland	Adults	Described increased opportunities for nature	Reported reduced stress, improved mood

(continued on next page)

Table 3 (continued)

Intervention	Author	Design	Country	Sample/Population	Connection to Nature (CTN) Outcomes	Health and wellbeing (HWB) Outcomes
	McEwan et al. (2019)	Quantitative: Longitudinal	UK	Adults	contact via green social prescribing (gardens/parks) App-based prompts in urban green spaces increased CTN	Improved psychological wellbeing, stress reduction

recounting past experiences of colours, fragrances, weather, and scenery. Taken together, these studies indicate that horticulture and nature immersion may support wellbeing in later life, although they also highlight practical challenges in this type of green prescription for older populations.

Horticulture was also seen in a workplace wellbeing programme in the study by Wong et al. (2025), where it was socially prescribed for staff. Here, staff took part in terrarium workshops, plant-care training, and decorating office spaces with greenery. The aim of the study was to facilitate nature connectedness for staff through horticulture. Through qualitative interviews, participants reported stress reduction, positive emotional states, and enhanced collegiality, while also gaining horticultural knowledge. The authors suggest that these elements are due to having an opportunity to connect to nature through the interventional wellbeing programme. However, barriers such as staff workload pressures and time constraints limited engagement, suggesting that such interventions may require structural support from employers to be effective.

Two studies examined the integration of horticulture within broader social prescribing pathways (Fixsen and Barrett, 2022; Moore and Thew, 2023). Moore and Thew (2023) focused on the role of link workers in facilitating participants' engagement with allotment-based gardening projects, noting that structured guidance enhanced sustained participation and CTN, particularly among individuals with low baseline environmental engagement. Fixsen and Barrett (2022) described workplace and community gardening linked to NHS social prescribing pathways, reporting improvements in mood, social interaction, and wellbeing. This highlights the importance of support and facilitation in enabling participants to navigate practical and motivational barriers.

Across the gardening and horticulture evidence base, CTN emerged primarily through active, routine, and sensory engagement with plants and outdoor environments. The majority of studies were qualitative and did not report quantitative effect sizes, limiting the possibility of inferring causality between the intervention and outcomes, however, participants consistently emphasised the importance of their connection to nature in enhancing wellbeing. Importantly, CTN was not merely an outcome of the activity; in many cases, participants described the experience of 'being in' and 'interacting with' nature as equally important to their wellbeing as the social or task-based aspects of the programmes.

3.1.3. Green care: park prescriptions and ecotherapy

Three of the studies were categorised as 'green care' (Lord, 2023; Razani et al., 2018; Westwood et al., 2025). Green care describes structured, therapeutic nature-based programmes (e.g., ecotherapy, park prescriptions), which emphasise purposeful interaction with nature to foster connection to nature and wellbeing. Moreover, they represent a broad category of socially prescribed programmes that emphasise immersion in natural environments, often through group-based or individual activities designed to enhance CTN. For example, park prescriptions were designed to enable individuals to connect with nature via their local green spaces (Razani et al., 2018), whereas ecotherapy explicitly positions CTN as the central therapeutic mechanism through which wellbeing outcomes are achieved (Lord, 2023; Westwood et al., 2025).

Razani et al. (2018) found that through direct exposure to natural

environments, participants experienced wellbeing benefits of psychological restoration, stress reduction and enhanced mood. In their ecotherapy study, Westwood et al. (2025) reported that social engagement in natural environments, and having that opportunity to connect to nature with others, was beneficial for participants' wellbeing and was linked to a reduction in isolation. Lord (2023) also found that ecotherapy helped participants reconnect with nature in ways that had previously been lost to them, with participants describing sessions as restorative and allowing them to reminisce about childhood experiences of nature. Additionally, Razani et al. (2018) highlighted the importance of consistent and regular time NC in contrast to occasional NC, which, even if it lasted several hours, is insufficient for long-term impact on CTN and wellbeing.

There was evidence that green care interventions can consistently promote CTN and various aspects of wellbeing across diverse age groups and settings. Ecotherapy, in the study by Lord (2023) demonstrated qualitatively that CTN is associated with wellbeing outcomes. Specifically, Lord (2023) described experiences of adults engaging with green spaces in Wales, noting that nature served as a *restorative refuge* and supported mental health. In addition, Westwood et al. (2025) reported that structured ecotherapy – the core element of CTN, for adolescents, including interaction with plants and outdoor environments, led to significant improvements in confidence, independence, social skills, and overall wellbeing, with a large effect size ($g = .812$). This finding highlights the importance of CTN in driving positive health and wellbeing outcomes.

Park prescriptions and outdoor nature-based activities further illustrate not only the role of CTN in promoting health but the effectiveness of a prescription; Razani et al. (2018) compared groups of low-income parents who were prescribed weekly park visits either independently or as part of a group with support. The authors found improvements in stress outcomes at one and three month follow up as well as well as improvement in park visits, loneliness, physical activity, physiologic stress and nature affinity (measured using the 'love and care for nature' validated scale (Perkins (2010)). There were no significant differences between groups, and, contrary to the author's expectations, the group prescribed independent park visits had more park visits per week (mean difference 1.75; 95% CI [.46, 3.04], $p = 0.0085$) than the supported, group suggesting that the prescription to visit the park was as effective as the prescription to visit the park combined with group support.

Across the green care studies, CTN appears to function synergistically with other therapeutic components—such as physical activity, social connection, and sensory immersion, to support HWB. While the physical or social activity in a natural setting is important, the connection with the environment was reported to improve mental health and social benefits. Furthermore, the importance of regular, consistent NC was emphasised, with evidence suggesting that occasional or infrequent exposure may be insufficient for sustained wellbeing gains. Together, these findings indicate that green care interventions may cultivate CTN through immersive, meaningful, and often socially facilitated engagement with natural environments, contributing to improvements in psychological and social wellbeing. Although two of the studies used a qualitative approach, the results of the randomised trial were congruent with this trend, which strengthens the likelihood of a causal association between NC and CTN with HWB outcomes.

3.1.4. Structured nature engagement and educational interventions

Structured nature engagement and educational interventions represent a subset of socially prescribed programmes that combine deliberate learning or skill acquisition with immersion in natural environments. These interventions often involve explicit curricula, guided facilitation, or structured activity sequences designed explicitly for enabling CTN, to enhance wellbeing, and promote social and cognitive development. The five studies retrieved that fall into this criteria illustrate the diversity of structured programmes, spanning individual and group activities, brief interventions, and multi-week campaigns (Kolster et al., 2023, 2025; McEwan et al., 2019; Sachs et al., 2022; Vert et al., 2024).

A consistent pattern across these interventions was the integration of deliberate exposure with reflective processes. For example, weekly park walks paired with journaling (Sachs et al., 2022) and app-based prompts encouraging nature observation (Kolster et al., 2023; McEwan et al., 2019) combined physical or sensory engagement with structured reflection. A key part of these interventions were reminders or reflections prompt participants to notice how they are connecting to nature. This dual approach appeared to impact wellbeing benefits, including reductions in perceived stress, improvements in mood, and increases in positive affect (Kolster et al., 2023; McEwan et al., 2019; Sachs et al., 2022). Participants often described enhanced mindfulness, heightened awareness of natural details, and strengthened emotional regulation, suggesting that the combination of activity and reflection was central for connecting to nature and subsequent wellbeing benefits.

Group-based programmes further highlighted the role of social facilitation in structured nature engagement. The multi-site “Friends in Nature” study (Vert et al., 2024) demonstrated that guided group activities, collaborative environmental tasks, and facilitated discussions enhanced not only CTN but also social cohesion, feelings of inclusion, and motivation to engage. Across these group-based interventions, participants with lower baseline CTN or wellbeing tended to show the greatest improvements, indicating that structured and socially supported approaches may be particularly effective for individuals initially less connected to nature or more vulnerable to stress.

Despite these positive outcomes, these interventions faced common challenges. Access to suitable green spaces, time constraints, and participant motivation influenced adherence and engagement (McEwan et al., 2019; Sachs et al., 2022). Digital or app-based interventions, while offering flexibility, depended on self-directed participation and may be less suitable for individuals less comfortable with technology. Moreover, baseline CTN and wellbeing moderated outcomes, suggesting that tailoring intervention intensity or duration may be necessary to maximize benefits for different populations (Vert et al., 2024).

Taken together, these studies illustrate that structured, educational, and guided engagement with natural environments consistently promotes CTN, which in turn supports a range of psychosocial and physiological outcomes. Whether through group-based programmes, technology supported prompts, or clinical interventions, the evidence suggests that intentional, structured interaction with nature enhances wellbeing, with social and educational components further reinforcing the benefits.

However, it is important to note that most of these studies were correlational (Sachs et al., 2022; Vert et al., 2024; Kolster et al., 2025) so cannot demonstrate a causal associations. McEwan et al. (2019), through pre and post-test follow-ups demonstrated long-term outcomes and Kolster et al. (2023) demonstrated how different interventions led to different outcomes for CTN. In Kolster et al.'s (2023) study guided walks in nature (immersion in a forest with high biodiversity) led to higher perceptions of nature compared with those who took part in a versatile sports group.

Overall, evidence from structured nature engagement and educational interventions indicates that deliberate, guided, and reflective interactions with nature can promote CTN and contribute to a range of psychosocial and emotional wellbeing benefits. These findings suggest that NBSP programmes incorporating reflective or educational

components may be particularly effective in strengthening CTN, especially for individuals with low initial nature connection or greater vulnerability to stress.

3.1.5. Summary of the literature reviewed

Across these categories, interventions varied widely in format, duration, intensity, referral routes, and the degree to which CTN was explicitly incorporated or measured. This heterogeneity reflects the broader diversity of NBSP provision and highlights the importance of examining how CTN operates differently across intervention types. In the sections that follow, we summarise the evidence within each category, focusing on the extent to which interventions generated opportunities for NC, how CTN was described or assessed, and how these factors related to HWB outcomes.

Across the review studies, nature-based interventions delivered through SP consistently demonstrate positive effects on HWB (Baker et al., 2024; Menhas et al., 2024; Robinson et al., 2022; Thomas et al., 2022). CTN was linked to mental wellbeing and mood, health and happiness, global wellbeing, positive affect and reduced anxiety. However, the unique contribution of CTN towards these outcomes could not be isolated because CTN was inconsistently defined, infrequently measured, and often inferred qualitatively rather than systematically assessed. Even where CTN was measured, review authors did not synthesise these findings, limiting insights into CTN's specific role within NBSP. Collectively, the review evidence positions CTN as one of several possible mechanisms, alongside social interaction, physical activity and exposure to nature, all of which may contribute to wellbeing benefits. This highlights both CTN's value and the need for clearer conceptual and methodological approaches to understanding how CTN interacts with other components of NBSP.

Across the intervention studies, while there is considerable overlap, distinct patterns emerge in relation to CTN and wellbeing outcomes. Gardening and horticulture-based programmes (Aughterson et al., 2024; Evans et al., 2019; Fixsen and Barrett, 2022; Gorenberg et al., 2023; Howarth et al., 2018, 2021; Moore and Thew, 2023; Wong et al., 2025; Wood et al., 2022), typically cultivate a gradual but sustained sense of connection, rooted in the routine care of plants and the relational experience of nurturing growth. These interventions appear especially effective for supporting recovery, confidence, and social inclusion among people with existing mental health challenges or those in institutional settings. This category had the most studies, suggesting it to be a popular form of green social prescribing in research. Where thematic analyses was conducted, CTN was well-described, suggesting that being in nature through practical means of gardening and horticulture are the group of interventions that has the strongest links to CTN.

Green care interventions (Lord, 2023; Razani et al., 2018; Westwood et al., 2025) offered more immersive and/or structured therapeutically oriented nature engagement, typically emphasising CTN explicitly. These approaches are effective at reducing stress and emphasising community aspects. However, the long-term effects of these require further study, particularly post intervention. Notably, there are only three studies in this category, so comparisons should be taken with caution, but they indicate clear avenues for future research, particularly in understanding how structured therapeutically oriented nature contact shapes CTN over time.

Structured nature engagement and educational interventions explicitly designed to stimulate reflection and generate an intentional awareness of the natural environment into the intervention (Kolster et al., 2023, 2025; McEwan et al., 2019; Sachs et al., 2022; Vert et al., 2024). In the studies we found, this included journal prompts or reminders through an app. These interventions build CTN by emphasising both the experience of nature and the reflective processes surrounding it, integrating cognitive and affective pathways into wellbeing outcomes. Group formats often enhanced social belonging and motivation, with individuals reporting the largest gains when baseline CTN or wellbeing was low. However, many studies relied on correlational

designs, and practical barriers such as access, time constraints, and reliance on digital tools were commonly noted. However, their successful use of different tools such as journaling and an app indicates scope for innovative approaches to support CTN in NBSP.

Together, these complementary approaches illustrate multiple pathways through which CTN may support wellbeing. While the mechanisms vary, from routine care of plants to immersive therapeutic experiences, to reflective engagement, the collective evidence suggests that CTN can be cultivated through diverse forms of nature contact and may contribute meaningfully to HWB within NBSP. At the same time, heterogeneity in definitions, measurement, and intervention design highlights the need for more systematic investigation of CTN's role and its interaction with other components of NBSP.

4. Discussion

4.1. Connection to nature and health and wellbeing

The evidence reviewed connection to nature (CTN) was consistently associated with psychological, emotional, and social benefits, with benefits observed across diverse populations including children, adolescents, adults with long term conditions, older adults, and individuals in care settings.

These findings suggest that CTN may operate as an important pathway through which nature engagement influences wellbeing, aligning with broader literature that links CTN to both hedonic and eudaimonic wellbeing outcomes (Ryan and Deci, 2001). CTN appears to be malleable meaning that interventions may be able to support increased health and wellbeing HWB benefit through supporting CTN. Interventions that intentionally or indirectly supported CTN, such as gardening, ecotherapy, and structured nature noticing, often demonstrated improvements in mood, stress regulation, confidence, and social connectedness. Importantly, CTN appeared to strengthen not only the emotional experience of being in nature, but also participants' motivation to continue engaging with natural environments beyond the intervention period, highlighting potential longer term effects.

These results indicate that CTN should be given central consideration in the design, delivery and evaluation of NBSP interventions. This growing body of evidence supports a shift in focus from merely providing access to green spaces to fostering deeper, more meaningful connections with nature in NBSP. Embedding CTN within NBSP may therefore help maximise long-term impact by encouraging participants not only to access green spaces but also to develop enduring, meaningful relationships with nature.

CTN research has demonstrated that benefits even for people who have limited mobility and frailty (Kolster et al., 2025) and from nature are not solely derived from physical activity outdoors. While CTN related benefits were noted across varied demographic groups, the form, ease, and expression of CTN differed between individuals. Providers should be mindful that there is not a 'one size fits all' and CTN may not have universal appeal. While beyond the scope of this review, sensory and emotional connections, engagement with natural sounds or views, and even indoor nature-based experiences can contribute meaningfully to wellbeing. Thus, there is an opportunity to reframe CTN as an inclusive, adaptable component of SP. There was also an array of ways in which individuals engaged with nature and their perception of connecting with it. For example, some reported it to be a tranquil, mindful experience, while others engaged in nature with a more actively such as through trail running, or active reflection through journaling. Thus, interventions may need to be tailored for specific populations and demographic groups.

The evidence also suggests that CTN frequently works in synergy with other therapeutic components, including social interaction, physical activity, mindfulness, and pro-environmental behaviour. CTN should therefore not be viewed as the sole aim of NBSP interventions but as one of several interlocking experiences that collectively support

wellbeing. Recognising this interplay will be important for designing interventions that reflect the complexity of NBSP and the multiple mechanisms through which nature engagement may promote HWB.

4.2. Policy and systemic implications

As social prescribing is increasingly recognised as an important policy response to the growing need for health and social care, the literature provides limited critical examination of how CTN is integrated into policy and practice, partly because most studies report positive outcomes and fewer explore system level barriers. These barriers include unstable funding, transport and participation costs, uneven geographical coverage and access to nature, limited referrer awareness of the local offer, variable accessibility for diverse groups, and under-measurement of CTN within service design and evaluation (de Bell et al., 2024; Melam et al., 2025; Rafiei et al., 2025). To fully realise the potential of CTN within SP, systemic changes are required, including sustainable funding, workforce investment, cross sector collaboration, and equitable access to nature (Calderón-Larrañaga et al., 2024; Hassan et al., 2023). One way to facilitate this is through transitioning from short-term grants to long-term, stable funding is critical for service sustainability (Bertotti et al., 2018; Kenyon et al., 2023; Khan et al., 2022; Sands et al., 2023).

Coverage of SP and NBSP remains patchy and, geographically, access to nature is unequal, reflecting broader inequalities (de Bell et al., 2024). Applying principles of proportionate universalism, where support is scaled to local levels of disadvantage, could ensure that NBSP prioritises groups with the lowest access to green space and the highest need (de Bell et al., 2024; Marmot, 2010). By providing targeted NBSP for vulnerable groups, NBSP can help to overcome inequalities in access and provision (de Bell et al., 2024).

Referrer knowledge may also play a part in facilitating access to NBSP that supports CTN. Even where schemes exist, potential referrers often unaware of local offer which reduces their capacity to make referrals into schemes that could help people (Melam et al., 2025). Recent qualitative work indicates that some link workers exclude naturebased options, perceiving clients as "not ready," which limits access despite evidence that CTN benefits extend to people with mobility limitations and frailty (Brown and Aylett, 2025; Sumner et al., 2020). Strengthening CTN within NBSP, through intentional design, training for practitioners, and consistent measurement, may enhance HWB outcomes and support equitable access to the psychological and social benefits of nature.

4.3. Methodological limitations and future research

Much of the evidence synthesised in this review is correlational making it more difficult to ascertain causality in the association between CTN, NBSP and HWB. Although several experimental and quasi experimental studies were identified, no randomised controlled trials were found. While randomised controlled trials are often considered the gold standard in healthcare research, they may be neither feasible nor desirable within NBSP, where complex, community-based interventions are difficult to standardise. Nevertheless, future research would benefit from stronger methodological designs, including longitudinal studies with extended follow-up, pragmatic randomisation across intervention types, and mixed-methods approaches capable of capturing both experiential and measurable components of CTN. Future research should also consider whether individuals continue to connect with nature post interventions like ecotherapy or park prescriptions.

CTN was defined and measured inconsistently across studies making comparisons between outcomes difficult, although the use of quantitative surveys dominates the literature measuring CTN using self-report scales. Such standardised, validated measures may allow comparison across programmes and regions when applied consistently and it may be possible to measure more long-term effects of nature connectedness, by administering quantifiable measures (i.e. the scales identified) at

different time points of an intervention. Qualitative research and newer scales or methods may touch on nuances of CTN that are missed from quantitative scales and qualitative measures have been developed more recently which include non-westernised concepts of CTN. NBSP research should consider multiple types of data collection measures. Assumptions about what CTN is and how it can be measured profoundly affects what outcomes can be found. More nuanced tools can improve intervention tailoring and reveal effects that standard metrics may overlook and result in further HWB improvements.

Moreover, few studies distinguished between state and trait CTN, despite evidence that these components may differ in their responsiveness to NBSP (Hatty et al., 2020). NBSP interventions should consider the differences in state and trait CTN, and whether the programme aims to capture immediate or longer term CTN or both, and use measures that can capture these subtle differences reflect these different types of CTN. Addressing these gaps will require more systematic use of validated CTN measures, clearer definitions within intervention protocols, and research designs that test CTN explicitly as a target, mechanism, or outcome.

The relationship between the natural environment and human health and wellbeing has cross-disciplinary interest with calls for greater collaboration between fields (Craig and Prescott, 2017; de Bell et al., 2024). Breaking down silos between health, environment, and community sectors can enhance funding flows and service integration. In social work, for example, DiLauro (2024) recommends that social workers learn more about the benefits of nature and explore their clients' relationships with nature. Given this cross sector relevance, CTN can serve as a common organising mechanism across governance structures. This aligns with integrative frameworks such as the One Health model (Kenyon, 2024), which recognises the interdependence of human, animal, and environmental health. CTN thus has the potential to bridge public health and sustainability goals. Moreover, embedding CTN within NBSP can leverage this impact contributing to individual and planetary goals such as climate change mitigation strategies and carbon sequestration (de Bell et al., 2024).

This paper did not explicitly examine differences for different demographic and socio-cultural groups in relation to CTN. Evidence suggests demographic, socio-economic, and geographic factors shape CTN, and more research is needed for vulnerable groups (Leavell et al., 2019). Also, from a life course perspective, fostering CTN early in life may be especially beneficial. Childhood and adolescence are critical periods for the development of emotional regulation and self-concept, and exposure to nature during these formative years has been associated with better psychological functioning across the lifespan (Tillmann et al., 2018; Vella-Brodrick and Gilowska, 2022). Moreover, those who are exposed to nature in childhood are more likely to seek out nature and its benefits into adulthood (Barrable et al., 2024). As such, research into supporting CTN through NBSP for children and young people could be particularly important for future HWB outcomes.

Finally, the evidence presented in this review is geographically limited to the UK and middle/high income countries. As such, the conclusions drawn can only be considered in these contexts at the expense of knowledge and evidence from other places. Nonetheless, it raises questions as to whether NBSP is being utilised in other countries. Future research should consider the wider context and potential of NBSP. The meaning of "nature" and "nature connectedness" differs across countries because people's relationships with nature are shaped by their cultural context, local environments, and past experiences. In some settings nature is viewed as restorative and supportive, while in others it may be associated with risk or discomfort. Understanding these individual and geographic differences is therefore essential for integrating nature into social prescribing.

5. Conclusion

The potential of a connection to nature (CTN) to leverage

improvements in health and wellbeing represents an exciting avenue for social prescribing to develop and innovate in what is currently an underexplored avenue. Embracing the potential of CTN to support health and wellbeing (HWB) could form part of a solution to contemporary challenges such as increasing rates of loneliness and isolation and an ageing demographic and the burden of mental health. As health systems struggle to cope with unmet health needs, the need to explore such possibilities has never been greater.

This scoping review examined how CTN is conceptualised, measured, and integrated within nature based social prescribing (NBSP) interventions, and how it may contribute to improvements in HWB. Across diverse NBSP models, including gardening and horticulture, green care, and structured nature engagement, CTN consistently emerged as a meaningful component of participants' experiences, even when it was not explicitly measured. The evidence suggests that CTN can be cultivated through varied forms of nature contact and may serve as an important pathway through which NBSP supports psychological, emotional, and social wellbeing.

Definitions and measures of CTN vary widely, and many studies rely on qualitative accounts rather than validated tools. As a result, the specific contribution of CTN to wellbeing cannot yet be quantified or differentiated from other mechanisms such as social connection, physical activity, or skill building. Addressing these gaps will require more systematic use of conceptually aligned CTN measures, clearer articulation of CTN within intervention design, and methodological approaches capable of capturing both short-term and sustained changes in CTN.

Despite these limitations, the evidence highlights significant opportunities. NBSP offers a practical and scalable means of supporting meaningful engagement with nature, and with appropriate support, CTN can be intentionally embedded within service delivery. Strengthening CTN within NBSP, through practitioner training, equitable access to green spaces, sustained funding, and strengthened cross sector collaboration, has the potential to enhance HWB outcomes and extend the reach of nature-based care. In doing so, NBSP can contribute not only to individual HWB but also to broader public health and environmental goals.

Overall, this review highlights the importance of giving greater attention to CTN within the development, evaluation, and implementation of NBSP. By integrating CTN as a core consideration rather than an implicit by product, NBSP has the potential to deliver more impactful, equitable, and sustainable nature-based support for diverse populations.

Table 4: List of acronyms

Acronym	Definition
CTN	Connection to nature
HWB	Health and wellbeing
NBSP	Nature based social prescribing
NC	Nature contact
SP	Social prescribing
UK	United Kingdom

Ethics statement

This work used only secondary data and so ethical review was not required.

CRedit authorship contribution statement

Anna Kenyon: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Supervision, Writing – original draft, Writing – review & editing. **Trishna Chauhan:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Kelly**

Reynolds: Data curation, Formal analysis, Writing – original draft. **Sam Pywell:** Conceptualization, Funding acquisition, Writing – original draft. **Ruqaiya Shaikh:** Data curation, Writing – review & editing. **Aderonke Ajiboye:** Data curation, Methodology.

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Data availability

No data was used for the research described in the article.

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